CONSERVATION INNOVATION GRANTS
Final Report

Grantee Name: Wildlife Habitat Federation
Project Title: Demonstrate the Conservation and Producer-Based Benefits of Marketing Restored Grasslands for Seed, Renewable Energy Generation, Hunting/Eco-Tourism and Grazing
Period Covered by Report: December 1, 2009 through September 23, 2010
Project End Date: 9-23-2010

Summary of Work Performed: The long-term objective of this three-year project was to create native grassland ecosystems of sufficient size (3,000-5,000 acres) and of enough genetic diversity to sustain quail and other wildlife species. Any success in reaching this goal can be measured in the diversity of wildlife and in the increased quality and quantity of all natural resources.

Three innovative activities were pursued to encourage or create incentives for the restoration of native grass: 1) preserve remnants by creating a market for native grass seed and mulch hay, 2) determine the market potential for biofuels and 3) create more opportunities for hunting, eco-tourism and for livestock producers. A prerequisite for accomplishing all activities was the development of a successful native grassland restoration model, which became known as a wildlife corridor. Such a model has encouraged landowners to adopt practices to counter activities that cause land fragmentation, soil degradation, water depletion and air quality decline. Landowners are more willing to incorporate necessary practices if they can be shown that other landowners or a landowner cooperative, the Wildlife Habitat Federation (WHF), has prevailed in restoring native habitat and, in turn, is gaining a positive response for the targeted wildlife species. Leading by example and testimony has always been the best approach to galvanize support.

According to Texas A&M University, approximately 1,000 new farms and ranches were established each year between 1970 and 2003 while the total area devoted to agricultural uses declined by almost 3 million acres. This trend is expected to continue. Most of these new-to-the-land owners plus remaining born-to-the-land ones have either not understood the need to restore habitat or been unable to take their land out of production while paying the costs of brush removal, cross-fencing pastures, removing invasive

herbaceous and woody species, doing prescribed burns and replanting native grasses. Add to this, the incentives to over-stock and over-graze being caused by the current appraisal system, a reduced staff of state and Federal employees able to assist (NRCS personnel in Texas has been cut in half—from 1,500 to 750) and reduced support from legislatures that represent a growing uninformed pubic (eighty-three percent of Texans now live in urban areas) .

All activities in this CIG program were severely hampered by two years (early 2008-early 2010) of the *most severe drought* in recent history for this part of Texas and during most of 2009 this was the worst drought in the nation. This drought caused cattle producers to over-graze most pastures and to over-harvest native grass for livestock hay; however, many landowners were made more aware (at least during the period of the drought) of the need to have more drought tolerant grass. Others became interested in planting native grass and restoring wildlife because of the Wildlife Habitat Federation's (WHF) success in establishing a 7-mile wildlife corridor, in its ability and willingness to assist member landowners and others with habitat related activities and generally due to WHF's proof that it is not just a talker but a real implementer. This surge in interest was demonstrated by the following:

- WHF services daily calls from landowners, ranch managers and others seeking technical, financial and on-site assistance. In response to these calls and to monitor restoration efforts, WHF visits at least one site weekly. Ranches visited to date account for at least 30,000 acres. To handle such requests, WHF developed a new generic user-friendly website (www.hmrtexas.org), which lists all organizations, equipment and other resources needed by those interested in habitat restoration. WHF is also developing and will publish a Native Grass Restoration Guide for landowners and those servicing them that Texas AgriLife Extension Service (see attachment) wishes to co-author.

- In spite of the 2008-09 drought and frequently imposed burn bans, WHF conducted prescribed burns at 14 sites. One of these burns entailed getting county authorities to grant a waiver to a burn ban, which opens up the possibilities for increasing the number of burns in future years. At least 30 miles were plowed to prepare fire lanes.

- WHF received donations from several entities, like Texas Parks and Wildlife Department, Sands County Foundation, Houston Chapter of

Quail Coalition, Audubon Texas, Houston Safari Club, Magnolia Trust, Hammon Foundation and others to purchase equipment (Truax no-till drill, burn trailer, Donahue equipment trailer, Brillion cultipacker) and to cover operational expenses.

- More than 500 acres of native grass was planted with a no-till drill on ranches representing more than 5,000 acres. The first test plots of native grass were planted with mulch hay. Square bales of hay were spread on 30 acres at a rate of 30-40 bales per acre with a Finn B70 mulch spreader. Round bales of native grass hay were spread on 20 acres using a Veneer round bale spreader or simply unrolled and spread by hand or with a tedder rake. This hay was harvested from local remnants of native grass.

- All of the above acres planted in native grass had to be prepared prior to planting, which required at least one application (normally two applications) of herbicide to control invasive grass or weeds. Therefore, herbicide was applied to more than 1,000 acres.

- Cover crops were planted on 50 acres where mulch native grass hay was spread to improve soil organic content and control invasives. Soil tests revealed that the organic content was low (0.2 percent or less) on over-grazed fields of exotic grass versus 1 percent or higher on native grass fields.

- In addition to the 30 miles of fire lanes plowed, an additional 200 acres were tilled for planting cover crops or for preparing land for spreading mulch hay.

All of the above activities were generated in an effort to achieve one or more of the following goals:

Seed marketing program—To encourage the preservation of native grass remnants, WHF sought to develop a market for seed or mulch hay versus continuing to use these relict tracts for grazing or for harvesting livestock hay. Eighteen native grass remnants representing 215 acres were identified within a 50 mile radius of Cat Spring, Texas. In spite of the 2008-09 drought, rain in the spring and summer of 2010 enabled WHF to harvest about 1,500 pounds of native grass seed during October-November 2010 from three of these remnants. Native grass hay was baled from four other remnants.

A tetrazolium test was first conducted on the seed harvested in each of the three native grass remnants harvested for seed to determine if harvesting them was worthwhile. The little bluestem sample had a germinable seed rate of 77-83 percent. Yellow indiangrass had a 76 percent germinable rate. This test is only an indication of pure live seed potential but verified that harvesting would be justified.

Full germination tests on three fields were then run during the harvesting process and they revealed pure seed percentage rates of 30.5-65.9 and germination rates of 18-65.9 percent. The harvested native grass seed was dried, tested, bagged and stored and will be delivered to major commercial seed companies for cleaning and processing in late February 2011. The price received from these seed companies will help to determine the feasibility of using this seed marketing program as an incentive for encouraging producers to preserve relict tracts. The ability to provide locally sourced seed and the potential for preserving a wide array of genetic material are also major considerations for marketing this seed.

Approximately 1,200 square bales and 50 round bales of native grass mulch hay were harvested from three relict tracts. A Finn mulch spreader was used to distribute square bales on prepared seed plots representing about 40 acres during January-February 2011. A rate of 40+ square bales is recommended so as to get 20 native grass seed/forb seed per square foot. The amount distributed was reduced to 30 bales per acre since this rate easily produced 50+ seed per square foot. The large bales were either unrolled and spread with a tedder rake or blown out with a Veneer big bale buster on about 30 acres. A cultipacker or roller and cattle hoofs were used to pack the seed beds prior to and after planting. The results from these planting methods cannot be assessed until at least one full growing season has elapsed.

Many of the native tracts that WHF wished to harvest for native grass were not suitable. In many cases these relict tracts were cut three or more times at a lower than desired level before WHF was able to convince some producers to let the grass mature out. This practice of scalping the landscape of all grass also allowed invasive species, like Johnson grass or old world bluestem, to invade. One old world bluestem variety (KR-2), which was reportedly planted by Texas Department of Transportation (TXDOT) along roadways, has begun to invade hay meadows, including native grass sites that were cut too close for livestock hay.

The Texas Parks and Wildlife Department (TPWD) has reportedly asked TXDOT to refrain from further plantings of KR-2 since this invasive variety has now become a scourge to the countryside and is invading at a rapid rate from roadside across fence lines to hay meadows and pastureland. The Texas State Conservationist has stated to WHF and others that getting TXDOT to plant more natives versus exotic grasses in road beds is limited by the supply of native grass seed. Producing native grass seed is therefore a huge marketing opportunity.

WHF has a pending proposal to TXDOT for restoring a section of Hwy. 36 between Bellville and Sealy, Texas in native grasses. WHF will also seek to conserve the adjoining railroad right-of-way. This highway is being widened to four lanes in on the northern edge of the Texas Coastal Prairie Ecological Region and passes through the northeastern edge of the largest eastern gamma grass field in the U.S.

Due to the long term degeneration of remnant prairie grass meadows, WHF was forced to lease more than 100 acres (some for two years) so as to preserve enough area for seed or seed hay and keep the marketing program on tract, to maintain the generic diversity that exists in these remnants and to keep invasive grasses from intruding. Any success in increasing the number of producers willing to participate in the seed marketing program and continue participating will now depend on WHF's ability to prove that it can harvest, dry, clean, process and market the seed correctly. If feasible, WHF will continue pursuing this project following the end of the current CIG contract.

One native grass seed harvester has been built through donations from WHF and its collaborators (Audubon, Texas Quail Coalition and TPWD) and another was borrowed from USFWS to harvest the native grass seed. Two commercial seed marketers are willing to clean and process the seed and are willing to consider jointly marketing the seed. A big hurdle was making sure the seed was harvested at the right stage of maturity (i.e. half of the seed already mature) and had a high enough germination rate to justify the cost of getting it to the marketplace. All sites were appraised on a weekly, if not daily, basis to determine stage of maturity.

In an effort to support WHF's seed marketing effort, officials with the 10,500 acre Attwater Prairie Chicken NWR will allow WHF to harvest seed there in future years. One commercial seed company that gets its coastal seed mix from Attwater PC NWR did not harvested any seed from this large

site during falls of 2008 and 2009 as droughts limited seed production. It did harvest seed there again in November 2010.

WHF was able to harvest mulch hay from two native grass tracts in 2009 and two different ones in 2010 for seeding test plots. The tracts harvested this season that were not overgrazed or cut for hay prior to harvest.

Although no locally harvested seed was processed in time to plant it this season, both square and round bales of native grass mulch hay was spread on approximately 40 acres. Some of the seed tested in this mulch hay had very high germination rates (up to 69 percent). Well prepared seed beds (void of invasives) were prepared [see attached Native Grass Restoration Guide which was developed by WHF] for planting this locally harvested seed/seed hay. Planting where species like Bermuda grass or KR-2 bluestem are not controlled is asking for failure and frustration. To get the landowner to prepare such a seed bed becomes a feat in itself. Also, it is much easier for the landowner with an EQIP contract to plant a prepared seed bed with an invasive species, like a hybrid Bermuda grass or Klein grass, since using locally harvested native seed requires more effort to plant the seed, more testing to verify germination and quantity of pure live seed and more patience and persistence to get a good stand.

Using native grass for ethanol or biofuel [see WHF's 6th Semi-annual report for additional information on this activity]—According to Primenergy, LLC representatives, the development of a biofuels operation requires that "Five-F's" dilemma be resolved: "Fuel/Feedstocks/Facility/Feasibility/Finance". Although studies indicate that native grasses are suitable feedstocks, the feasibility of using native grasses for producing biofuels for steam energy or ethanol in the target zone is largely limited by the minimum tonnage and therefore the acreage required. For example, a 20 megawatt power plant (based on 6,500 btu's/lb fuel, 20 percent moisture) would require a minimum of 300,000 tons of feedstocks/year. At 10 tons/acre and one cutting/year, 30,000 acres would be needed each year. A financing entity will likely require a ten year fuel supply be available; therefore, no less than 300,000 acres would have to be committed by producers to assure long-term quality, quantity and price. Some suggest that 500,000 acres is a more likely area needed during this 10-year span.

Since the amount of native grass in the target area is less than 1 percent of the amount required, it must initially be viewed as a component in a multi-crop mix to provide the 30,000 ton/year minimum amount needed in the

target zone to attract such a plant, The lack of seed and proven techniques for establishing it are also lacking. These constraints must continue to be addressed before native grass can be a serious contender as a major source of feedstocks.

Coal-fired power plants, like the Lower Colorado River Authority (LCRA) facility in Fayette County will probably not modify its facility in hopes that enough native grass would ultimately be produced as a direct substitute for coal. A larger production base would first be required. LCRA or other energy suppliers would consider a biofuels plant for producing energy from a variety of crops if enough supplies can be amassed within a fifty mile radius of the facility. Grain sorghum, especially new high-biomass forage types being developed by Ceres in conjunction with Texas A&M University, seem to have more potential for initially meeting the minimum feedstocks requirement. Rice and corn stubble would also be suitable.

Current low prices for natural gas have temporarily made cellulose-based sources for producing steam-based energy less attractive. The enforcement of tighter standards regarding drilling practices, namely those aimed at protecting ground water supplies are, however, creating more interest in bio-fuel energy sources. Clarification of such rules, the amount of subsidies available and the one-year extension of the thirty percent investment tax credit on capital investment past the previously established December 31, 2010 deadline provide additional incentives.

Natural gas supplies do not have a direct impact on the demand for sources of bio-fuels, like native grass, to produce ethanol. Companies will continue to seek ways for meeting greenhouse gas standards required to reduce carbon dioxide going into the atmosphere. Native grasses are one of the best plant sources for sequestering carbon.

Projects have been announced for building several plants in East Texas that combined are reportedly capable of producing 330 megawatts of steam-based energy from cellulosic sources. These plants are to be built in areas that have large acreages of pine timber for providing a dependable supply of wood waste (e.g. chips). A main constraints to this source of cellulosic energy is the difficulties involved in leasing smaller tracts of timberland; crop based agricultural tracts tend to be larger.

Creating opportunities for hunting, eco-tourism and livestock producers-- Efforts to restore native grass on the 7-mile wildlife corridor and in

neighboring areas became the best means for proving the impact of restored habitat on wildlife. For example, Texas A&M University found 31 species of upland birds on one ranch where restoration efforts have been successful. Based on whistle counts and actual sightings, quail numbers more than doubled. Mottled ducks nested on one pond where native vegetation had been restored. Deer, rabbit and other game is now more abundant on the wildlife corridor. Such a response in wildlife numbers is encouraging other landowners to consider similar practices on their ranches.

Numbers of quail, a prime indicator species for determining the health of the land, rebounded by the 2010-11 season in areas where native grass and forbs were protected during the drought seasons of 2007-08 and 2008-09. The ability of quail hunters to find a covey of quail on the average of every 30 minutes on those areas where habitat was protected has increased interest in continuing such practices. Texas Parks and Wildlife Department was so encouraged by these results that it provided additional support to a few landowners that were willing to apply appropriate boots-on-the-ground habitat restoration activities. Due to increased demand by hunters and others wishing to use such areas for running bird dogs or for others to just see or hear wild things, like monarch butterflies, songbirds or rabbits, more landowners are willing to continue or initiate such practices. The demand by hunters to join hunting clubs that lease properties where wildlife has increased in response to WHF restoration efforts now even farther exceeds supply of memberships available.

Where native grass has been effectively restored and stocking rates reduced in the wildlife corridor, producers have used little, or no. hay, for feeding livestock even during recent droughts. These restored pastures in many instances adjoin over-stocked improved grass pastures where producers have had to feed hay during the summer months. Feeding hay in the summer, in lieu of reducing cow herds, is asking for trouble and negatively affecting the profits of those that continue this practice. Cattle on ranches where grazing has been depleted must be fed continually until new grass emerges in the following spring. Many ranchers, especially those born to the land and many new land owners, are still however reluctant to change to natives. Many are still under the impression that pastures should be grazed or shredded to maintain a low uniform height; they simply do not understand the attributes of having knee-high or higher tall grasses that provide thermal cover for livestock and wildlife and for succulent annuals/perennials that support all animal species during the winter months. They will shred

pastures that have any forbs (weeds), even if the forbs have already dormant and have dropped their seed.

In those pastures in the corridor where the stand of native grass was poor or in adjacent areas outside the corridor where introduced or "improved" grass was overgrazed or cut too often for livestock hay, weeds, especially croton (dove weed) became a more dominant species in 2010-11 following two years of droughts. Grasses in these areas were unable to compete with more deep-rooted weeds for moisture and nutrients. This benefitted recovering upland wildlife bird species as these forbs provided brood cover and insects and later produced an abundance of seeds for food.m Another positive result was that several landowners greatly reduced their stocking rates. Lastly, more are willing to consider native grass since high prices for inputs (namely fertilizer, machinery, hay) makes raising livestock less, or not, feasible.

Those areas where native grasses/forbs have been revived have attracted many visitors. About 250 persons have visited WHF's wildlife corridor; this included six field trips and dozens of visits by landowners and others interested in native plants and wildlife. Several field trips are scheduled for the next few months. WHF has become the best example of native grass and upland bird restoration in this area of Texas and possibly the best example of what can be accomplished by a landowner cooperative. The fact that this project became a front page news story in the Sunday edition of the Houston Chronicle underlines the desire of the public to hear about and see projects that preserve native plants and wildlife.

Results, Accomplishments and Lessons Learned: Landowners will follow other landowners that have persisted in restoring native grass. This has been evidenced by the fact that WHF continues to receive multiple calls weekly for advice and seeking site visits. Some of these calls are based on referrals from both government entities and private organizations that deal with habitat restoration. Some of the best referrals are from landowners who met others who have witnessed or experienced the impact of these activities.

WHF's project manager is continually asked to address producers and others at meetings, field days and conferences throughout the state to provide testimony on the virtues of native grass and techniques in restoring them. Due to the information gained and results obtained from this project, WHF's project manager is able to be a more useful member of NRCS' Texas Wildlife Subcommittee, Texas Parks and Wildlife Department's Upland

Bird Advisory Committee and the Coastal Prairie Partnership's Restoration Subcommittee.

Out of default, this project is proving to be the only good model in this region and the premier landowner cooperative for all of Texas for demonstrating the benefits of drought-tolerant natives for both livestock and for restoring upland birds. For this reason, WHF continues to host about four large field tours annually for organizations like the Coastal Prairie Partnership, Texas AgriLife Extension, Texas Parks and Wildlife Department and the Texas Quail Coalition. Participants are normally livestock producers, master naturalists and wildlife conservationists. WHF continues to host individual landowners monthly who want to see results prior to embarking on restoration activities on their own ranches. Without seeing such results, some would likely not pursue such a long-term program and many would not persist after discovering how difficult the process can be. Most want instant results and must be educated as to the patience and persistence needed.

This project supports the premise that boots-on-the-ground activities are the best means for restoring wildlife. Furthermore, results from this project give added weight to the Noble Foundation's argument that the most important practices for restoring native grasses are: 1) prescribed burns, 2) letting the land rest and 3) proper grazing. Most landowners want to do what they consider most obvious, like planting, plowing and controlling predators or what is oftentimes easier and provides more immediate visual change. Letting the land rest by removing cattle to determine what plant species exist and building fuel for burning takes more patience but this is a prerequisite for all other activities, like plowing and planting.

Due to recent droughts plus the increased cost of fertilizer and other inputs, the desire to raise livestock without having to feed hay, the interest in having more wildlife and more concern for conserving the land have spurred landowner interest in restoring native grass. Fortunately, WHF was formed at an opportune time for addressing these needs. Habitat/wildlife management plans have been prepared and/or assistance continues to be provided to landowners for restoring native grasses and forbs on ranches representing more than 11,000 acres. The following has been accomplished in servicing these landowners:

- Good stands of native grass have been re-established on approximately half of 500 acres planted to native grasses, on

ranches representing about 3,000 acres both within and outside the wildlife corridor, using both the no-till drill and mulch hay. [About 150 acres (30 percent of the total area planted) representing 1,000 or so acres was sown outside of the corridor.] This percentage of success is better than expected considering the droughts encountered.

  - Sites sown with locally-sourced little bluestem and splitbeard bluestem seed and with Alamo switchgrass seed purchased from a commercial company produced the best stands. These were also areas where the seedbed was re-packed following planting. Those areas planted in eastern gamagrass, big bluestem, indiangrass and sideoats grama emerged more slowly, sometimes more than two years later.

  - Good stands of brownseed paspalum, broomsedge bluestem, sand or plains lovegrass, gulf muhly and bushy bluestem were revived by resting, managed grazing and burning, not by planting.

  - Due to droughts, low organic matter or other unknown factors, poor stands occurred on ridges with lighter soils.

- WHF harvested about 1,500 pounds of native grass seed that will be cleaned, processed and marketing through a seed dealer or used to restore local sites. The profit ultimately received on this seed versus the cost of harvesting it and having it processed will determine the feasibility of marketing native grass in future years and using this as an incentive for encouraging landowners to preserve remnants of native grass.

- The user-friendly Native Grass Restoration Guide (attached) is founded on information gleaned from others but based more on lessons learned from this project. It is primarily aimed at restoring land that has been invaded by bermudagrass and bahiagrass.

- The following observations are based on empirical evidence obtained from this project, largely from work associated with

the establishment of the wildlife corridor. Not all should be considered as a given:

- Planting in late spring appears to be more of a gamble than in October or February due to the potential for drought during subsequent months; however, some good stands were obtained when summer rains were forthcoming or where more humus existed.

- A firm seed bed prior to planting is essential. Repacking the area planted is also advisable for obtaining better stands, especially in sandier soils. In spite of having press wheels on the planter, better stands were evident where tractor wheels or other equipment packed the soil during and after planting.

- Better stands in one area of the corridor versus another were not necessarily based on different practices or different weather. Although a field was treated with herbicide and planted at the same time, mixed results at the same site must therefore be attributable to different soil types, organic content (microbial activity) or other non-determinate factors.

- Good stands often occurred in areas where heavy brush was removed. This was attributable to seed that was already in the soil, not seed that was planted.

- Treating bahiagrass and bermudagrass one time with a minimum of 4+ quarts of glyphosate and then planting worked in some fields but not in many. Dual applications of herbicide (one in late spring and the second in late summer or early fall) with intermittent cover crops to improve humus may be a better route to take for controlling invasives.

- Good stands of bluestem varieties seem to control bermudagrass and bahiagrass better than switch grass although the latter seems easier to establish.

- Blackwell switch grass does not grow as tall and may be a more appropriate variety than Alamo for wildlife cover.

Alamo may however be a better variety for biofuel production.

- The planting of forbs or escape cover (e.g. sand plums) should be delayed until native grasses are re-established. Herbicides, like Cimarron Plus, used to control bahiagrass, not injure natives, will also kill forbs. Disturbing the soil usually creates sufficient forbs in this zone, especially wooly croton, which is an idea food for most upland birds and is not eaten by cattle.

- Water runoff from normal rains will be reduced significantly when natives are re-established as water will be absorbed into the soil. Stock tanks surrounded by native grass that are replenished by rainwater therefore take longer to fill.

- Livestock and all forms of wildlife (including white-tailed deer) tend to frequent native grass pastures more often during cold and windy days. Native grass provides thermal cover to protect them and even other plants for cows to eat. Succulent winter annuals and perennials grow in between clumps of native grass clumps that also seem to protect them from harsh winds.

- Heavy seeding rates seem to work better than lighter ones. It seems better for native plants to compete with one another than with invasive grass.

- Areas burned attract birds immediately after fires subside. Perhaps they can more easily find seeds or insects after the thatch is removed. Quail roost in burned areas, perhaps due to the warmth provided by the blacked areas absorbing solar energy.

- When dormant, sand plums are not adversely affected by prescribed burns in the winter. They tend to spread after being topped out with fire. Fire can be used to reduce and keep yaupon in check.

- When planting native grass with mulch hay, check the number of seed per square foot to determine how many

bales to use per acre. When a high volume of viable seed exist in a bale of hay, 30 or fewer square bales (or equivalent large round bales) may be needed to obtain 20 seed per square foot.

- Do not wait for all of the seed on mulch hay for seeding to mature before cutting. Cut it when half is mature as it will continue maturing while drying on the ground. Let the grass stems become brittle before baling.

- Using a bale buster to spread mulch hay is very labor intensive and requires precise control of invasives and a well prepared seed bed. Although not enough time has elapsed on sites planted this season to determine whether this practice is justified, Attwater Prairie Chicken NWR had limited success restoring one pasture seeded with native grass mulch hay. Attwater unrolled round bales of hay on a prepared seed bed which resulted in a fairly good stand of native grass.

- To collect enough seed of multiple species from local remnants to plant large acreages, a combine is required. A smaller pull-type harvester with a large diameter brush is good for small plots; however, only one or two species are normally mature enough to gather at the same time with this type of harvester.

- Providing technical expertise is usually more important than providing equipment to those restoring native grass. For example, practically all of those leasing WHF's no-till drill needed assistance in calibrating the drill and on how to operate it correctly.

- The main benefit already gained from the seed marketing program has been the education of landowners that relict native grass tracts have additional worth in that they can be used for more than for just grazing or for livestock feed.

- The generic website (hmrtexas.org) and the "Native Grass Restoration Guide" provide a clearing house for

producers and technicians alike to discuss and suggest alternative solutions and to find the most up-to-date means for establishing native grass in areas where bermudagrass and bahiagrass control is needed.

- Controlling KR-2 old world bluestem has become one of the most perplexing challenges for re-establishing native grass and for preserving relict tracts. The only method used in the wildlife corridor was hand spraying each plant (IPT) with glyphosate. The end result of this method will not be known until the spring of 2011.

- Based on interest in field tours (one recent tour was filled with a maximum number of participants within a week of being announced) and the coverage gained from media sources (numerous magazines, newspapers, TV and public events), ecotourism has great potential.

- Once quail numbers are restored, there would be no problem locating those willing to pay to quail hunt in this area. Several have already inquired about the possibility of hunting on the wildlife corridor and adjacent restored areas. There seems to be no problem filling quail hunting club memberships on areas managed correctly. The area must however be expanded and bird numbers increased before further expansion of membership can occur.

- Locally-harvested eastern gamma grass was used by one WHF produce members to successfully to plant about 25 acres on land previously considered too dry for this variety. More of this variety will be used in future plantings because it is so palatable for livestock, easier to harvest and plant, and it provides good wildlife cover.

- Although re-seeding (mainly with a no-till drill) has increased native cover, abstinence of grazing or reduced stocking rates may have been a more significant factor. In some areas where livestock was removed for at least two years and where invasive grass is not dominating, natives began to recover at a fairly reasonable rate.

- Some of the seeds planted with the no-till drill did not sprout until good rains occurred this season although they were planted two or more years ago.

- Stocking rates must be drastically reduced to be an effective means for increasing native grass; livestock will continue to over-graze natives before grazing introduced grass species. Cross fencing is the surest, and oftentimes the only, means for controlling grazing.

- Most over-grazed pastures or cultivated row crop sites are usually low in organic content. They usually have an organic content of less than 1 percent. Cover crops and soil supplements are likely needed to build organic matter and increase microbial activity prior to planting. In this region, wheat and Austrian winter peas are good for colder months and soybeans and iron and clay peas work well in warm months.

- Not shredding or not controlling forbs, like croton, with herbicide may be a good means for controlling invasive grass. Native grass seems better able to contend with forbs than lower-growing exotic grass. After all, forbs coexisted with natives before exotic grass was introduced.

- Over-grazed or closely mowed fields seem to be more susceptible to invasive specie infestations.

- Companies financing a biofuels plant require assurances that 30-50,000 acres of adequate feedstock (based on 10 tons per acre) will be provided for 10 years at a predetermined price. With native grass existing on less than 1 percent of this area, efforts to attract such a facility in hopes of stimulating producers to grow more natives becomes a moot point. Residue from annual crops, like corn, sorghum and rice, might be more attractive fuel stocks; however, this would rob the land of much needed organic matter.

- Producers do not have enough experience in growing native grass crops to rapidly increase the tonnage required for a biofuels plant. They will not be able to negotiate a price until they know the cost of establishing native. Growing it for seed/seed hay is a good means for gaining experience and for establishing this cost of establishment and maintenance.

- Growing large tracts of perennial native grass for biofuels should create better habitat for wildlife than annual crops since it does not require replanting and it would likely spread to non-harvested marginal areas, such as ditch banks or travel lanes. Furthermore, it would not be harvested during nesting periods for most ground-dwelling birds.

- Supplying limited amounts of native grass hay as a substitute for coal in a coal-fired plant is usually not feasible due to the cost of equipment modifications and the potential cost of down-time associated with changing the melting point of the ash or slag.

- WHF needs to work with NRCS on developing standards for determining the cost of using locally harvested native grass hay as a source for planting. Otherwise, producers with EQIP contracts will choose the quick and easy route of planting exotic grass varieties.

- Government programs to establish improved grasses compete with efforts to establish native grass and are contrary to the nation's energy goals.

- Producers should be able to improve their net profits by grazing fewer cattle year round on native grass than with higher stocking rates on introduced grass, the latter of which requires paying for expensive inputs (i.e. fertilizer, machinery and hay). TPWD is expected to contract Texas A&M University to conduct a study to determine if this premise is correct.

Anticipated Work over the Next Six Months and Beyond—WHF will continue with all projects pending its ability to obtain required funding. Refinement of existing techniques and further development of new ones, like spreading native grass mulch hay or adding soil amendments to reduce the time for establishing and enhancing the growth rate of native grass, will be continued.

More equipment will be obtained to increase prescribed burns. WHF will work with county officials to obtain waivers for landowners wishing to conduct prescribed burns during burn bans.

WHF will set up its first habitat action team (HAT) in Colorado and adjoining counties. A HAT is a two man strike force with all equipment, knowledge and financial resources for implementing all restoration activities. When a landowner is receptive to plowing fire lanes for conducting a prescribed burn, equipment and an operator will be dispatched immediately. The same holds true when personnel and equipment are needed for applying herbicides or for planting or harvesting native grass seed or mulch hay. Landowners are often apt to delay these practices due to a lack the knowledge on how and when to do them correctly. With a HAT in place, WHF will be able to conduct activities properly and at the right time.

WHF will work with TrafCo and others wishing to grow more native grass for supplying a biofuels plant; however, developing a substantial tract of land in natives by expanding the corridor program is a prerequisite for demonstrating the ability of this area to grow appropriate native grass-based feedstocks. Creating enough area in natives to sustain a population of upland birds and for producing a reliable source of local seed will continue to be WHF primary objectives.

Although the WHF's CIG program period ended on September 23, 2010, WHF will not stop what was started with this program three years ago. To stop now would be admitting defeat, which would be devastating to all believers in conservation and fodder for our foes.

NATIVE GRASSLAND RESTORATION GUIDE

In BERMUDAGRASS & BAHIAGRASS SYSTEMS

[Note: Landowners should not employ these practices in lieu of working with trained and experienced professionals or without first developing a set of restoration management plans and management goals.]

I. ASSESSMENT AND PLANNING

Step 1. Define your short and long-term goals. Be specific.

Step 2. Collect baseline data

a. Aerial imagery (http://www.tnris.state.tx.us), topographical maps, soil data, and local plant communities (http://websoilsurvey.nrcs.usda.gov).

b. Vegetative coverage and plant diversity

i. Identify plant communities. See http://www.hmrtexas.org for plant identification specialists and literature on identifying plant species. Local resource specialist can also assist with plant and plant community identification.

Figure 1. Little bluestem. This is a key native warm-season bunch grass (wildlife cover) that was once wide spread throughout much of Texas and beyond. This species is now absent from much of its range.

ii. Create permanent photo points – photos taken at the same point and same direction annually. Late winter (February-March) is a good time since this is the period when habitat is typically most deficient. (http://txspace.tamu.edu/bitstreamhandle/1969.1/87857/ pdf_983.pdf?sequence=1).

iii. Walk vegetation transects—walk 145 foot transects, about 50 steps, with your arms spread to the side. Count each bunch grass that falls beneath your spread arms. Multiply this number by 100 to get an estimate of the number of bunch grasses per acre. The more transects you walk the more accurate your survey will be. Walk transects annually to assess changes over time.

Figure 2. Annual photo points (same location/same direction) is a quick reference to identify herbaceous response to management activities.

iv. Survey wildlife species of concern. (e.g. grassland birds) Breeding bird surveys (May-July) can be conducted to census quail and grassland birds simultaneously. Flush counts (November) and morning covey call counts (October) can be utilized where quail are present.

See the following for more information on survey techniques:

http://websoilsurvey.nrcs.usda.gov – soil surveys containing site specific soil and plant data.

http://agrilifebookstore.org – publications on census techniques

http://teamquail.tamu.edu – census techniques

http://www.pwrc.usgs.gov/BBS/ - Breeding bird surveys. Historic local and statewide survey data and survey technique.

http://www.thayerbirding.com – birding software (bird calls)

v. Identify primary causes for habitat deficiency

Step 3. Consider the feasibility of achieving your goals in terms of resources and time.

Step 4. Use the above information to create a detailed restoration plan. See http://www.hmrtexas.org for organizations that can develop management plans and provide technical/financial assistance and other information.

II. NATIVE GRASSLAND RESTORATION TECHNIQUES

Action 1. **Deferment**--Postpone grazing, mowing/haying/tilling for one or more years (if identified as a key factor impacting management goals)

a. Reasons for deferment
   i. Better identify plant species by allowing seeds/plants to emerge and produce seed.
   ii. Allow plants to reach proper maturity for herbicide application
   iii. Create enough fuel for prescribed burn

b. Reevaluate plant community following each growing season deferment to determine:
   i. Area dominated by native grasses
   ii. Area dominated by exotic grasses
   iii. Area composed of a mixture of native and exotic grasses
   iv. Area dominated by weeds.
   v. Presence of invasive woody species

Action 2. **Natural Re-vegetation**—This is a management option to eliminate the need to plant when a good native seed bank exists. Other actions, such as prescribed burns or herbicide applications, are often required.

Figure 3. Natural re-vegetation of native grasses often occurs following grazing season deferments. Simple maintenance including periodic grazing, prescribed fire, or dormant season mowing can be utilized to revive native grasses.

Action 3. **Herbicide Application**--Apply herbicide for the specific situation. Herbicide is typically applied in late spring and follow-up treatments in late summer are often necessary.

a. Area dominated by bermudagrass, bahiagrass or bermudagrass/bahiagrass combination.
   i. Create a uniform herbaceous layer 4-6 inches tall by mowing, grazing, or utilizing a prescription burn to prepare for herbicide application.
   ii. Apply 4 quarts of Glyphosate (RoundUp) with 41% active ingredient per acre in sandy soils. Increase the amount of herbicide to 5-6 quarts per acre in clay soils.

b. Combination of Bermudagrass and native grasses.
   i. If natives emerge in bermudagrass pastures, discontinue fertilizer and weed control to allow natives to mature.
   ii. Allow natives to eventually outcompete exotics by utilizing partial growing season grazing and/or spot treatments of Glyphosate (utilize rates above)
   iii. Alternative: Cut losses and follow the practices identified above (Step 3-a,i,ii)

c. Combination of Bahiagrass and native grasses.
   i. During the month of May, treat area with 0.3-0.4 ounces of Metsulfuron methyl (Cimarron) per acre (follow recommendations listed on the herbicide label). Do not treat during drought conditions. http://www2.dupont.com/Land_Management/en_US/assets/downloads/pdfs/Pasture_Rangeland/K-14592.pdf
   ii. Cut losses and follow the practices identified above (Action 3. a,i,ii)

d. Control competing weeds
   i. Treat restored areas with Metsulfuron methyl (Cimarron) or 2-4-D to reduce competition with native grasses
   ii. Only treat areas with mature (5 leaf stage) native grasses. Young grasses may be injured by herbicide applications.

Action 4. **Seed bed preparation**

a. Areas being restored by broadcasting native seed or native seed hay, or areas that have been under an active crop production regime and have recently consisted of bare ground.
   i. Disk thoroughly to bare ground.
   ii. Smooth and pack seed bed before and after spreading/drilling seed.
   iii. If cool-season annuals emerge following a warm-season herbicide application, reduce the height of cool-season annuals (graze or mow) to 4-6 inches and treat with 1 quart of Glyphosate per acre. Disk the area to bare ground or drill seed into the dead thatch.

b. Areas where cover crops are needed to improve soil fertility/organic content or reduce the risk of erosion
   i. Plant legumes or cereal crops (not cereal rye) in late fall or plant annuals, like soybeans, cowpeas, grain sorghum or forage sorghum, in early spring
   ii. Multiple plantings over several seasons may be required depending on soil fertility
   iii. Prior to planting native seed, graze or mow cover crop to 4-6 inches
   iv. Treat invasives with herbicide (see Action items 3 and 4,a,iii) in spring prior to planting. Prepare seed bed for planting native seed (Action 4, a).

Action 5. **Planting native grass and forbs**

a. Planting seed with a no-till drill (Required: native grass seed hopper and press wheels).
   i. Drill native grass seed mixes at a minimum rate of 7-12lbs Pure Live Seed (pls) per acre (20-40 seeds per square foot). Higher rates per acre may be utilized.
   ii. If the area was previously dominated by exotics plant directly into dead thatch or stubble in area previously treated by herbicide.
   iii. Allow 1-3 years for natives to emerge

Figure 4. No-till seed drills with specialized hoppers for planting fluffy native grass seed such as this Truax allow for planting without necessarily having to prepare seed beds. Reducing soil disturbance reduces the risk of stimulating early successional invaders and invasive exotics plants.

b. Spreading bales of native grass hay/forbs
   i. Cut native hay while key native seed species are fully mature.
   ii. Allow hay to cure prior to bailing (do not windrow hay).
   iii. Spread 40-50 square bales/acre of locally harvested hay evenly across prepared soil (bale buster expedites spreading process).
   iv. Press hay into bare ground to create adequate seed-soil contact (cultipackers, rollers, or hoof action/cattle trampling)

c. Broadcasting seed
   i. Broadcast native seed at a rate of 15-20lbs (40-60 seeds per square foot) pls per acre.
   ii. Press broadcasted seed to bare ground to create adequate seed-soil contact (cultipackers, rollers, or hoof action/cattle trampling)

d. Timeframe - The best time to plant native seed can vary from year to year depending on environmental variables. Droughts and rainy periods are difficult to predict.
   i. Avoid planting during historic growing season drought periods of July and August
   ii. Successful plantings have taken place in fall (October), late winter (February-March), and early spring (April-May) time periods.
   iii. Base planting on site specific requirements (financial constraints, biological constraints)
   iv. Take as much time as possible to get it right the first time. Nothing is more valuable that proper planning and execution.

Figure 5. Bail busters help to expedite the spread of native grass hay. This process also adds beneficial humus to the soil adding to fertility and increasing the soil's potential to hold moisture.

Action 6. **Monitor activities.**

a. Monitor vegetative response and key wildlife response to management activities.
b. Continue to collect photo points and census wildlife annually to accurately assess response and declare success or failure based on baseline data and previously established management goals.

Figure 6. Native grasses mixed with bahiagrass. Natives will often emerge within fields dominated by exotic grasses following several growing season deferments. This type of response to deferment may lead to changes in management objectives

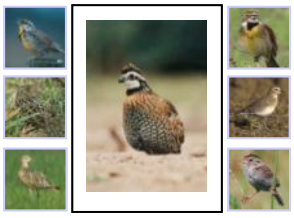

Figure 7. Several monitoring techniques exists for monitoring bobwhite quail. Breeding bird surveys (spring whistle county) can be utilized to monitor a number of grassland species. This is beneficial in areas where quail numbers are limited to the extent and monitoring is not feasible.

NOTES: Native grassland restoration is a long process (1-3 years) that requires PATIENCE on the part of the land manager. A lack of patience is a quick path to failure. Once the grassland is restored, proper maintenance of the restored area is required. Managers should define tiers of success as a part of their short and long-term goals and define management activities to maintain the restored site.

Re-establishing native grasses requires an adaptive management style. Pronounced changes brought upon by deferments and herbicide treatments require more frequent actions. Finally, managers must adapt to constantly changing techniques brought about technology and research.

Web Links:

- http://www.hmrtexas.org – one stop shop for natural resource links
- http://www.tnris.state.tx.us – imagery, topographic maps, and other base map information.
- http://websoilsurvey.nrcs.usda.gov – soil surveys provide site specific soil and plant data.
- http://agrilifebookstore.org – publications on census techniques
- http://teamquail.tamu.edu – census techniques
- http://www.pwrc.usgs.gov/BBS/ - Local and statewide surveys data (baseline).
- http://www.thayerbirding.com – birding software (bird calls)
- http://txspace.tamu.edu/bitstream/handle/1969.1/87857/pdf_983.pdf?sequence=1—Photo points
- http://www2.dupont.com/Land_Management/en_US/assets/downloads/pdfs/Pasture_Rangeland/K14592.pdf— Cimarron Plus applications and rates