11th Annual Conference

Texas Society for Ecological Restoration

August 18-20, 2006
Heart of the Hills Conference Center
Hunt, Texas

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Friday, August 18, 2006	
TIME	**EVENTS**
8:30 - 11:00 a.m.	Registration/Begin Riparian Group
11:00 - 12:00 p.m.	Lunch served for field trip participants/Riparian Group
11:30 a.m.	Field Trip to Native American Seed in Junction,
1:30 p.m.	Arrive at Native American Seed
3:30 p.m.	Leave Native American Seed to return to Hunt for the Social and Dinner
5:30 p.m.	SER Board Meeting (Riparian Group will return from field in time for Dinner)
6:30 p.m.	Dinner
7:30 p.m.--whenever	Social/networking

Saturday August 19	
7:00	Breakfast
8:00 - 9:00 AM	**Keynote Address by Dr. Fred Provenza**
	Paper Presentations
9:00 - 9:20 a.m.	Arroyo Colorado Habitat Restoration Plan. Kay Jenkins
9:20 - 9:40 a.m.	Using GIS to prioritize prescribed burning efforts. Charlottte M. Reemts
9:40 - 10:00 a.m.	Native grassland standard specifications and its applications. John Gleason and Mike Lyday

10:00 -10:20 a.m.	Break

Saturday August 19	
	Morning Session resumes
10:20 - 10:40 a.m.	Goose Island shoreline stabilization and marsh restoration project - phase I. Kay Jenkins
10:40 - 11:00 a.m.	La Semilla, the Seed. John Lloyd-Reilley
11:00 - 11:20 a.m.	The Metamorphosis: Transformation along the Trinity River Greenbelt in Dallas, Texas Emily Schieffer
11:20 - 11:40 a.m.	Developing Feral Hog Removal Procedures for Public Lands. Suzanne M. Tuttle
11:40 a.m. - 12:00 noo	At the Intersection of Ecohydrology and Ecological Restoration in semi arid environments. Georgianne Moore
12:00 Noon	Lunch
1:00 p.m.	Symposium on Endangered and Threatened species Session I, Vegetation moderated by Gad Perry, Texas Tech University
1:00 - 1:20 p.m.	The Effects of Season of Prescribed Fire on the Herbaceous Layer in a Temperate Savanna in Central Texas. Mark T.Simmons and Steve
1:20 - 1:40 p.m.	Mortality in *Echinocereus viridiflorus* var. *viridiflorus* after wildfire followed by drought in the Southern mixed Prairie of Texas. Sandra Rideout-Hanzak, David B. Wester and Gad Perry
1:40 - 2:00 p.m.	Effects of Prescribed fire on Kuenzler's hedgehog cactus, an endangered species in New Mexico. Ben C. May, Carlton M. Britton and Sandra Rideout-Hanz
2:20 - 2:30 p.m.	Break

Saturday August 19	
	Session 1 (Continued)
2:00 - 2:20 p.m.	The Physiological Basis for Timing the Use of Prescribed Fires: A Basic Principle. Carlton Britton, Carlos Villalobos, David B. Webster, Sandra Rideout-Hanzak
2:20 - 2:30 p.m.	Break
	Session II, Vegetation and Wildlife moderated by Sandra Rideout-Hanzak
2:30 - 2:50 p.m.	The effects of fire on the the invasive species, cogongrass (Imperata cylindrica), in two pine habitats of the southeastern United States. Y.L. Yager, D.L. Miller and J. Jones
2:50 - 3:10 p.m.	Short-term effects of prescribed fire on vegetation and nongame wildlife in Central Texas. Nikki J. Radke, Gad Perry, David B. Wester and Sandra Rideout-Hanzak
3:10 - 3:30 p.m.	Response of Vegetation and Nongame Wildlife to Summer Prescribed Fire in South Texas. Donald C. Ruthven. III, and Richard T. Kazmaier
3:30 - 3:50 p.m.	Impacts of Prescribed Fire on Coastal Prairie Vegetation and Birds. Terry L. Blankenship, D.Lynn Drawe, and Selma N. Glasscock
3:50 - 5:00 p.m.	Afternoon presentation session concludes with discussion group/panel
6:00 -- 7:00	Members Meeting and Dinner
7:00 -- whenever	Social

Sunday August 20	
7:00 a.m.	Breakfast
8:00 a.m.	Morning paper presentation session begins
8:00 - 8:20 a.m.	The long road to developing native herbaceous summer forage legume ecotypes. Sara Ann Schreiber and J.P. Muir
8:20 - 8:40 a.m.	Austin Bastrop River Corridor Project. Kevin Anderson
8:40 - 9:00 a.m.	An Economic Analysis of a Large Scale Ashe Juniper Control Project in the Leon River Watershed. Rebecca Flack
9:00 - 9:20 a.m.	The Central Texas/Oaks and Prairies Joint Venture: A Vision for Regional Avian Habitat Conservation. Chad S. Boyd
9:20 - 9:40 a.m.	The North Texas Ecotype Project: Promoting the Use of Native Ecotypic Seed. Lauri Heintz, Jim Muir and Mike Miller
9:40 - 10:00 a.m.	Aquatic macrophyte restoration in the San Marcos river following removal of an invasive species. Melissa L. Mullins and Robert D. Doyle
10:00 - 10:20 a.m.	The Texas Master Naturalist Program. Michelle Haggerty
10:20 - 10:40 a.m.	Revegetation of a moisture stress site at old cantonment area of Allahagab India. Kumud, Dubey
10:50 a.m.	Restoration discussions on the river, many topics: bring your own
12:00 p.m.	Lunch
	Conference Concludes, Drive home safely

Arroyo Colorado Habitat Restoration Plan

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The Arroyo Colorado Habitat Restoration Plan is the product of the efforts of the Arroyo Colorado Habitat Restoration Workgroup to develop and recommend strategies for habitat restoration that would reduce pollutant loadings to the Arroyo Colorado, improve assimilative capacity of the stream, and/or mitigate existing physical conditions that contribute to poor water quality in the stream. The Arroyo Colorado, a former distributary of the Rio Grande, runs a course roughly parallel to the lower most portion of the Rio Grande in the Lower Rio Grande Valley region of Texas. Although the tidal segment (2201) of the Arroyo Colorado has been designated for high aquatic use by the Texas Commission on Environmental Quality, it is currently included in the 2002 and Draft 2004 Texas List of Impaired Waters because dissolved oxygen concentrations are sometimes lower than the criterion established to assure optimum conditions for aquatic life in the tidal segment. The Arroyo Colorado Habitat Restoration Workgroup, facilitated by Texas Parks and Wildlife Department, is one of six stakeholder workgroups helping to develop a Watershed Protection Plan to address low dissolved oxygen problems in the Arroyo Colorado.

The Arroyo Colorado watershed is comprised of 706 square miles and is characterized by alluvial soils, absence of topographic relief, subtropical and semi-arid climate, unique natural vegetation and intense agricultural and urban development. Threats to habitats associated with the Arroyo Colorado, identified by the Habitat Restoration Workgroup, include continued loss of wetlands and riparian areas, continued channel and streambank erosion, invasive plant species, and continued dissolved oxygen problems in the Arroyo Colorado. Ten strategies are recommended by the Workgroup to address the three main objectives in the Habitat Restoration Plan: conserve existing riparian and wetland habitats, 2) reduce channel and streambank erosion, and 3) construct wetlands to improve the water quality in the Arroyo Colorado.

Using GIS to prioritize prescribed burning efforts

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Prescribed burning serves many restoration purposes, including invasive species control, grassland maintenance, and habitat improvement. However, it can be difficult to balance multiple objectives within a single management unit, especially if each objective has a different fire return interval. We developed a simple GIS model (using ArcView 3, Spatial Analyst, and Model Builder) to prioritize prescribed burning on the Fort Hood Army Installation (Fort Hood, TX). Prescribed burning on Fort Hood is used to reduce fuel loads, prevent shrub encroachment into grasslands, improve habitat for the endangered black-capped vireo, and maintain post oak woodlands. Each objective is represented in the model by a GIS layer that combines vegetation and time since the previous fire. The local fire managers ranked the four objectives and assigned an 'influence value' (weight) to each. The model compares each burn unit to its desired fire return interval and then ranks the units according to the objectives' influence values. The final output is used to plan prescribed burning for the following burn season. Our model can be adapted to almost any prescribed burning program to ensure that resources are used efficiently and that burning objectives are met.

Native Grassland Standard Specification and Its Applications

John Gleason and Mike Lyday
City of Austin

Austin was in need of a specification that gave construction contractors direction for the establishment of native grasslands. Our existing native specification was limited to seeding for erosion control with a half dozen native grass seeds, and included a healthy
dose of Bermuda seeds to insure that erosion control was achieved. In addition, the original specification was limited to the use of Winter Rye as a cover crop. Austin's existing native grass seeding specification for erosion control was improved in the following ways: removing Bermuda, adding a greater diversity of native grass seeds, including a variety of native wildflowers to the mix, beefing-up the quantity of

seed, and allowing Oats and Wheat as optional winter cover crops.

City staff also wrote a new specification for the **seeding and planting** of a native grassland. This specification calls for planting rooted climax grass species on ten foot centers, while seeding a mixture of pioneer grasses, climax grasses, and wildflowers in-between the rooted grasses. This new specification has custom lists for different environments as well. By consulting with native plant growers, contractors, and authorities such as The Lady Bird Wildflower Center, Austin now has specifications
that reflect the current best practices and available species for the establishment of native grasslands. These standard specifications may be used extensively throughout the City and its ETJ for both private and public projects where native grasslands are disturbed by
development impacts or where restoration of native grasslands is desired.

Goose Island Shoreline Stabilization and Marsh Restoration Project – Phase One

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The Goose Island Shoreline Stabilization and Marsh Restoration Project is being implemented by Texas Parks and Wildlife Department and its federal, state and local partners to protect, enhance, and restore wetland habitats that are integral parts of the Texas Gulf Coast and the Aransas Bay estuarine ecosystems. Goose Island is part of Goose Island State Park, located 12 miles northeast of Rockport in Aransas County, Texas. The island is located at the northern end of Aransas Bay and consists of intertidal estuarine marsh dominated by smooth cordgrass (*Spartina alterniflora*) and high marsh dominated by saltwort (*Batis maritime*), marshhay cordgrass (*Spartina patens*) and sea-ox-eye daisy (*Borrichia frutescens*). Adjacent aquatic habitats include shallow open water, seagrass beds and oyster reefs.

Texas Parks and Wildlife Department GIS staff compared aerial photography from 1969 and 1995 and determined that 17.1 acres of Goose Island eroded from the southern shoreline. Continued erosion and submergence of Goose Island threatened to convert the remaining seven acres of smooth cordgrass marsh and ten acres of associated high marsh on the island into open water with resulting degradation of adjacent aquatic habitats. The completion of Phase One of the project provides immediate and long-term protection and enhancement of valuable coastal habitats in Aransas Bay. Phase One included the construction of a 4,400-foot-long offshore rock breakwater that protects a 40-acre lagoon between

it and Goose Island. Phase One of the project also involved construction of two containment levees that form the outside of a 24-acre marsh restoration site. In Phase Two, dredged material from two nearby boat channels will be used beneficially to raise the bay bottom inside the containment levees to an elevation that will support smooth cordgrass. Community volunteers will transplant marsh plants into the site to start colonizing the restoration site.

***La Semilla*, the Seed**

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Different names, different strategies for getting diversity on the landscape: single accession, cultivar release, multi-accession seed release, and multi-species commercial seed blends. All of these will be discussed in order to promote creative thinking to meet the need for economically viable and field effective native commercial seed sources.

The Metamorphosis: Transformation along the Trinity River Greenbelt in Dallas, Texas.

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In 2002, the City of Dallas began work on a project aimed at transforming the Deepwoods Landfill into a public park, christened the Trinity Interpretive Center. The resulting facility provides trails, wetlands, and an interpretive center that highlights the bottomland hardwood ecosystem within which the center is located. This talk will discuss the goals, results, and challenges involved in developing the Trinity Interpretive Center.

Developing Feral Hog Removal Procedures for Public Lands

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The Fort Worth Nature Center and Refuge (FWNC&R) is a 3600+ acre (1450+ hectare) urban green space owned by the City of Fort Worth and managed by employees of the City's Parks and Community Services Department as a natural, native landscape. Resource management objectives are to conserve, maintain and/or restore plant and animal communities native to North Central Texas; this includes controlling the introduction and spread of exotic plants and animals with eradication as the ultimate goal. In July 1999 FWNC&R staff began to notice areas of major soil disturbance consistent with the type of damage caused by feral hog rooting; visual records by staff and visitor reports of sightings soon followed. In keeping with the goal of controlling the introduction and spread of exotic animals, staff immediately began planning for removal of the hogs. This led to a three-year process of navigating through the uncharted territory of developing a municipal wildlife management plan, which culminated in January 2003 with the commencement of an ongoing trap-and-euthanize program. The experiences of and lessons learned by the FWNC&R staff are shared here for the benefit of other governmental employees or small private landowners who may be faced with a similar situation.

At the intersection of ecohydrology and ecological restoration in semiarid environments

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Ecohydrology is defined as the sub-discipline shared by the ecological and hydrologic sciences concerned with the effects of hydrological processes on the distribution, structure and function of ecosystems, and on the effects of biotic processes on elements of the water cycle. Ecohydrology thus melds beautifully with the discipline of ecological restoration, and yet the two rarely intersect. In semi-arid regions were water is limited, ecohydrology can inform watershed restoration in upland areas resulting in improved stream and riparian conditions.

Three examples are presented where ecohydrology research provides insights for restoration: Pecos River riparian systems invaded by Tamarix, central Texas rangelands with juniper encroachment into native grasslands, and south Texas mesquite rangelands with periodic root plowing. In all cases, vegetation management has the potential to impact both water resources and ecosystem function, but quantity/quality trade-offs should be carefully considered in restoration plans.

The Effects of Season of Prescribed Fire on the Herbaceous Layer in a Temperate Savanna in Central Texas

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Prescribed fire is increasingly utilized as a tool for grassland and savanna restoration and conservation. In the Great Plains of North America fire is often installed during the dormant season due to ease of installation and to promote the growth of the predominant warm season grasses. However, the timing of modern anthropogenic fire conflicts with the seasonality of lightning-caused wildfires that once maintained these systems. Although attempts have been made to coarsely model fire-season effects, the paucity of studies and conflicting results have not produced useful generalizations for restoration practitioners. This study sought to examine the responses of the herbaceous component of the savannas of Central Texas and to test the assumptions surrounding floristic guild responses to seasonal prescribed fire. Results to date show that the response of common species are far from uniform, often exhibiting no response or contra-indicated responses to treatment. The preliminary (five year) data from this study demonstrate that fire and fire season fundamentally affect both the community structure and herbaceous production. Furthermore, guilds alone, at least at the specificity at which they are commonly applied, are not good predictors of these responses.

Mortality in *Echinocereus viridiflorus* var. *viridiflorus* after wildfire followed by drought in the Southern Mixed Prairie of Texas

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Wildfire is a naturally occurring event in the Southern Great Plains. While fire effects on plains vegetation have been studied intensively, there is little information regarding fire effects on small, infrequently occurring cacti. *Echinocereus viridiflorus* var. *viridiflorus*, also known as nylon hedgehog cactus, has small ovoid stems 2.5 to 7.5 cm long and green flowers approximately 2.5 cm diameter. It occurs in grasslands from Wyoming south to the Texas panhandle. Its responses to fire are unknown. A wildfire of unknown origin ignited in October 2005 at Buffalo Lake National Wildlife Refuge in the Texas panhandle. Vegetation at the refuge is considered short-grass prairie, dominated by blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*). The purpose of this project was to compare density, condition (dead or alive), basal diameters and heights of an *Echinocereus viridiflorus* var. *viridiflorus* population in an area that was burned by the wildfire, and a population in an adjacent unburned area. Populations were sampled in May 2006. Precipitation at the refuge between the fire and our sampling period was significantly lower than average. Results indicate total cactus density was not affected by burning. However, there were more dead cacti in the burned area than in the non-burned area. Burning had no effect on average diameter or average height of dead cacti. Further, burning did not affect the distribution of diameters or heights of dead cacti. In contrast, burning affected diameters and height of living cacti. In particular, living cacti in the burned area were narrower and shorter than plants in the non-burned area. These results were reflected in burning effects on the distribution of diameters and heights of living cacti, where plants were shifted to larger sizes in the non-burned area. We will continue to monitor these populations in future years.

Effect of prescribed fire on Kuenzler's hedgehog cactus, an endangered species in New Mexico

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Prescribed fire is commonly used by land managers to manipulate vegetation for range improvement purposes. Fire is generally applied at a landscape scale, and thus has the potential to impact all species in a burn unit, including those which might be negatively affected as individuals. Kuenzler's hedgehog cactus (*Echinocereous fendleri* var. *kuenzleri*) is an endangered species known to occur in only 4 counties in New Mexico. The species is found in pinyon-juniper habitat at elevations from 1,500 to 2,100 mm, typically on south to southeastern aspects. Mean fire return intervals for pinyon-juniper habitats in the southwest have been estimated at 12 to 25 years (historically). However, mean fire return intervals have lengthened since the late 1800s because of changes in land use. Although prescribed fire is an important management tool used by the Bureau of Land Management in this area, burning is not conducted within 1,600 m of known Kuenzler's cactus populations in the Carlsbad, NM BLM District because of its endangered status. Little is known about the effect of fire on Kuenzler's cactus. We have conducted prescribed burns in 4 study areas in 2 counties to better understand fire effects on this species. Individual plants were randomly assigned to burn or control treatments. Pretreatment data included plant size and a description of fuel load and fuel arrangement surrounding each plant in a 110-cm diameter plot. Plots were individually burned with hand-held drip torches, and have been monitored for post-treatment response for 1 or 2 growing seasons. Mortality in burned and control treatments was similar. Additionally, burning did not affect flowering response of plants. Plants continue to be monitored for future mortality.

The Physiological Basis for Timing the Use of Prescribed Fires: A Basic Principle

Carlton Britton, Texas Tech University
Carlos Villalobos, Texas Tech University
David B. Wester, Texas Tech University
Sandra Rideout-Hanzak, Texas Tech University

Prescribed fire is an environmentally-sound method of manipulating plant communities to achieve specified management goals. Often, these goals include restoration to an approximation of the original plant assemblage; however, other ecological states are sometimes desirable. The successful use prescribed fire to manage vegetation begins with an intensive inventory of the present plant assemblage. Knowledge of the current plants that characterize a study area, as well as their relative abundance, is a necessary first step in the management process because it often defines the limits of what is possible with prescribed fire. A second consideration recognizes that fire usually results in defoliation of plants, and often also damages or destroys the perenniating tissues that are necessary for plants to survive fire. Thus, timing of burning is a fundamental factor that determines whether prescribed fire will achieve the desired management objectives. Season of burning is important because fire should be applied when it will most seriously affect plants we want to reduce in abundance. For example, if the management goal is to reduce Texas wintergrass, prescribed fire must be applied in spring when this species is setting seed and storing carbohydrates for the next growing season. In contrast, if the management goal to increase the abundance of Texas wintergrass, fire should be applied during the summer when it will have minimal or negative impacts on the dormant wintergrass but will have a strong negative effect on all the associated warm season grasses. As with all plant community manipulations used in responsible land management, knowledge of a species' physiological status during the time of burning will determine success or failure.

Effects of fire on the invasive species, cogongrass (*Imperata cylindrica*), in two pine habitats of the southeastern United States.

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In the longleaf pine ecosystem, maintenance of pine/bluestem habitat and restoration of pine/shrub habitat to pine/bluestem habitat is dependent on fire; but fire may facilitate survival and vegetative spread of cogongrass, a non-native grass which has been shown to displace native vegetation, alter fire regimes and cause other undesirable ecosystem impacts in forest systems of the southeastern United States. This is of particular concern for the pine/bluestem habitat which provides habitat for a large diversity of species including the federally-listed as threatened gopher tortoise. In order to provide information needed to develop priorities for cogongrass control, rates of vegetative encroachment of cogongrass into burned and unburned pine/bluestem and pine/shrub/hardwood habitats were measured from 2002 to 2004 on Camp Shelby Training Site, MS. Relationships of vegetative growth with environmental variables such as light availability and soil characteristics were also examined. Burning increased linear encroachment ($p = 0.0024$, df 32) and number of cogongrass shoots ($p = 0.0006$, df 32). Two years post-burn mean linear growth of cogongrass into the habitats of interest was 390 cm in burned plots compared to 236 cm in unburned plots, with the growth rate more than doubling in burned plots in the second year of measurement. By 2004, number of cogongrass shoots was highest in pine/bluestem burned plots ($x = 84$) and lowest in pine/shrub unburned plots ($x = 8$). Linear growth differences between habitats remained significant ($p = 0.057$, df 32) with higher growth in pine/bluestem habitats. Correlations between cogongrass growth and measured environmental variables were not significant. Our results indicate greater vulnerability of the fire-dependent pine/bluestem habitats to cogongrass encroachment. Thus, if maintenance or restoration of these species-rich habitats is desired, then efforts to control cogongrass should be prioritized based on this vulnerability and value.

Short-term effects of prescribed fire on vegetation and nongame wildlife in Central Texas

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Prescribed fire is a common land management tool used to reduce invasive plants, improve forage quality, and enhance wildlife habitat, but also has impacts on nongame species. We examined whether a prescribed fire would affect the abundance of arboreal herpetiles and other nongame species in the Texas Hill Country using eight 0.2-ha sites in Mason County, Texas. In February 2004, four sites were burned with low-intensity prescribed fires; four adjacent non-burned sites served as controls. Vegetation measurements (litter depth, percent canopy cover, tree diameter, visual obstruction, foliar cover, and ground cover) were recorded prior to and seasonally following the burn. Vertebrates and invertebrates were collected from all plots between March and August 2004 (152 traps, 5,908 trap nights). Texas wintergrass ($P < 0.04$) and three invertebrate orders [Homoptera ($P < 0.01$), Microcoryphia ($P < 0.001$), and Diplopoda ($P < 0.002$)] were reduced in burned plots. Vertebrates, other plants, and most invertebrates were not significantly affected by the fire. Results indicate that small-scale, low-intensity fires have minimal impact on vegetation structure and nongame species during the year following burning.

Response of Vegetation and Nongame Wildlife to Winter and Summer Prescribed Fire in South Texas

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With an increased emphasis on wildlife management as the primary land use in South Texas prescribed fire is increasingly utilized as a tool to manage rangelands and prolong the benefits of mechanical and chemical vegetation treatments. However, responses of floral and faunal communities on native rangelands in the western South Texas Plains to fire are not clearly understood. Our objective was to compare a variety of vegetation and non-game wildlife ecological parameters on burned and nontreated rangelands. The study was conducted on honey mesquite (*Prosopis glandulosa*)-mixed brush uplands on the Chaparral Wildlife Management Area. Treatments included rangeland sites that received dormant- and growing-season prescribed burns and nontreated rangelands. Woody plant cover was estimated using the line intercept method. Herbaceous plant density and cover were estimated in Daubenmire frames. Herpetofauna and small mammals were sampled in drift fence-pitfall arrays. Breeding bird diversity and abundance was determined with point counts. Texas horned lizards (*Phrynosoma cornutum*) were monitored via radio telemetry. Harvester ant (*Pogonomyrmex rugosus*) abundance was assessed with bait stations. Burning treatments had little effect of floral and faunal diversity. Woody plant cover was reduced following burning; however, many species including hogplum (*Colubrina texensis*) recovered top-growth rapidly following fire. Warm-season annual forbs such as croton (*Croton* spp.) increased during the first growing-season post fire; however, increases did not persist into the second growing-season. Perennial forbs such as erect dayflower (*Commelina erecta*) increased on burned sites with increases carrying into the second growing season. Grassland species such as the six-lined racerunner (*Cnemidophorus sexlineatus*) tended to increase following summer fires. Harvester ant abundance was greater on burned sites and Texas horned lizard home range size was smaller on burned sites. Prescribed fire may be a useful tool in managing woody and herbaceous vegetation on native South Texas rangelands to the benefit of grassland wildlife.

Impacts of Prescribed Fire on Coastal Prairie Vegetation and Birds

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Prescribed fire use has increased on rangelands as managers seek low cost methods to manage vegetation. Impacts to vegetation and wildlife have been monitored on the Welder Wildlife Foundation and local area during summer and winter burns. December burns had significantly higher forb yields than February burns or the control. Total grass yields were significantly higher on February burns than other treatments. Woody vegetation mortality and canopy reduction were related to fuel load. One-year post-burn woody plant mortality ranged from 0 to 10 percent on one study site and 5 to 68 percent on a nearby site burned on a different date. Woody vegetation began sprouting at 4 weeks post-burn and huisache sprouts were greater than 1 meter tall 47 weeks post-burn. Grassland bird abundance begins to decline as a result of woody advancement. Le Conte's Sparrow, Sedge Wren, and Sprague's Pipit rapidly declined in areas where shrub densities surpassed 100/ha and shrub cover exceeded 30%. Sandhill Cranes, Long-billed Curlews, and Killdeer increased on winter burned areas but declined after 3 months. Le Conte's Sparrows, Grasshopper Sparrows, and Sedge Wrens declined following winter prescribed burns. Studies conducted on summer burn areas also showed declines in Sedge Wrens, Grasshopper Sparrows, and Le Conte's Sparrows. Savannah Sparrows increased and Sprague's Pipit exhibited higher use in recently burned areas. Invertebrate abundance declined substantially when sampled 5 weeks after a July prescribed burn. A single summer fire did not substantially change the invertebrate or bird communities on the burn site 1-year post-fire. Weather conditions and timing play a large role on the impacts prescribed burns have on vegetation. Prescribed burns may reduce canopy cover and height but may have little impact on plant density.

The long road to developing native herbaceous summer forage legume ecotypes.

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Of the approximately fifty native herbaceous legumes species left in north central Texas, few are available commercially. Legumes fulfill a wide variety of tasks including prairie restoration, wildlife food plots, soil stabilization, and pasture enrichment. Studies to find the individual qualities of many legumes are being conducted at Stephenville's Texas Agricultural Experiment Station to assist landowners establish legume stands. My presentation goes over several of the legumes we are currently researching and offers some of the characteristics they possess.

River Corridor Restoration along the Colorado River from Austin to Bastrop.

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In the arid Southwest, riparian areas are critical habitats because of the ecosystem services that they provide and for the biodiversity that they support. Unfortunately, urban and rural riparian areas in Texas and other Southwestern states have been severely degraded by poor land management practices. This presentation examines how restoration ecology and biogeography are utilized in an effort to restore riparian habitat and guide development along the Colorado River in the Austin, Texas area. This 60-mile river corridor runs from inner city to rural rangeland and pecan orchards, and so it is subject to a wide variety of development and land management pressures. Gravel and sand extraction pits are having a particularly large impact on this river corridor, yet the abandoned pits hold promise for habitat restoration and associated ecosystem services benefits. Moreover, this river corridor is subject to rapid development as transportation projects and housing tracts fill the river bottomland. Since 2003, a stakeholder partnership has been working to protect and to restore land along the river

corridor, and the project is now the focus of collaboration between governmental, non-profit, and developer groups.

An Economic Analysis of a Large Scale Ashe Juniper Control Project in the Leon River Watershed

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Ashe Juniper (*Juniperus ashei*) is native to the Edwards Plateau in central Texas. In the past 150 years, however, this species has rapidly increased in abundance within its range. Reduced fire frequency and increased livestock grazing, are two factors attributed to the rapid rate of juniper encroachment. While the losses associated with this brush encroachment are recognized, many ranchers lack the funds necessary to implement management practices to reduce juniper densities on their property. The high cost associated with clearing brush has led to the creation of cost-share programs, which help offset the expenses incurred by participating landowners. Within Coryell and Hamilton Counties, Texas, two cost-share programs are offered to interested landowners. The Leon River Restoration Project (LRRP), funded by several state and federal agencies, provides 100% cost-share incentives, for up to $15,000 of total clearing costs. The Environmental Quality Incentives Program (EQIP), funded by The Natural Resources Conservation Service (NRCS), offers different degrees of cost-share incentives. Although these programs provide much needed financial assistance, it is unclear whether the benefits gained from clearing are high enough to make it worthwhile for landowners to implement these conservation practices. The goal of this research project is to perform an economic evaluation of brush control methods (including follow-up maintenance practices) and restoration practices implemented by these different incentives programs. Landowners who are participating in one or both of these programs are being interviewed to determine changes which have occurred on their land since brush clearing has been performed. Differences, if any, in the levels of satisfaction between participants of the various programs will also be evaluated. Work on this project is ongoing, and preliminary results are to be provided at the time of this presentation.

The North Texas Ecotype Project: Promoting the Use of Native Ecotypic Seed

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Land managers in north-central Texas face a lack of commercially available, locally adapted native seed for use in revegetation projects. In 2005, The North Texas Ecotype Project was founded to conserve native plant genotypes and improve the availability and diversity of native plant products on the market. The project has four main goals:
1) inventory prairie remnants in our 45-county region;
2) develop a network of landowners, conservation groups, seed companies and researchers who can provide plant materials for restoration projects;
3) collect, multiply, and conserve native herbaceous germplasm; and
4) restore key native prairie reference and demonstration sites.

The Central Texas/Oaks and Prairies Joint Venture: A Vision for Regional Avian Habitat Conservation

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Joint Ventures (JV) are self-directed partnerships of agencies, organizations, corporations, or individuals that have accepted the responsibility of implementing national or international bird conservation plans. The newly formed Central Texas/Oaks and Prairies Joint Venture (CTOP) covers both the Edwards Plateau of Texas and the Oaks and Prairies Region of Texas and Oklahoma. Recent and historical population declines in regional avifauna have underscored the need for large-scale habitat conservation measures. The Central Texas/Oaks and Prairies Joint Venture will work to reverse these trends by producing region-wide conservation plans, implementing those plans, and using research to refine our knowledge of avian/habitat relationships. Avian habitat conservation within CTOP boundaries faces numerous challenges. Fire suppression and fine fuel reduction via livestock grazing have reduced fire frequency resulting in accelerated development of shrub and tree species. The end result of this process has been a decline in habitat for savannah and grassland-associated birds. Most of the grassland habitat within the Post Oak Savannah has been converted to cotton production or planted in Bermuda grass; 98% of the Blackland Prairie has been

lost, primarily to cultivation; and grassland habitat within the Cross Timbers is being planted with "improved" forages. Additionally, nearly 3 million acres of rural land in Texas and Oklahoma were converted to urban uses from 1982 to 1997. Both Texas and Oklahoma have a diverse array of existing avian-related conservation initiatives. However, these efforts need to be tied together with a unifying vision, common goals and a collective approach to landscape planning and delivering on-the-ground conservation. The partner-based format of Joint Ventures is ideally suited to putting together the planning, implementation, research and outreach programs needed to impact avian species at a regional level.

Aquatic macrophyte restoration in the San Marcos river following removal of an invasive species

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A recently completed dredge project funded and overseen by the USFWS aimed for total eradication of approximately 2,000 m^2 of Asian water trumpet (*Cryptocoryne beckettii*) from 2.9 km stretch of the upper San Marcos river. Concern over the rapid expansion of this invasive and the similarity of its habitat requirements to Texas wildrice, (*Zizania texana*) prompted the dredge project; follow-up efforts are on-going. Baylor University, in cooperation with USFWS and other partners, is developing a multi-year plan and initiating efforts to facilitate native macrophyte species restoration into areas impacted by the dredge activities. Preliminary components of the plan as well as relevant research questions to be discussed include: what species have the greatest likelihood of success in the impacted stretch of river? What culture and planting methods will maximize success of the restoration effort? What are the long-term competitive abilities of the native species with other invasive plants that are abundant in the project area?

The Texas Master Naturalist Program.

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The short supply of dedicated, will-informed citizens and volunteers is often cited as a limiting factor for community-based conservation efforts. The Texas Master Naturalist program—with over 35 chapters statewide—works to address this need by developing local corps of "master volunteers" who provide outreach education and service dedicated to the beneficial management of natural resources and natural areas within our Texas communities. Come learn about this multi-award winning program that has made an impact on more than 1 Million people and 30,000 acres of habitat across the great state of Texas and how Texas is leading the nation in the development of a National Master Naturalist Program.

Re-vegetation of a Moisture Stress Site at Old Cantonment area of Allahabad, India

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The district, Allahabad, is centrally located in Uttar Pradesh State of India and lies between 24^{o} 47' and 25^{o} 47' N latitude and 81^{o} 9' and 82^{o} ^{21}' E longitude. The district may be divided into three physical parts : (1) The Trans Ganga plains; (2) The Doab ; and (3) The Traans Jamana Tract. The river Ganga and its tributary Jamana, mark out the Boundaries of these tracts .The Jamana Unites with the Ganga at Allahabad, the confluence being known as "Sangam". The Gangatic plain is a fertile flood plain, however in dry season the land suffers from moisture loss due to absence of vegetation cover. To re-vegetate such area a representative site was selected at Old Cantonment area of Allahabad district. Total eleven species viz. *Azadirachta indica, Dalbergia. sissoo, Tamarindus indica, Terminalia arjuna, Salvadora percecae, Albizia lebbek, Albizia procera, Emblica officinalis, Pongamia pinnata, Eucalyptus hybrid* and *E. camaldulensis* were planted to green the area. This experiment was established as demonstration plot with an objective to encourage peoples' participation for ecological restoration of such areas. Local villagers, farmers and defense staff of the area were involved in preparation of this plot from the beginning of the experiment as pit digging, fencing of plot, planting material and plantation work etc. People were also involved in maintenance and management of plants for biotic interference. Growth data were recorded annually. It was found that *Dalbergia sissoo,*

Azadirachta indica, Terminalia Arjuna, Emblica officinalis and *Albizia lebbek* performed well for growth as well as survival over other species. Soil samples for each species were analyzed for its pH, Nitrogen, Phosphorous, Potassium and organic matter after four years of the plantation. Soil analysis at the beginning of the experiment was taken as control. These values were compared to study the change in the nutritional parameters of soil before and after the experimentation and it was found that soil quality was improved after the plantation.