Texas Society for Ecological Restoration

TXSER 2017 Annual Conference: Resilience & Connectivity at Our Roots

Conference Abstracts

Keynote Address by:

Kenneth Steigman, Ph.D.
Director
Lewisville Lake Environmental Learning Area (LLELA)
Lewisville, TX
&
Research Scientist
University of North Texas, Denton, TX

University of North Texas
Environmental Education Science & Technology
Denton, Texas
November 10-12, 2017

TXSER 2017 Annual Conference:
Resilience & Connectivity at Our Roots

University of North Texas
Environmental Education, Science & Technology
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Gratitude

Many individuals played a role in the organization of this conference. From its inception, the TXSER Board of Directors visualized the return to North Texas as an opportunity to return to our "roots" where TXSER was founded in 1995 and to take stock in how much the field has grown and changed since its early days. Board members have been instrumental in developing ideas for speakers, conference sessions, field trips, and pulling together the many pieces of the conference, great and small.

We also owe a special debt of gratitude to our colleagues at the Lewisville Lake Environmental Learning Area (LLELA) and the City of Lewisville who pushed to make this conference happen in North Texas. They opened doors for us at the University of North Texas, enthusiastically welcomed us to LLELA for field trips, and kicked off the conference with a very special Friday Picnic on the Prairie at LLELA.

We would especially like to thank our sponsors whose support has enabled us to bring together individuals and organizations involved in ecological restoration across the State of Texas and beyond. Your support allows us to share our collective experiences and ideas, and to enhance collaboration across our broad geographical area. Your contribution to making this happen is much appreciated!

A heart-felt thank you to all!

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Keynote Speaker

Kenneth Steigman, Ph.D.
Director, Lewisville Lake Environmental Learning Area, Lewisville, TX and Research Scientist, University of North Texas, Denton, TX
Contact: Kenneth.Steigman@UNT.edu

Dr. Ken Steigman is the Director of Lewisville Lake Environmental Learning Area (LLELA), a 2,000 acre wildlife management area south of the Lewisville Lake Dam. Ken assumed that position 13 years ago after serving for 28 years in a number of positions at the Heard Museum and Wildlife Sanctuary in McKinney, Texas, including Wildlife Sanctuary Director. He received the Texas Parks and Wildlife Department's *Lone Star Stewardship Award* for his restoration work at the Heard.

Ken's past and current contributions include prairie restoration, research and wildlife reintroductions of harvester ants, wild turkeys, prairie dogs and northern bobwhite quail. He established the longest continuously run bird-banding station in Texas at the Heard and established and manages the bird-banding station at LLELA with the support of numerous sub-permitees and volunteers. Ken conducted four years of research for his dissertation, *Nesting Ecology of the Dickcissel on a Tallgrass Prairie Relict in North Central Texas*.

He has also consulted on a variety of municipal wildlife habitat projects with the cities of Carrollton, Farmers Branch, Grand Prairie, Parker, and Richardson and with developers and private landowners.

Under Ken's direction, a native plant nursery was established at LLELA, supported by staff and volunteers, which provides thousands of native plants for prairie and forest restorations at LLELA. Many of the plants were originally propagated from plants rescued from prairie remnants destined for development. Ken and a group of volunteers recently rescued plants from a prairie adjacent to the President George Bush Turnpike in Plano.

Steigman has led numerous collecting and educational trips throughout the U.S., Mexico and Costa Rica. Big Bend is one of his favorite places and through his many professional and personal trips there since 1969, he has developed significant expertise with the flora and fauna of the area. He says that no matter how many times he hikes to the South Rim in Big Bend, it is always a religious experience for him.

He enjoys hiking, kayaking, snorkeling and propagating plants in his greenhouse at home. Ken has been married for 34 years and has two children, one who lives in California, the other in Colorado, both great places to visit and hike.

As one of TXSER's founding Board Members, Ken Steigman will share his reflections on TXSER and changes in the field of ecological restoration. He will use examples from his tenure at LLELA to demonstrate how LLELA has grown and adapted over the years to changes in the natural and human landscape. Steigman will share his thoughts and concerns about current issues and major challenges in the field, highlighting the urgency for restoration management. His opening address will set the stage for thought and discussion about how we, as scientists and practitioners, can create resilience, encourage connectivity, and grow from our roots.

Timber Rattlesnake

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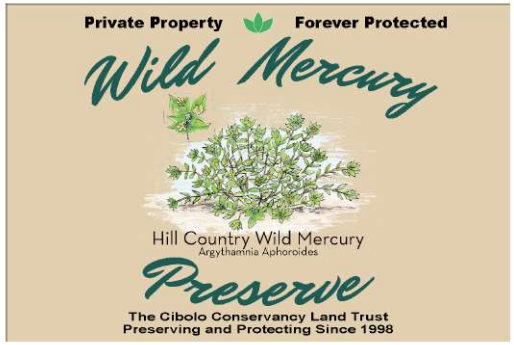

Wild Mercury Preserve
Contact: David Davidson, San Antonio, TX

Individual Sponsor: Colin Shackelford

Presentation Abstracts

[alphabetical order by presenter's last name]

Belcher, Brandon
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The Effects of Fire and Mowing on *Scabiosa atropurpurea L.* (Dipsacaceae) in North-Central Texas

Scabiosa atropurpurea L. is a biennial herbaceous plant species from the Mediterranean region of southern Europe, western Asia, and northern Africa. This introduced plant has become invasive in parts of the United States, and the species is now reported from 11 counties in north-central Texas. *S. atropurpurea* reproduces by seed, forming dense colonies along roadsides and within old agriculture fields, and may pose a threat to native and improved grasslands in the region. This study evaluated changes in the density of the species within a mixed grassland community in north-central Texas. Study plots for three treatments were established, and the effects of repeated mowing, growing season fire, and dormant season fire were measured. Mowing treatments were found to increase density of *S. atropurpurea*, while growing and dormant season fire, and controls, were found to decrease density. These results suggest risks and potential control of the species for grassland managers.

Scissor-tailed Flycatcher, Cont.

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https://www.shield-ayresfoundation.org/

American Bumblebee

Texas A&M Forest Service
http://texasforestservice.tamu.edu/

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Lewisville Lake Environmental Learning Area (In-Kind)
https://www.llela.org/

Biles, Kelsey S.
Authors: Biles, Kelsey S. and Doyle, Robert D.
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Interactive Effects of Soil Fertility and Crayfish Herbivory on *Ludwigia repens* Biomass Production

Ecologists have had issues establishing *Ludwigia repens* populations in the bare, unvegetated sediments, which typify much of the upper Comal River. Fertilizing such sediment may help the *Ludwigia* to establish colonies, but it is unknown how this increased soil fertility will interact with the suspected crayfish herbivory. The overarching goal of this research was to quantify how herbivory and soil fertility interact to influence the ongoing restoration efforts of *Ludwigia repens* in the Comal River. To study this interaction, we designed cages to encircle individual plants that either allowed space for herbivores to move or completely excluded them. Half of the plants in each type of cage were treated with a slow-release fertilizer. After two weeks, every plant open to herbivory was gone, regardless of soil fertility treatment, and after 6 weeks there was noticeable herbivory on the plants that were in cages designed to prevent it; the overall herbivory was greater than anticipated. Herbivory in the upper Comal, particularly by crayfish, appears to be much more severe than previously thought and increased soil fertility could exacerbate the issue in *Ludwigia repens*.

Bowling, Greta
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Teaching Environmental Stewardship Through Use of Outdoor Classrooms: A Multi-Campus Restoration Initiative. TCC Conservation Coalition

In a time where natural areas are fewer and farther between due to urban sprawl, educating youth and the community about the benefits of essential ecosystems is of utmost importance. Colleges and universities across the nation have heard the call to action and have seen the benefits outdoor classrooms have on promoting land stewardship as well as student success and retention. Tarrant County College has over 800 acres of land spread across five major campuses. Each campus has designated a fraction of its land to house sustainability initiatives with the aim to connect students to nature through outdoor classrooms. Recently, a group of faculty, staff and administrators across the district came together to form the TCC Conservation Coalition. The aim of this committee was to combine the efforts of all campuses to support a vision of experiential learning as well as to foster a culture of land stewardship among students, faculty and the community. With the multitude of restoration strategies employed across the campuses, TCC is able to demonstrate to students and the community that there is more than one way to restore habitat and approach environmental problems. Tarrant County College wants to use its natural areas to combine classroom and field experience to help students apply their learning to living in the community. With the establishment of this type of learning into our curriculum, we can focus on building collaborative learning communities and directing our students to understanding the value of constructing relevant connections between theory and practice.

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Assistant Professor
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Upper Coastal Texas Representative
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……..

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Monitoring Small Mammal and Breeding Bird Community Patterns in a Managed Blackland Prairie Remnant in Northcentral Texas

The Clymer Meadow Preserve, in northcentral Texas, represents a remnant of the Blackland prairie ecosystem. The *ocean of grasses* this remnant once was a part of has been largely fragmented through land conversion for cultivation and urban development, and experienced widespread suppression of natural disturbance patterns important to maintaining this unique region. Achieving long-term conservation requires monitoring of ecosystem indicators, such as important faunal communities through measuring responses to management. We measured differences in abundance and species richness of small mammal and avian communities, and variables related to the vegetative matrix in which they are distributed over two years and across all seasons in four land units with different disturbance and management histories. Data were collected by performing mark-recapture trials with small mammals, point-counts with birds, and vegetation surveys. We used ANOVAs to compare differences in measures across units, seasons and years where appropriate. We then used PCA to reduce dimensionality between vegetative variables measured and ran scores as predictor variables in GLMs to model mean relative abundance estimates of fauna in multiple linear regressions. Lastly, we ran Spearman's rank correlation tests to detect patterns in abundance between faunal communities. Litter cover and depth, and height of forbs were among the most important variables identified in predicting small mammal community abundances and species richness, as well as ground-nesting birds. Additionally, the faunal communities tended to show significant positive correlations in abundance patterns.

Carroll, Kelly and Olivia Roybal
Authors: Carroll, K., Roybal, O., Lenihan, M., Reynoso, K., and Lyons, K.
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The Effect of Disinfectant and Stratification on the Germination Rates of Five North American Milkweed Species

Propagation of native milkweed species is critical to restoration efforts to re-establish larval resources for monarch butterflies. Nonetheless, studies on the germination and growth requirements for individual milkweed species are lacking and most recommendations are not specific species. We aimed to assess the effect of bleach disinfectant and stratification for five native milkweed species often used in restoration: *Asclepias asperula*, *A. speciosa*, *A. syriaca*, *A. tuberosa*, and *A. viridis*. We hypothesized that lower latitude species would respond negatively or neutrally to stratification. We also hypothesized that germination of most species would improve with some level of bleach treatment. We utilized a 5 x 4 x 2 factorial design with species, bleach concentration, and stratification as treatments. Each treatment combination (x40) had ten replicate petri dishes of ten seeds. Seeds were either stratified at 2°C for two weeks on moist vermiculite, or not, and then placed on moistened filter paper and exposed to one of four bleach treatments (0%, 5%, 10%, or 15%) for five minutes. They were then sealed with Parafilm. We measured days to radicle emergence and total number of radicles daily for fourteen days. Our results indicate that lower latitude species do not require stratification, and that overall germination in temperate species improves after stratification. Pathogen colonization was less prominent in treatment groups that included a bleach treatment, although several species were negatively affected by combined bleach and stratification treatments. These results suggest that generalizations regarding germination requirements of native milkweeds should be made with caution.

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Collins, Georganna
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Natural and Nature-based Features for Coastal Protection

Working with Nature is an integrated process which involves means and methods to develop win-win solutions with respect to nature and projects that provide economic development and coastal protection. Working with nature has become a program launched in 2013 called Engineering With Nature (EWN) at the U.S. Army Corps of Engineers' Engineering Research Development Center that enables more sustainable delivery of economic, social, and environmental benefits associated with water resources infrastructure projects, such as navigation channel maintenance and inland stormwater management. As part of this EWN Program, in response to Hurricane Sandy recovery efforts, in 2015 a report on the Use of Natural and Nature-based Features (NNBF) for Coastal Resilience was prepared classifying NNBF, characterizing vulnerabilities, developing performance metrics, and addressing key policy challenges. To date, international guidelines are being developed to inform the conceptualization, planning, design, engineering, construction, and maintenance of NNBF used to support resilience and flood risk reduction for coasts, bays, and estuaries. This presentation highlights NNBF Guidance Document content addressing beaches, dunes, barrier islands, marshes, seagrass beds, and reefs.

Concilio, Amy L.
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Vegetation Response to Prairie Restoration Treatments at an Urban Park in Travis County, TX

Urbanization and sprawl have led to dramatic losses in biodiversity due to habitat fragmentation and degradation. Restoration of urban green spaces can serve to ameliorate some of these negative ecological impacts, while simultaneously increasing recreational and cultural opportunities for nearby residents. We analyzed vegetation response to a relatively large-scale (40-acre) prairie restoration effort at an urban park in Austin, TX, to evaluate its success from an ecological perspective. The restoration treatments and most of the data collection were conducted by the Commons Ford Prairie Restoration Organization and partner organizations. In 2011, herbicide was used to remove mesquite and invasive grasses. Following this, the land was tilled and planted with a seed mix of 70 native grasses and forbs in 2012, and a prescribed fire took place in 2013. In spring of 2010, pre-restoration vegetation surveys were conducted along 9 established transects, 20m in length. Post-restoration surveys have been conducted annually since 2012 in the same locations. Pre-treatment, invasive grasses (Bermuda grass, KR bluestem, and Johnson grass) made up about 91% (± 5.8, SD) of the plant cover, but they were reduced dramatically to 4 -18% in the years following treatments. In 2017, a total of 93 species of grasses and forbs were identified along the transects, and several others were present at the site but not captured. Overall, the restoration has been hugely successful in terms of increasing biodiversity at the site, and can act as a model for other urban prairie restoration projects.

Witt, Daniel
Authors: Witt, D., Melton, A., Smith, C., Potter, G., Talbott, W., and Baxter-Slye, J. L.
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Establishment of American Kestrel (Falconidae: *Falco sparverius*) Nest Boxes in North Central Texas to Understand Population Decline and Promote Conservation Education

The American Kestrel (*Falco sparverius*) is the smallest North American falcon and has historical widespread distributions. However, abundances have been steadily declining since the 1960's. The Peregrine Fund established the American Kestrel Partnership (AKP) in 2012 in response to kestrel declines. The AKP is a network of citizen and professional scientists that build and monitor nest boxes to understand kestrel demographics and advance conservation. The University of North Texas Ecology Program became a partner in spring 2016. Undergraduate students built and installed six nest boxes in Denton, Texas. Three boxes are located at UNT's Discovery Park campus in association with a native tall grass prairie reconstruction project. Two boxes were installed at the UNT Water Research Field Station, and one at the UNT Rafes Urban Observatory. Regular monitoring of nest boxes documented kestrel activity observed in all three locations. In the winter of 2016/2017, three kestrels were captured and banded near the Discovery Park boxes by Dr. Jim Bednarz. In the summer of 2017, invasive European Starling nests were removed from two boxes in preparation for migrating kestrels in the fall. Boxes will be continuously monitored by UNT undergraduate Ecology students for activity, presence of eggs, and if successful establishment occurs, brood size, fledgling dates, and juvenile banding. Observational data, as well as feathers obtained from juveniles and adults for genetic analysis, will be given to the American Kestrel Partnership to add to the nationwide effort to understand kestrel distributions.

Walder, Bethanie
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Certified Ecological Restoration Practitioner (CERP) Program

Over the last several decades, the relatively new field of ecological restoration has rapidly grown, both in number of projects and in number of practitioners. However, professional standards for practitioners are minimal at best, resulting in inconsistent project quality. As one way of addressing this problem the Society for Ecological Restoration (SER) launched a new certified ecological restoration practitioner (CERP) program to create a high professional standard for practitioners throughout the world. Certification is based on a combination of knowledge and experience, and also requires adherence to the SER code of ethics and an understanding of SER's foundational documents. By promoting practitioner standards, SER hopes to improve ecological restoration and the associated benefits on the ground. Certification will also have numerous other benefits: 1) individuals can improve their professional status through formal recognition of their training and experience, 2) academic institutions with ecological restoration degree programs can use the knowledge requirements to evaluate curricula so that graduates will have the core competencies specific to the field; and 3) employers, agencies, organizations, and the general public will benefit by easily being able to identify those practitioners who meet the high standard set by SER. You can find out more about the program benefits and requirements at http://www.ser.org/page/certification.

Cork, Karlee
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Home Range Size of Montezuma Quail in the Capitan Mountains of New Mexico

Of the 6 North American quail species, Montezuma quail (*Montezumae cyrtonyx*) are one of the least researched. Due to difficulties in capture and survey, not many studies have been successful obtaining more than anecdotal information about their ecology. Two other studies have used radio telemetry to monitor movements, and no studies until now have used GPS units to achieve fine-tuned information about movements. The study was conducted on the Fort Stanton Snowy River National Conservation Area in Lincoln County, New Mexico. The New Mexico BLM in the area is attempting to create more useable Montezuma quail habitat by mechanically removing juniper and pinon pine trees. Using both known and novel capture methodology we captured 62 Montezuma quail from 2015 – 2017. Of those 62 captured 51 were equipped with radio-telemetry. Seventeen acquired enough data points to estimate home ranges. The average home range for Montezuma quail on the study area was 24 ha, with the smallest range being 3.85, and the largest 92.21. Average home range was twice as large as home ranges recorded in other studies. These documented differences may be due to management practices in the area or environmental differences.

Crawford, Priscilla H. C.
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Status of Aquatic Invasive Plants in Oklahoma's Lakes: Year Two of a Four Year Survey

Prior to this project no one has conducted a comprehensive survey of invasive plants across Oklahoma. Consequently, our knowledge of the geographic distribution of invasive species within the state is poor. Partially funded with a State Wildlife Grant, I have completed two years of a four-year survey of eight aquatic invasive plants that are considered of particular interest by the Oklahoma Department of Wildlife Conservation. Surveys started in the spring of 2016 looking for Yellow Iris (*Iris pseudacorus*) at bridge crossings on the Blue River, because of the known infestation on private land NW of Connerville, OK. No irises were observed at any bridge sites. Boat ramps and docks, fishing piers, marinas, and swim beaches of public lakes are the focus of the targeted species surveys because of the likelihood of introduction at these sites. After two field seasons, I have examined over 180 public access points at 70 lakes, primarily in eastern Oklahoma. I found significant infestations of Eurasian Milfoil (*Myriophyllum spicatum*) at three lakes. I found abundant infestations of Parrotfeather (*Myriophyllum aquaticum*) at three other lakes. I found a small population of Alligator Weed (*Alternanthera philoxeroides*) at one boat dock at Pine Creek Lake. I found a single Hydrilla (*Hydrilla verticillata*) at a small southeastern lake. Lake managers and ODWC's Aquatic Nuisance Species Biologist were notified of these populations. I am currently testing eDNA techinques that may help detect invasive plants from water samples.

Senula, Sarah
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Ecological Niche Models of Eight *Trachymyrmex* Species

Fungus-gardening (attine) ants form an obligate symbiosis with certain fungi; one partner cannot survive without the other. Attine ants are found only in the tropics and temperate regions of North and South America. About fifteen attine species are found in the US. Fungus-gardening ants can have a large effect on their ecological systems, for they harvest a great amount of plant biomass to feed to their fungal cultivars. Furthermore, because they must excavate chambers for their fungal gardens, they are responsible for soil movement within an ecological system and sometimes are referred to as "ecosystem engineers". Ecological niche models were created for eight *Trachymyrmex* species that occur within the continental United States based on species collection data and 39 different environmental layers, including climate and soil data. Species within the higher-attine *Trachymyrmex* genus have a large distribution; however, by far, the species *Trachymyrmex septentrionalis* has one of the most widespread distributions that extend from Southern Texas to New Jersey and New York. With these models, we can better understand what factors contribute most in the distribution of these neo-tropical higher-attine species.

Romo, Rachel
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Ecological Niche Model and Haplotype of *Pogonomyrmex comanche* Colonies

Pogonomyrmex is a genus of harvester ant found in mostly arid regions from northern to southern America. Their major ecological role is distributing wild flower seeds across the prairie like areas. *P. comanche,* is restricted to the fine grain, sandy soil regions of Texas, Arkansas, Oklahoma and Louisiana. *P. comanche* is also state listed in Texas as Threatened. Their habitat and genetic diversity are being threatened by human interference and fragmentation. Unlike the other species found within this genus, little is known about their mating habits or life histories. To answer these questions, population genetic analysis and ecological niche modeling was conducted. Specimens were collected from 7 locations in Texas, 1 in Oklahoma, and 2 Arkansas. Two individuals from each colony collected were used for phylogeographic analysis with mitochondrial COI and COII primers. The data were analyzed and a haplotype network was created to analyze the relatedness between colonies. For the ecological niche modeling, 39 different environmental and soil layers were used to create the map. Ecological niche models are used to show where potential habitats are located. With this map, future colonies could be located if the soil and environment conditions match current colony locations.

Crenshaw, Keith
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Restoring Pollinator Meadows along the Bayou Greenways System in Houston, Texas

The Bayou Greenways 2020 Project is transforming 3,000 acres of land along the bayous of Houston into linear parks with 150 miles of hike-and-bike trails connecting the Houston and Harris County parks and communities like never before. By creating a network of connected parks and trails along the major waterways, Houstonians are able to connect with nature in a new and exciting way. Out of the Wildflower Meadow project, 75 acres (out of 380 acres) have been converted into pollinator meadows over the past two years (2015-2016) providing a key habitat component into the greater Houston ecosystem. The struggles of finding wildflower seed for such a large project have brought about some unique hurdles to overcome. An additional 50 acres of pollinator meadows will be established this fall enhancing the recreation, conservation and active transportation in Houston.

Dodd, Lynde L.
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Dallas Floodway Extension Lower Chain of Wetlands and Grasslands: A Case Study of the Adaptive Management Approach in Ecosystem Restoration

Working within an adaptive management (AM) framework for ecosystem restoration projects requires monitoring that includes the collection and analysis of quality biotic and abiotic data. These data must be legally defensible because of their use in the AM decision making process, especially in high profile aquatic ecosystem restoration projects authorized by the federal government, which are highly scrutinized by non-governmental organizations, stakeholders, or other entities. Quality assurance and quality control of the data are especially important as adaptive management strategies are employed. Consistency among data collection methodologies is paramount to ensure data comparability over the duration of the project. However, situations may arise in the field that challenge the ability to remain consistent in data collection methodologies. While these challenges may persist throughout the project, reliable data collection can be achieved.

In this presentation we will discuss AM approaches for ecosystem restoration elements of the Dallas Floodway Extension: Upper Chain of Wetlands and Grasslands. We will also explore the lessons learned that revolve around monitoring of a 10-year multi-purpose floodway project where highly dynamic site conditions call for prompt and decisive management action for corrective measures. Herbivory, water level and flow rate fluctuations, overbanking events, nuisance species and unintentional/intentional management activities by others sharing right-of-ways within the same project footprint are examples of unpredictable perturbations to a restoration project. All of these natural or anthropogenic interventions may alter the way in which monitoring data are collected and interpreted, and ultimately how AM strategies will be developed and subsequently implemented.

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Northern Bobwhite Habitat Restoration in a Landscape Dominated by Non-Native Grasses

The Northern bobwhite (*Colinus virginianus*) has exhibited precipitous declines across its geographic range, due primarily to habitat loss and fragmentation. However, populations in South Texas have remained relatively stable to date. Unfortunately, this stronghold is being threatened by the invasion and establishment of non-native grasses, particularly buffelgrass (*Pennisetum ciliare*) and Old World bluestems (*Dichanthium* spp.). These grasses invade and replace native-vegetation communities, thereby reducing available habitat for bobwhites. As a result, we are attempting to restore a 109-ha area originally dominated by these grasses. We began our restoration treatment in 2014 by repeatedly disking and aerially applying glyphosate across the site to exhaust the seed bank and prevent these grasses from reestablishing. We then drill-seeded a diverse assemblage of native, locally-adapted grasses and forbs in October 2016. In April 2017, we transplanted woody-plant seedlings onto the site. As the restoration progresses, we are monitoring bobwhite site use before, during, and 2-years post-restoration treatment using radio-telemetry, attaining locations 2-3 times per week. Following planting, bobwhites have begun to use the site regularly and several nests have been discovered. We expect increased use through time as the native-plant community further establishes. Our results will provide valuable insight to landowners in restoring habitat for bobwhites as non-native grasses continue to spread and naturalize.

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Introducing the 'Pollinative Prairie': An Undergraduate Education Experience to Reconstruct a Native, North Central Texas Tall Grass Prairie in an Urban Setting to Promote Urban Plant and Pollinating Insect Biodiversity

Native Texas tall grass prairies are endangered. Habitat loss and fragmentation from agricultural and urban land use are primary causes for prairie biodiversity decline. To promote urban biodiversity and education, the University of North Texas Ecology program founded the 'Pollinative Prairie' at UNT's Discovery Park campus. Since the project inception in spring 2016, over 150 student volunteers have worked to reconstruct four acres of Bermuda grass-dominated pasture into a native tall grass prairie through a combination of herbicide, solarization, mulch, and mechanical techniques. A native prairie seed mix was sown on research plots fall 2016. Prior to seeding, semi-annual BioBlitzes identified common insect and plant taxa to provide a baseline dataset. The most abundant insect orders spring 2016 were Hemiptera (8 families), Coleoptera (3 families), and Orthoptera (2 families). In the fall 2016, we report Hemiptera (10 families), Coleoptera (4 families), and Hymenoptera (4 families). The most overall-abundant plant taxa included the families Euphorbiaceae, Asteraceae, and Solanaceae. The observed plant and insect species represented taxa that were already widely common in north central Texas. Post seeding observations in fall 2017 report 11 of the 30 forbes and grasses from the native seed mix successfully growing, primarily in the herbicide research plot. Semi-annual BioBlitzes through 2021 and the undergraduate Ecology Laboratory will continue bioassessments to determine increases in biodiversity and ecological function, as well as teach the public about the importance of protecting pollinator populations, such as Monarch butterflies and native bee species perhaps even in their own backyard.

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Winter Ecology of a Declining Grassland Bird, the Sprague's Pipit (*Anthus Spragueii*)

The Sprague's Pipit (*Anthus spragueii*) is a passerine of North American prairies, breeding in northern United States and southern Canada, and overwintering in the southern grasslands and deserts of United States and into Mexico. Over the last several decades, pipit populations have declined in both breeding and wintering ranges as a result of degradation and loss of native prairie. Previous research on this species has primarily focused on their breeding habitat, providing limited information on their wintering habitat. To help fill in these data gaps, we assessed wintering distribution and abundance along the Texas Gulf Coast Plain, as well as local-level habitat associations. We used a distance-based line transect sampling technique to estimate pipit densities during the winters of 2013 – 2014 and 2014 – 2015 at seven private, federally, and state managed sites. We found Sprague's Pipits at all of our sites, with overall densities estimated at 0.07 (95% CI = 0.19 – 0.31) the first winter and 0.1 (95% CI = 0.05 – 0.18) the second winter. Number of detections varied greatly between sites with the most detections at the Attwater's Prairie Chicken National Wildlife Refuge. Pipits were most likely to occur at low levels of vertical cover below 0.5 m (peak at 10%) and sites with 20-40% cover of bare ground. While pipits are considered native grassland specialists in their breeding range, proportion of native grasses was not an important variable in our analyses. Our results indicate that habitat management to benefit wintering populations of this species should focus on vegetation structure rather than species composition.

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Effects of Concrete Channelization on Aquatic Biodiversity: A Case Study of White Oak Bayou in Houston, Texas

Bayous are an essential component of water conveyance in Houston, Texas, but they also are an important ecosystem. Many bayous in and around Houston have been channelized to allow for increased flow, and in some places channelization has included lining the waterway with concrete. While concrete lining prevents erosion, it may have detrimental impacts on the bayou as an ecosystem. Ecosystem health is intrinsically important and also has been tied to human health and wellbeing through ecosystem services. This study measures how concrete lining affects the ecological health of White Oak Bayou, a channelized bayou in Houston, through a biodiversity survey of aquatic invertebrates. I find that the concrete-lined portion of the bayou has decreased diversity as compared to the unlined portion. However, the lined portion has a higher abundance of some organisms, such as caddisfly larvae, which could be due to the substrate being less complex with fewer opportunities for refuge. Overall, these results indicate that lining White Oak Bayou with concrete has decreased the health of the ecosystem by changing the species composition. Future maintenance projects in White Oak Bayou and other watersheds should take into account the tradeoffs of transporting water faster versus the health of the bayou ecosystem and its related effects to human health.

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Prescribed Fire's Effect on Plant-Microbe Interactions in Tallow-Invaded Coastal Prairie

Invasive plant species are a major threat to native biodiversity in the Texas Coastal Prairie. In addition to directly influencing native plants through competition, invasive species can indirectly influence the performance of native species by altering the composition of soil microbial communities. Managing invasive species, including their soil legacy effects, is critical for the future conservation of the coastal prairie. Prescribed fire is often used for the restoration and maintenance of coastal prairies. However, fire's effect on microbial communities post invasion has not been addressed. It is possible that multiple disturbances (invasion and fire) may alter soil microbial communities in non-additive ways that make it difficult to predict how soil microbes will influence the relative performance of native and invasive species. Here, I describe a proposed experiment to test how fire and invasion interact to influence plant-microbe interactions. This information will provide insight into the efficacy of restoration using prescribed burns and could demonstrate need for further work to establish best management practices for regenerating a healthy ecosystem.

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The Role of Below-Ground Mutualists in Above-Ground Plant-to-Plant Communication

Variation in herbivory may drive differential fitness outcomes and alter plant population dynamics. While herbivory is generally viewed as an interaction between a single plant and its herbivores, recent work suggests that third parties -- including mutualists and other plant species -- can mediate herbivory. For example, herbivory in plants triggers the release of airborne "warning signals" known as volatile organic compounds (VOCs) that pre-emptively upregulate conspecific neighbors' chemical defenses, leading to shifts in herbivory rates on both the emitter plants and receiver plants. Likewise, below-ground mutualists may alter the concentration and composition of VOCs in their associated host plant. The interaction of above-ground communication plant-to-plant communication and belowground association with microbial mutualists, however, is relatively unexplored. Given the ubiquity of below-ground mutualisms, knowing how below-ground mutualists mediate above-ground plant-to-plant communication is critical for understanding the community-level effects of mutualisms.

Solidago altissima, a prairie forb, has demonstrated high intra- and inter-colony variation in herbivory rates. Furthermore, *S. altissima* frequently associates with arbuscular mychorrhizal fungi (AMF), which is known to alter both the nutrient content and chemical defenses of above-ground leaf tissue.To test the effect of soil mutualists on plant-to-plant communication, I am manipulating the presence of AMF and herbivory pressure on *Solidago* to induce emission of VOCs, and measure subsequent herbivory rates of neighboring *Solidago*. I predict that AMF will increase the effectiveness of plant-to-plant communication, such that plants exposed to cues from neighboring plants with AMF will experience less herbivory than plants exposed to cues from neighboring plants without AMF.

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Chinese Privet: Lost Cause or Just Reason to Pause

Anyone in Texas working in an understory setting is familiar with Chinese privet. Often the scope of these infestations are simply daunting. With eradication unlikely, the long term commitment required to achieve even a satisfactory control of this woodland menace can make even the most optimistic land manager ask why even bother. At LLELA our approach, and more importantly the attitude we take in our approach, has changed the face of our Chinese privet control program. Instead of being one of "those dreaded tasks" we find that volunteers look forward to the cooler days when we venture into the woods, weed wrenches in hand. I now use our most active privet removal site as a talking point of inspiration to the cause of ecological restoration.

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Legacies: Are We Missing the Mark?

Regardless of how you describe it: conservation, preservation or restoration, as a collective profession are we missing the mark? Preserving parcels of land, saving rare plant communities or bringing back what once was… Why? To what end? If we collectively cannot connect with the nearby communities, all of the decades of hard work are at risk to being for not. We need to set down some of the ivory tower and technical jargon and share what we do and why with all who will listen. Finding ways to engage the public with the work we do or at least open their eyes to the concepts is one of the few ways to truly create a legacy for the lands that we pour our heart, sweat and blood into. We have to share our stories…

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The Effects of Warming and Altitude on the Distribution of Root Fungal Endophytes

Climate change-induced global warming has caused significant and observable shifts of grass species to higher elevations and latitudes. Many grass species host leaf and root-dwelling fungi (fungal endophytes) that can improve tolerance to warming and concomitant drought stress; however, little is known about the identities and habitat ranges of these fungal symbionts or symbiont sensitivity to climate change. We used previously established plots at the Rocky Mountain Biological Laboratory, Gothic, CO, USA, to ask: 1. Which fungal endophytes are associated with grass species at the middle and extremes of their elevational gradient; and 2. Do fungal endophyte associations change with warming? Question #1 was addressed utilizing three sites in the Upper Gunnison River Valley. From each site, roots of nine grass species were sampled from six individuals at mid- and high-elevation habitats. Question #2 was addressed utilizing a twenty-year warming study, likely the oldest of its type in the world. In this investigation, five pairs of 10 x 3 m plots are assigned to either ambient (control) or warmed (2°C) treatments. Three grass species were selected for sampling. From each plot, roots were collected from three individuals per species for a total of nine/plot. All collected roots were prepared for root staining to detect the presence of fungal endophytes and cultured to isolate individual fungal endophyte species. In addition, all isolates are being identified using Sanger sequencing with fungal specific primers. Preliminary results and techniques used in the collection and processing of these samples will be presented.

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Assessment of the Restoration Ecoculture Methodology for Conservation – A Comparative Study of Agricultural Systems

Increasingly, land-use conversion threatens high biodiversity ecoregions and offsets ecological restoration gains. An innovative methodology, Restoration EcoCulture, seeks to resolve this conflict. Restoration Ecoculture (REC) is the theory and practice of restoring indigenous ecosystems to their pre-Columbian state, while sustainably managing and harvesting nut-producing trees and other native edible species in an ecological farm situation. Although Restoration EcoCulture has great potential to reconcile agriculture to the goals of ecological restoration, it has yet to be tested. However, ecological agriculture methods such as agroforestry and rotational grazing, which have many correlations to Restoration EcoCulture, have documentation. Using ecoagriculture in place of Restoration EcoCulture, this study seeks to survey the effectiveness of existing ecological agricultural systems in increasing food production, economic profitability, and ecological protection compared to conventional and organic agricultural systems. By surveying a variety of variables in nutrition, economics, and ecology, the research evaluated how eco-agriculture minimizes the impact of agriculture on natural habitats and their conservation. In addition, the study surveys how Restoration EcoCulture addresses the issues on which current ecoagriculture methods clash with ecological restoration principles.

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Plateau: The "New" Silver Bullet for Johnson Grass

Even though it has been around for more than 20 years, plateau (now Panoramic 2SL) seems to be a little known herbicide that works amazingly well in controlling Johnson grass (*Sorghum halepense*). The effectiveness of this product for prairie restorations where Johnson grass is present makes it worthwhile despite the costly price tag. Success in a few application areas have triggered aggressive Johnson grass control efforts at LLELA.

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Funding the Long-term Restoration Efforts on the C.L. Browning Ranch – Blanco County

In 2002, the owners of the C.L. Browning Ranch – Blanco County, Texas began documenting their attempt to increase plant diversity, improve wildlife habitats, and slow down the flow of water. They would now like to establish an endowment to fund the continuing restoration efforts on the 977-acre ranch.

Through conversations with lawyers, realtors, land trusts, investment professionals, landscape architects, and others, we have explored 1) conservation developments 2) purchased conservation easements, (3) donated conservation easements, (4) species mitigation banking; and (5) agricultural research organizations.

This presentation will focus on the suitability of each option for the C.L. Browning Ranch, including the policies, financial considerations, legislation, and market forces involved. Relevant financial information will be shared to project how each option will assist in our efforts to establish an endowment.

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Urban Ponds: An Important Source for Dragonfly Diversity and Conservation in Denton, Texas

The City of Denton, located in a semi-arid region of Texas, has over 200 manmade ponds within its city limits. Many of these ponds, located in densely populated areas, are engineered to control storm water runoff. There is a general lack of recognition of the value these waters contribute to regional biodiversity and as greenspaces. This study, conducted in Denton, is monitoring habitat variables and macroinvertebrate diversity in a series of ponds selected to represent a gradient of urban influences. The objective of this study is to identify the variables associated with the highest diversity. This presentation focuses on one component of the study, the charismatic species, dragonflies (Odonata) and their diversity. The study has determined that the storm water ponds have comparable levels of diversity, but differing odonate species composition. The ponds contribute to the natural resources in the city by providing beautiful, green spaces. Results of this study will be used to develop a conservation plan to maximize the aquatic health of the ponds and if implemented, contribute to the sustainable development in Denton.

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Beneficial Microbe Interactions Enhance the Growth of Sideoats Grama (*Bouteloua curtipendula*) When Grown Together with Bermuda Grass (*Cynodon dactylon*)

Beneficial microbe interactions play a critical role during the establishment of native plant communities throughout different successional stages. Beneficial microbe interactions have thus become an effective tool for projects that involve native species restoration in areas dominated by a non-native invasive. In this study we assessed the effects of soil fungi and bacteria on the growth of the native perennial Sideoats Grama when grown together with the non-native perennial Bermuda grass. The study was conducted using indoor lighting and plastic cones. The experimental units for this study included cones, each with individual Bermuda grass, Sideoats Grama, and both seedling species together. Different groups of 12 seedlings from each experimental unit received: native soil inoculum, autoclaved native soil inoculum with fungicide and antibiotic, native soil inoculum with a fungicide, native soil inoculum with antibiotic, no inoculum with fungicide, no inoculum with antibiotic and a group received no inoculum to be used as controls. Results from this study show that Sideoats seedlings treated with a native soil inoculum had greater root and shoot biomass than untreated seedlings. Bermuda grass seedlings treated with the Sideoats native soil inoculum showed no significant growth compared to controls. The fungicide and antibacterial treatment confirmed that the growth observed in Sideoats Grama is attributed to the microbial activity and not the chemistry of the native soil inoculum. Beneficial microbe's interactions using native soil inoculums could increase the rate of Sideoats Grama establishment when grown in areas dominated Bermuda grass.

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Large Scale Grassland Conservation Support Through a Public-Private Partnership: GRIP (Grasslands Restoration Incentive Program) and the Oaks & Prairies Joint Venture

In response to declines in many grassland species populations like grassland birds including Northern Bobwhites, pollinators, and monarch butterflies, the Oaks and Prairies Joint Venture (OPJV) partner state agencies, federal agencies, and non-governmental conservation organizations implemented the Grassland Restoration Incentive Program (GRIP) in portions of Oklahoma and Texas. The primary objective of this program is to increase the populations of target bird species by increasing the amount of suitable habitat available to them on the landscape. GRIP provides direct payments to landowners for approved practices that are aimed at addressing the greatest limiting factors for grassland habitat suitability in the project area. Since 2013, GRIP has provided over $1 million in incentives for over 60,000 acres of grassland habitat practices. GRIP is supported by a biological planning, research, bird monitoring, and habitat tracking efforts in an adaptive management framework. This includes over 8,000 grassland breeding bird point counts each spring as well as covey call count surveys in the fall in select areas. Additionally, the OPJV partners developed a Grassland Management Inventory Tool (G-MIT) which is used to organize spatial and vegetative data for each project area, treatment, and resulting habitat. This G-MIT system provides an important tool that can be used across programs and organizations to track progress toward shared conservation goals. Data from these efforts are being used to link research and monitoring efforts with conservation delivery efforts in an adaptive management framework to support achievement of shared conservation objectives OPJV partners worked together to develop.

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Preliminary Analysis of Plant Community Response to Prescribed Fire and Mechanical Thinning in the Eastern Edwards Plateau

Abstract: Prescribed burning and mechanical thinning are used as restoration treatments in savannah grasslands around the world. Few studies document the vegetation response to these treatments in Texas, and almost none span more than a few years or more than a few treatments. In the present study, 134 vegetation transect surveys were conducted over a period of 12 years along 36 transects representing approximately 7000 acres, capturing the vegetation response to 41 prescribed burns, 19 mechanical thinning treatments, and 40 rest intervals. This preliminary analysis covers changes to canopy cover, woody plant species composition, and seasonal effects of prescribed burning.

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A Visit with SER Nepal

In March TXSER board member William Forbes visited SER Nepal as part of a trip to plan a service-learning study abroad course at Stephen F. Austin State University. SER Nepal was started by a young scientist/researcher, with Dr. Dhananjay Regmi becoming chapter president in 2011. Dr. Regmi studied at the University of Arizona under restorationist Don Falk and received his Ph.D. in geography from Japan. The chapter has conducted the following activities: 1) planted over a thousand trees along the sacred Bagmati River within the city of Kathmandu, involving numerous community organizations and volunteers; 2) planted landscaping trees at Kalkani, a key western entry/exit point of the city that receives more air pollution than other parts of the city; 3) established a tree nursery at Chalnakhel on the southern outskirts of Kathmandu, to support future tree planting initiatives of SER and other organizations; 4) built over 500 bamboo houses, specially designed to withstand future tremors, for villagers displaced by the April 25, 2015 earthquake. As with many restoration projects around the world, natural and human-caused challenges occur, such as plant survival and competing land use. Future activities may include: 1) more tree plantings to reduce erosion, flooding and pollution; 2) research on what trees are best at air pollution mitigation; 3) construction of “rain gardens” around village wells, to assist infiltration and storage of groundwater; 4) and possibly a tree planting including Texas students in 2018!

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Leaving The Slash In Place Following Thinning Ashe Juniper From Texas Hill Country Grasslands

The Edwards Plateau of Central Texas exemplifies the global phenomenon of indigenous woody plant encroachment into grasslands. The present study in Blanco County investigates a grassland management technique where felled *Juniperus asheii* trees are left in place after cutting. This method, coined 'The Juniper Blanket ', has anecdotally shown to stabilize the soil, reduce erosion and provide favorable conditions for grass growth as well as desirable woody species. Treatment plots consisting of juniper removal, juniper blanket, and control plots were established in both a woodland as well as a grassland setting and monitored for eight months. In addition to monitoring plant assemblage, soil moisture and the soil seed banks will be examined as well. At this early stage, the soil seed bank has shown no emergence of plant species. Preliminary results show soil moisture is higher under the juniper blanket plots in the woodland as compared to both the juniper removal plots and the control plots in the woodland. In the grassland, the same was not observed. Based on anecdotal evidence, plant diversity is expected to increase where the 'Juniper Blanket' method is applied due to changes in the microclimate conditions. There is the potential that the findings of this study could be applicable to land management in the Texas Hill Country.

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Bald Cypress (*Taxodium distichum*) Dominated Riparian Restoration along the Lower Pedernales River, Travis County, Texas

In the fall of 2017, 13 graduate students in the Biodiversity Conservation course at St. Edward's University in Austin, Texas were assigned a working group project to assess and make recommendations for the restoration of riparian forest along the lower Pedernales River. The primary area of interest is a 2 mile stretch of the river between Hamilton Pool Preserve and Milton Reimers Ranch Park. The project is equal parts mystery solving and restoration project as almost no bald cypress (or other woody riparian species) exist beyond 1-2 years of age are present in this stretch of river, though adequate seed source exists upstream. This paper will update the current status of the project and seek additional input from practitioners as it goes forward.

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Upper Whites Branch Stream Restoration at Bluestem Park

This presentation will focus on issues related to the design, permitting, and construction of an ephemeral stream restoration project in a suburban area. The presentation will cover upfront planning, permitting, design, construction, and management.

The upper reach of Whites Branch is an ephemeral stream on the Fort Worth prairie located within the ongoing Alliance Town Center mixed-use development. Planning for this development began in late 2012. One of the key questions for this development was how to handle a stock pond formed by a 50-year dam and ephemeral stream flowing through the development. The dam and stock pond presented inherent safety concerns, necessitated strict maintenance and reporting requirements, and posed significant water conservation issues. After the project team evaluated the site in light of the development, it was determined that removing the pond dam and restoring a natural stream channel through the former pond was the most desirable option.

The restoration activities involved waters of the U.S. which were under the jurisdiction of the U.S. Army Corps of Engineers, which necessitated a Section 404 permit. The dam removal and other related restoration work was accomplished using Nationwide Permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities), which required the project proponent to construct the restored stream segment to a near natural condition. The natural stream design for the restoration focused on geomorphologic factors such as gradient, sinuosity, capacity, and sediment transport characteristics. Ecological factors included native vegetation and wildlife habitat potential. A series of natural stone (native to the site) drop structures were designed to provide grade control and create a natural complex of riffles and runs, mimicking nearby natural streams.

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Herpetological Communities Within Artificial Wetlands Complexes: Does Size Matter?

Wetlands are critical habitats for a wide variety of taxa. However, they are in peril as 52% of Texas wetlands have been drained, dredged, filled, or flooded. In response, many conservation agencies have made efforts to create artificial wetland complexes, but because over 95% of the land in Texas is privately owned, large parcels of land with the potential to be reconstructed into wetlands are a rarity in the open market. Smaller plots of land may be more available to convert to wetlands, however, but little is known about how much biodiversity they can support in comparison to larger artificial wetlands. We used drift fencing combined with funnel traps and pitfall traps to measure the herpetological communities at two artificial wetland complexes that drastically varied in size: (1) the Texas A&M University Commerce artificial wetlands; and (2) the Cooper Lake WMA. Using total abundance, species richness, Shannon Weiner Diversity Index, and species equitability, we found that the smaller wetland complex had greater total abundance and species richness, while the larger wetland had a larger Shannon Weiner Diversity Index and greater species equitability. Future wetland conservationists should utilize smaller areas that can be transformed into wetland habitat as these areas can support large amounts of biodiversity.

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Sparrow Use and Site Fidelity of the Restored Prairie at the Lewisville Lake Environmental Learning Area in North-Central Texas

With the assistance of volunteers, we used mist nets to capture and band grassland sparrows during winter at the Lewisville Lake Environmental Learning Area (LLELA) in North Texas, 2013–2017. Species abundances, age ratios, condition indices (mass/wing chord) were assessed during four consecutive winters. The most abundant species were Savannah (*Passerculus sadwichensis*), Song Sparrows (*Melospiza melodia*), Field Sparrows (*Spizella pusilla*), and Le Conte's Sparrows (*Ammodramus leconteii*). Savannah Sparrows were most abundant during two years and Song Sparrows were most abundant during two years. Nine other sparrow species were sampled. Age ratios (juvenile:adults) indicated that the winters of 2013-14 (42% juvenile) and 2016-17 (45% juvenile) were less successful reproductive years than 2014-15 (54% juvenile) and 2015-16 (62% juvenile). The lower proportion of first-year birds recorded during the winters of 2013-14 and 2015-16 may have been related to harsh winter weather. Condition indices of sparrows varied and showed no clear patterns. Of 616 sparrows banded during the first three years, only 15 (2.4%) were recaptured in subsequent years, indicating a low rate of annual site fidelity. The mean number of days between the date of first capture and the date recaptured during the following year was 23.6 days, but a third of the recaptured birds were caught less than 10 calendar days apart from the previous year. Results suggest that winter sparrow use of the LLELA prairie is dynamic from year to year and is affected by weather conditions experienced by sparrows on their southward migration and on their wintering grounds.

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Watershed Resilience: It Is All About Connections

Land use changes are happening everywhere. Some areas are over run with "new" people, roads, buildings, and expectations. In other areas the changes are less obvious, changes in land ownership, from large scale ranching downsized to hobby ranches, and livestock operations to wildlife operations. These changes in land use or cover also range from urban growth areas to wildland urban interface areas with roads and homes amongst the trees and hillslopes to the conversion of open grassy rangelands to woodland/forested landscapes. Landscape vegetation and weather conditions link together in determining the amount and timing of flows from headwater streams to floodplains and rivers, and often connect surface water to groundwater. These connections apply to water supply and water quality along with a community's quality of life. Watersheds are about connections.

The connection between watershed protection and landscapes are becoming clearer as population demand increases, weather cycles from drought to flood extremes, and severe wildfire occurrences increase. Fire is a natural process on the landscape and is necessary for healthy functioning ecosystems within a watershed, thus connecting fire and water. How communities manage, natural or human ignited fires have an impact on ecosystems and downstream water users. Watershed resilience is all about connections between communities, landscape management, economic benefits, and ecological functions, including fire, water supply and quality.

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Supplemental Mechanical Removal Methods are Effective in Inhibiting Long-Term Regrowth of Privet (*Ligustrum japonicum* & *Ligustrum sinense)* at Wild Basin Wilderness Preserve

Invasive plant species have characteristics that allow them to invade, proliferate, and outcompete native species, which gives them the propensity to damage natural ecosystems, sometimes resulting in novel ecosystems. In order to maintain and restore native biodiversity in these damaged systems, it is important to identify successful methods for invasive plant species removal that is both effective and appropriate for the target ecosystem. Riparian ecosystems are vulnerable to some known removal methods, because application of chemical herbicide could cause further damage to the ecosystem due to its close proximity to a water source. Our study site was at Wild Basin Wilderness Preserve (WBWP) and, as it is a part of the Balcones Canyonlands Preserve (BCP), it has many riparian corridors. *Ligustrum japonicum* (Japanese Privet), and *Ligustrum sinense* (Chinese Privet) are two invasive plant species coexisting and disrupting the natural riparian ecosystem at the WBWP. The objective of this research project was to identify an effective mechanical removal method, with the capability of being implemented on a large scale by the volunteers and staff at WBWP, and the greater BCP. We measured the response of the plant community to the following mechanical removal methods: hand-pulling, hand-pulling and oversowing with Inland Sea Oats (*Chasmanthium latifolium*), and hand-pulling with the addition of a cedar-based mulch. Results suggest that both oversowing and the addition of mulch are significantly more effective in inhibiting *Ligustrum spp.* regrowth than just hand-pulling alone. Furthermore, the supplemental addition of a cedar-based mulch may be the most successful method in removing and preventing future invasions. These results can contribute to helping maintain the natural ecosystems, services, and biodiversity that encompass the BCP.

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Sexual Segregation by Habitat in American Kestrels (*Falco sparverius*) Wintering in North Texas

American Kestrels in North America have been found to exhibit sexual segregation by habitat on their wintering grounds in Florida, California, Georgia, and elsewhere. Based on these previous results, we predicted that wintering female American Kestrels in north Texas would occupy significantly more open habitats and that males would be found at sites with more woodland habitat. We also expected the sex ratio of wintering kestrels in our study area to approximate 1:1. We captured 19 kestrels in Denton County, Texas either in the vicinity of Lewisville or north of Denton. In addition, we included in our analysis the locations of two repeatedly-observed birds that proved wary of traps. We then characterized and measured the area of cover types (i.e., disturbed grassland, restored prairie, open pasture, woodland, or other) within a 1-ha circular plot (radius = 56.4 m) from Google Earth images for these 21 locations where kestrels (12 males and 9 females) were trapped or repeatedly found. The mean percentage of open grassland or prairie in plots occupied by females (84.4%) was significantly (P = 0.036) greater compared to the amount of open habitat measured in male plots (66.7%). Further, male plots contained more woodland cover (33.3%) than female plots (15.6%), but this trend was not significant (P = 0.093). Our limited sample supported that American Kestrels in north Texas exhibited sexual segregation of habitat similar to that reported elsewhere. Additional data are needed to fully test this hypothesis.

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Status and Density of Breeding Painted Buntings at the Lewisville Lake Environmental Learning Area

Very little work has been done on the breeding ecology of western population of Painted Buntings (*Passerina ciris*). We examined the ecology of these birds the Lewisville Lake Environmental Learning Area (LLELA) using spot map surveys conducted in two experimental grid areas with 50 x 50 grid squares: one 24 ha surveyed eight times and one 20 ha surveyed six times. Additionally, Painted Buntings were captured using mist nets, a decoy bird, and song playbacks. Trapped birds were given a unique color band combination for later identification of individuals. Of our 35 total color-banded individuals, 32 were male, 29 were after-second year (ASY) birds (90.6%), and three were second-year (SY) males (9.4%). Two definite females were captured (one ASY, one SY), and a SY bird of undetermined sex was also banded. In the larger grid, approximately 36 unique male territories were identified (1.46 breeding males/ha). In the smaller plot, 19 male territories were identified (0.95 breeding males/ha). Based on our spot map surveys, LLELA seems to provide ideal habitat for Painted Buntings, and it currently supports a rather phenomenal density of breeding birds (>1 male territory/ha). For future work, we plan to assess annual return rates of marked buntings, territory site fidelity of males, and monitor the nesting success of the population.

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Integrating Science and Practice in Ecological Restoration and Restoration Ecology

A relatively young field of study, restoration was further separated into the practice of ecological restoration and the theory of restoration ecology in the 1970s. As early as the 1990s, a schism between the science and the practice was becoming evident. In recent years, the rationale for the isolation of theory and practice has been questioned. Collaboration between the two disciplines will likely result in research informed by practitioner needs and a better understanding of scientific approaches by practitioners. This presentation explores the development of ecological restoration and restoration ecology as disciplines; criticisms, problems and issues of each; types of knowledge and the ways in which knowledge is developed and communicated; available knowledge resources; research strategies; and solutions that have worked. Significant efforts have been made in the last few years to reunify the two disciplines.

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Lower Shoal Creek Adaptive Restoration: One Year Assessment

The Lower Shoal Creek restoration site is located in Austin, Texas on the west bank of Shoal Creek. The site is subject to extreme erosion during flash flooding of the creek. Baseline conditions were very poor. Essentially a gravel bar, there was little soil present prior to restoration work. The objectives for the adaptive restoration test plots and year-long monitoring were to determine the most effective strategy for establishing vegetation in the riparian zone of an urban creek by assessing management activities and vegetative response to three different planting strategies. The first was more sparsely planted with primarily woody species ("woodies plot"). The second was not planted and left to revegetate naturally ("passive plot"). The third was more densely planted with primarily herbaceous species ("herbaceous plot"). Monthly monitoring visits included plant species identification and determining percent cover by species in three strata: groundcover, understory, and canopy. Planting and maintenance activities per plot were quantified. Assessments of the recovery status of the individual plots were made using the Society for Ecological Restoration recovery wheel. Results indicate that planting bare-root woody species near the active channel of a frequently flooding creek is not the best strategy. Woody species are stiff-stemmed and do not yield to floodwaters. A broad overview suggests that forbs and grasses (both planted and volunteer) are much more effective than woody species at establishment and survival in riparian flood zones.

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Population Viability of the Rare Annual Endemic *Streptanthus bracteatus* in Bexar County, Texas

Small populations of rare plants are at risk of extinction due to habitat loss and fragmentation and are highly vulnerable to the effects of environmental stochasticity, local catastrophes, and genetic deterioration. Population viability analysis (PVA) models use demographic data to determine the probability of extinction of a population in response to various environmental conditions. *Streptanthus bracteatus* (bracted twistflower), a rare annual endemic to Central Texas, exhibits small, highly fragmented populations that are declining due to these threats and could benefit from information supplied by PVA models. A PVA model will be created for a small population of *S. bracteatus* located in a protected enclosure at Eisenhower Park, Bexar County, Texas. Two years of demographic data will be collected, including survivorship, germination, and seed production, for the population and will be used to create the PVA model. The information obtained from this model can be applied to the Eisenhower Park population as well as other populations of *S. bracteatus* to help inform conservation and restoration management decisions. Data on the phenological characteristics of *S*. *bracteatus* from the 2016-2017 field season will be presented at the conference.

Poster Abstracts

[alphabetical order by presenter's last name]

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Let the Children Get Messy and Dirty!: Pocket Blackland Prairie Restorative Land Practice in an Educational Setting

This presentation (re)defines and (de)constructs the process for restorative land practices on private property within the framework of pedagogical implications for young children as active participants. Informed by the work of Muir, J., Leopold, A., Louv, R., and E. O. Wilson, we assert the theoretical aspects of conservation and restoration of blackland prairie versus the applied and technical processes of daily maintenance and restoration of flora.

The discussion is guided by the following questions: 1) What cultural, theoretical, and applied practices do restoration technicians employ as they engage in environmental education experiences and planning outdoor learning environments? 2) How and where is a restoration pocket prairie chosen? 3) How can restoration and maintenance of a pocket prairie experience be examined and interpreted for pedagogical experiences?

Our work in progress investigates themes that include: 1) affordance of nature in an urban environment; 2) (re)defining terms of restoration and maintenance for visual and aesthetic narratives and discourse; 3) site specific ecological impact on our urban private property; 4) major challenges of pocket blackland prairie maintenance in an urban setting; lastly, 5) recommendations that invite conservationists, community educators, and policymakers to explore urban restorative land practices with enthusiasm at the possibilities and avenues in which they can be viewed, used, and lived.

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Grassland Restoration and KR Control: A Multi-Site and Multi-Stakeholder Project Supported by the Shield Ranch

Grasslands throughout the Great Plains of the US have been converted to non-indigenous habitats dominated by Old World Bluestems (OWBs). There is growing interest in restoring native grasslands and an increase in availability of native seed; however, controlling OWBs has proven difficult. Through engagement with TXSER and funding from the Shield Ranch, we developed a multi-stakeholder research project to evaluate best-practices for grassland restoration in Central Texas. The experiment, replicated across three sites in Austin, TX was designed to test which native species and establishment method provide the greatest levels of OWB suppression. The sites included: City of Austin Water Quality Protection Lands, the Nature Conservancy's Barton Creek Habitat Preserve, and the private Shield Ranch. We employed a 6x2 factorial design: five monospecific and one all species treatment (6) by two establishment methods, seed or plug (2). Restored species included: big bluestem, little bluestem, sideoats grama, and Indiangrass. We also included plots with a City of Austin native seed mixture. The experiment was established in a randomized, complete block design with four blocks. The sites were burned fall 2016 or winter 2017 and then planted or seeded February 2017. In spring 2017, we found 70% establishment for restored plugs and 30% from seed, with the highest establishment rates for sideoats grama. Results from the spring and fall 2017 field season will be presented on native species establishment and restoration as biocontrol for OWBs.

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Predicting Northern Bobwhite Habitat in Semiarid Rangeland Using Landsat Imagery

Multiple studies have attempted to model northern bobwhite (*Colinus virginianus*) distribution using classified remotely sensed imagery in combination with pattern recognition software. These models tend to be more accurate in humid subtropical regions. To identify bobwhite habitat in subhumid and semiarid rangeland, we performed our own classification on 4 LANDSAT scenes of Clay County, Texas, from July and December, 2015. Stands of mature little bluestem (*Schizachyrium scoparium*) provide bobwhite nesting cover and could be identified using LANDSAT imagery. Habitat was scored from 0 to 1.0 based on estimated range health, presence of little bluestem, and presence of brushy cover. We compared habitat score with the results of breeding season call counts from 2014 and 2015 and found significant correlation. When used in combination with other landscape data, this approach can provide a regional context to inform conservation and management decisions.

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Discovery Hill Outdoor Learning Center: A Public Demonstration Garden Using Restoration Principles

Environmental Survey Consulting/(ESC), National Wildlife Federation/(NWF), and Austin Independent School District/(AISD) collaborated to create a native plant area at AISD's Science and Health Resource Center in Austin, Texas. Goals were to use habitat restoration principles while creating a demonstration area for local teachers and students and to encourage teachers to replicate similar native plant areas at their schools. Through several grants, NWF provided funding. AISD provided space and ESC provided the design and installation supervision. Local businesses provided material donations.

ESC's design included an annotated list of approximately 190 native species for the ¼ acre site and different habitat niches, including open shrubs with flower edges, thickets, woodland, tall/short grasslands, wildflower meadow, ephemeral creek, succulent area and freshwater pond. Concepts included techniques for using stormwater run-off, control erosion through vegetative barriers and naturalistic terracing, and create companion planting of native species to mimic natural areas.

The garden was installed by ESC and 75+ community volunteers. Since completion, there have been many workshops on native plant identification, strategies/techniques for maintaining plant types, and principles of habitat restoration. ESC continues management of the site and has written educational materials and signage.

This public project is well used. It's AISD's first outdoor classroom and training site and first of its kind installed in Texas by NWF. The garden offers a place for field investigations, a way to improve student science and math performances, and opportunities for hands-on, inquiry-based experiences. All these experiences are based on understanding the importance of habitat restoration.

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Giant Ragweed (*Ambrosia trifida*): Palatable to White-tailed Deer and a Problem in Urban Areas

In Central Texas the native annual, giant ragweed (*Ambrosia trifida*), often becomes a dominant species in urban riparian corridors, soaring 6-10 feet tall and creating dense shade underneath. It functions very differently than typical annuals and dramatically retards, or possibly eliminates, the germination and/or survival of later successional native species. This inhibitory effect has also been observed at a 20 year tall grass restoration project in east Travis County, where we have learned to reduce ragweed's dominance through carefully timed mowing to assist the establishment of more desirable Blackland Prairie perennial species. These observations created a conundrum: Why would this native annual species play such a dominant negative role in the restoration of urban riparian communities?

In 2016 an important piece of this puzzle became apparent at Spicewood Ranch, 1200 acres 20 miles west of Austin, where ESC has been conducting a 27 year restoration project. This includes long term research on browse species palatable enough to have been greatly reduced or eliminated by domestic goats and white-tailed deer over large parts of the Texas Hill Country. We are learning how to restore those species to this ranch. Coincidentally, last year, as we have improved browse conditions on parts of the ranch, we have noted the survival of a few isolated specimens of giant ragweed in locations partially protected from deer browse and have thus added giant ragweed to our ranch species list for the first time. Subsequent mapping of ragweed locations on and adjacent to the ranch have confirmed giant ragweed as a highly valued browse plant by white-tailed deer.

With these observations we postulate that giant ragweed has become dominant in the urban riparian corridors and in the east Travis restoration site because browse by white-tailed deer has been eliminated at those sites. This observation is guiding our management decisions observations and research in 2017.

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Let There Be Light: Effects of Mechanical Thinning of Ashe Juniper on Texas Red Oak Regeneration and Recruitment

Declining recruitment of oak species has been documented in forests and woodlands throughout much of North America. In central Texas, reduced or failed recruitment of Texas red oak (*Quercus buckleyi*) is a special concern with regard to Golden-cheeked Warbler (*Setophaga chrysoparia*) habitat as well as resiliency of oak-juniper woodlands. Common hypotheses for poor oak recruitment include fire suppression and invasive species contributing to low light and nutrient availability, but perhaps the most common scapegoat is intense deer browse of oak seedlings and saplings. Thinning of woodland canopies via mechanical methods and/or prescribed fire as a means of increasing ambient light levels is sometimes implemented with the goal of improving red oak regeneration and recruitment.

In 2013, all Ashe juniper (*Juniperus ashei*) less than 10 cm (4 in) DBH were mechanically cut within a 12.5 ha (31 ac) savanna restoration near Austin, TX. A prescribed fire at this site is planned for winter 2018. The impacts of this thinning treatment on the density of various size classes of red oak and Ashe juniper as well as canopy and herbaceous species composition will be discussed. This project will add to our practical understanding of the factors limiting red oak recruitment and what methods may be feasible for management and restoration.

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Utilizing SER's International Standards to Improve Restoration Outcomes

Ecological restoration is increasingly promoted and funded as an important solution for environmental degradation and climate change throughout the world. However, international agreement on what constitutes restoration does not exist, nor does systematic oversight of restoration projects. When sole ecosystem services (e.g. carbon sequestration, flood control, wood products), drive the "restoration" agenda, the results may not be as ecologically restorative as intended. SER's International Standards for the Practice of Ecological Restoration provide a framework for: assessing and promoting ecologically- and socially-sound restoration that achieves multiple benefits including improving the biodiversity outcomes of climate and reforestation initiatives. This presentation will introduce SER's International Standards while also discussing how they can be incorporated into ongoing restoration programs at the planning, implementation, and monitoring phases. Integrating SER's scientifically- and socially-sound standards into private, state and federal restoration projects can help ensure these activities achieve desired ecological and social goals.

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Brownseed paspalum (*Paspalum plicatulum*) as a Tool in Restoring Native Coastal Prairies

Along the upper Texas coast restoring native prairie grassland by planting seed is still an emerging practice due largely to the lack of diversity of local native seeds on the commercial market and the lack of best practices to establish them, making projects difficult and unpredictable. The Nature Conservancy has undergone an effort to harvest seeds in the region which are then planted on loamy soil areas of the Texas City Prairie Preserve that would benefit from restoration, primarily those formally dominated by deeprooted sedge (*Cyperus entrerianus*). Four pilot studies looking at planting rates, seed mixes, and planting dates are discussed as well as five restoration projects. From those projects, brownseed paspalum (*Paspalum plicatulum*), a common component of these grasslands, has emerged as a key species for plant community stabilization and project success. This species has been instrumental in establishing ground cover, creating resiliency against re-invasion of deeprooted sedge, and creating a stable pathway for expression of native forbs and overall native plant diversity. Successful seedbed preparation, planting, and post-planting management practices are also discussed.

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Native Grass Restoration at the Connemara Meadow Nature Preserve

Presentation deals with the effort to restore 15 acres of the Connemara Meadow to native grasses: switch, big and little bluestem and Indian grass. Detailed pictorial essay from the start through its current state, March 2013 until present. Highlights include invasive removal techniques (herbicide and solarization), use of a "no till drill", results of 2013 season, actions since 2013 including creation of custom irrigation systems and use of greenhouse and nursery to establish native grasses. Current small plot techniques highlighted based on lessons learned from original 15 acre effort. Our "lessons learned" regarding invasive removal, site preparation and custom irrigation are being modeled by several restoration areas in Texas.

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Balancing the Functional, Ecological and Aesthetic Values of Wet Ponds in Central Texas

Striking a balance between the functional, ecological, and aesthetic values of wet ponds is essential for successful management of these created, urban wetland systems in Central Texas. Functionally speaking, wet ponds act as a buffer between impervious areas and creeks/rivers, providing a space for runoff to be cleaned by natural processes such as bio-filtration and sedimentation. Ecologically speaking, we call wet ponds "created" wetland systems because they are not found naturally in Central Texas. In general, we have found it helpful to rely on habitats in East Texas to serve as the closest models, especially in choosing the plant communities we install. If managed properly, a wet pond can flourish as a bio-diverse community of plants, animals, and microorganisms. Lastly, wet ponds present a unique opportunity to create a beautiful landscape out of what could otherwise be an ugly ditch on the side of the road. However, sometimes the measures taken to improve aesthetics can be at odds with the ecological and functional values of wet ponds. This presentation will explore the tendency of cattail and bulrush to create monocultures at wet ponds, and a few different methods for managing these species while maintaining a balance between the functional, ecological, and aesthetic values at play.

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Restoration of Military Land: Challenges and Conflicts

Many restoration projects begin with the removal of invasive species since they can threaten the ecology of an area by decreasing the diversity and density of native species. These projects are often expensive and require a long-term commitment in order to be successful. Other restoration projects begin with the objective of improving habitat for an endangered or threatened species. The Texas Army National Guard is required by law to manage invasive species and manage for species of concern. Staff of Camp Mabry are responsible for managing 376 acres within the city limits of Austin, Texas and the primary focus of restoration activities is to promote an Ashe juniper-oak woodland that benefits golden-cheeked warblers. This management decision was based on the need to remove invasive species and a way to secure funding, but it has not come without challenges and conflicts. Not all restoration professionals agree on this strategy and sometimes it is not compatible with other management goals such as wildfire protection, recreation, and protecting pollinator habitat. This presentation will discuss the process for deciding to manage for golden-cheeked warblers and the consequences of that decision in a military organization.

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Evaluation and Development of Native Seed Sources for West Texas

West Texas Native Seeds was organized under the *Texas Native Seeds* Project of the Caesar Kleberg Wildlife Research Institute at Texas A&M Kingsville in 2010 as a partnership with the Borderlands Research Institute at Sul Ross State University.

Our mission is to develop native ecotypic seed sources for restoration activities in the Trans Pecos, western Edwards Plateau, and adjacent ecoregions. At present, only one high quality, locally-adapted native seed source appropriate for use in these regions is commercially available. Our goal over the next decade is to develop 15+ regionally-adapted ecotypic seed sources for restoration work in West Texas.

Over 1,100 collections have been made from a target list of 38 grasses and 52 forbs across 37 counties in West Texas. These collections are the foundation for the evaluation and selection of ecotypic native plant materials for commercial scale production.

Presently, eight species are in initial and advanced evaluation as well as the project feasibility stage of development. Two species are currently under breeder seed production with commercial availability expected in 2018. Seven species are now in seed increase with commercial release expected in 2019. Evaluation plantings are located at two sites representative of the variable climate and soil environments of the Trans Pecos, western Edwards Plateau, southern Rolling Plains, and southern High Plains ecoregions of West Texas: the Sierra la Rana Plant Research Facility, south of Alpine, TX; and the Railway Ranch Plant Research Facility, south of Odessa, TX.

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Monitoring Grassland Restoration to Benefit Monarch Butterflies

Texas grasslands play a crucial role in supporting migrating monarch butterflies. In the spring, the first new generation of monarch is often fed with Texan milkweeds. In the fall, our grasslands provide important nectar sources for the Mexico-bound butterflies and sometimes help raise a fifth generation. The Nature Conservancy is restoring grassland habitat for monarch butterflies (and other pollinators) at our Clymer Meadow Prairie Preserve (Hunt County). Our restoration treatments include prescribed fire to increase plant diversity, mechanical treatments to reduce shrub encroachment, and limited herbicide applications of invasive plants. Pre-treatment monitoring data showed that milkweed was already abundant on the restoration sites and that restoration treatments should focus instead on increasing nectar source diversity. I will present 1-year follow-up data (collected in October 2017) and discuss how restoration for monarch butterflies can benefit other species.

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Alliance for America's Fish and Wildlife: The Future of Funding Wildlife Conservation

The Alliance for America's Fish and Wildlife is a national coalition of businesses and organizations committed to developing a sustainable funding model for fish and wildlife conservation. Recently, significant developments have created the potential to secure $1.5 billion annually for wildlife conservation efforts nationwide. If successful, this funding will be used to protect over 12,000 species that have been identified as Species of Greatest Conservation Need. Come and find out how you can be a part of one of the biggest "wins" in conservation history!

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Changes in Mean Passage Dates of Two Migratory Bird Species Related to Climate Change in North Texas

Migratory birds initiate migration based on environmental cues such as photoperiod and temperature. Worldwide bird migration patterns have been shown to respond to rises in mean temperature resulting from climate change. Mean annual temperature in the Dallas-Fort Worth, TX, region rose ~0.8 degrees C from 1897 to 2016. We analyzed banding data for the Gray Catbird (*Dumatella carolinensis*) and the Wilson's Warbler (*Cardellina pusilla*) from two locations in north-central Texas, Lewisville Lake Environmental Learning Area and Heard Museum, McKinney, for 9- and 37-yr periods, respectively. We predicted that Gray Catbirds (short-distance migrator) would shift migration timing based on trends in local weather patterns and that Wilson's Warblers' (long-distance migrator) migration timing would not change over the study period. Consistent with our prediction, Gray Catbirds migrated an average of 9 days sooner in the spring, correlated with increases in local temperatures, over a 37-yr period at the Heard banding station. Wilson's Warblers showed no changes for spring migration data for the same period. Unexpectedly, Wilson's Warblers exhibited earlier fall migration by 14 days over the last 37 years. We propose that increasing mean annual temperatures may affect the Wilson's Warbler by resulting in the earlier termination of the breeding period, possibly enabling warblers to accelerate their physiological readiness for migration during the autumn. Further data are needed to understand how global climate change is influencing changes in the breeding and migration ecology of long-distance migratory birds.