Texas Plant Conservation Conference

BRIT

Botanical Research Institute of Texas

19 - 21 September 2018
Fort Worth, Texas

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Day 1: Wednesday

7:30 AM	**Registration and Breakfast**
8:30	**Welcome**
8:45	**Vision for Plant Conservation in Texas**
9:00	**Keynote Address: Networking for Conservation – Getting Projects Going, Plants in the Ground** **Jennifer Ceska, Georgia Plant Conservation Alliance**
10:00	**Morning break**
10:30	Synergistic Effects of Habitat Fragmentation and Climate Change on Conservation of an Endangered Orchid—Hsiao-Hsuan Wang, Frederico Mestre, Carissa Wonkka, Michael Treglia, William E. Grant, Fred Smeins, William E. Rogers
10:45	Long Term Monitoring Results for Texas Wild-Rice (*Zizania texana*) Using Three Monitoring Regimes—Casey Williams
11:00	Conservation Genetics of the Threatened *Mononeuria minima* (*Geocarpon*, Earth Fruit, Tiny Tim) Using Microsatellite Markers—Christine Edwards, Matthew Albrecht, George Yatskievych
11:15	Comparison of Plants in 15 Texas River Bottomlands and its Implication for Ecological Restoration—Allan D. Nelson, Turner Cotton, and Randall Rosiere
11:30	Milkweeds & Monarchs: Mapping Native Texas Milkweeds Using Citizen Science Data—Darrel Murray
11:45	Saving Native Trees in the Urban Environment: Part I—Gareth Harrier
12:00 PM	**Lunch**
1:00	**Workshops**

(1) The Armchair Botanist: Engaging the Online Community to Improve our Knowledge of the Texas Flora
Instructors: Jason Best, Tiana Rehman (Botanical Research Institute of Texas)

(2) Seven Stages for Banking Seeds of Native Texas Flora
Instructors: Minnette Marr[1], Anita Tiller[2], Suzzanne Chapman[2] ([1]Lady Bird Johnson Wildflower Center, [2]Mercer Botanic Gardens)

(3) Developing Conservation Banks for Orchid Mycorrhizae and Seeds in Texas: Concept and Methods
Instructor: Dr. Jyotsna Sharma (Texas Tech University)

(4) Grass Identification
Instructors: Dr. Brooke Best, Dan Caudle (Botanical Research Institute of Texas)

Day 1: Wednesday

3:00 **Afternoon Break**

3:30 **Lightning Talk Session 1**

*Conservation Status of Rare Texas Plants—David Bezanson

*The Comparison Between Two Surveys for Correll's False Dragonhead (*Physostegia correllii*) in Travis County—Casey Williams

*Patterns of Soil Preference and Regional Genetic Diversity of the Texas Endemic Plant, *Dalea reverchonii* (Fabaceae)—Seth Hamby, Russel Pfau, Darrel Murray, Allan Nelson, Jeffrey Brady

*The Sampling Problem in Rare Plant Population Studies—Chris Best, Norma Fowler

*Myxomycetes on American Elms Surviving Dutch Elm Disease in Texas—Vanessa M. Marshall, Harold W. Keller

*Studying Natural History Collections to Understand the Ferns and Lycophytes of the Dallas-Fort Worth Metroplex—Lani DuFresne, Alejandra Vasco

*The Lichen-forming Fungi of Mason County, Texas—Taylor Sultan Quedenlsey

4:15 **Lightning Talk Session 2**

*Creating a Novel Population of the Tobusch Fishhook Cactus: How, When, and Where?—Bonnie Amos

*When Size Matters: Studies of the Flowering Phenology of the Federally Threatened Tobusch Fishhook Cactus (*Sclerocactus brevihamatus* subsp. *tobuschii*), a Texas Endemic—Karen Clary, Hans Landel, Sean Watson, Ryan Mecredy

*Status of the Federally Petitioned *Schoenoplectiella hallii* (Cyperaceae) in Texas—Kim Taylor

*The Genetic Time Machine: Investigating the Response to Climate Change and Land Management Via a 50-Year-Old Herbarium Collection from Guadalupe Mountains National Park—Matthew G. Johnson

*Love it to Death: Big Red Sage, *Salvia pentstemonoides*—Heather Bass

*Research Avenues in the Conservation of *Styrax platanifolius*, Including the Endangered Texas Snowbell—Peter W. Fritsch

*Art for Conservation: Botanical Art to Educate and Inspire—Barney Lipscomb, Layla Luna

Day 1: Wednesday

5:00 **Poster Session and Happy Hour**

*The Role of the USDA-NRCS Plant Materials Program in Ecosystem Restoration—Brandon Carr

*Vegetation Survey of Local Urban Area Begins Long-term Documentation of Land Use Impacts on Area Biodiversity—Kelly Carroll, Dan Caudle

*When Size Matters: Studies of the Flowering Phenology of the Federally Threatened Tobusch Fishhook Cactus (*Sclerocacus brevihamatus* subsp. *tobuschii*), a Texas Endemic—Karen Clary, Hans Landel, Sean Watson, Ryan Mecredy

*Extinction Threats to White Rosinweed—Alyssa Hutchinson, Calista Lothliam, Bruce Benz

*GIS Analysis of Rare Plant Species of Texas—Emily Inglis, Tamie Morgan

*The Status of the Shinner's Sunflower (*Helianthus occidentalis* ssp. *plantagineus*) in Texas, Arkansas, and Louisiana—Amber Miller

*A Preliminary Report on the Seed Dispersal of *Sclerocactus brevihamatus* ssp. *tobuschii*: An Endemic Cactus—M'Kayla G. Motley, Bonnie B. Amos

*Global Strategy for Plant Conservation 2020: Progress Report for Texas, U.S.A.—Kim Taylor, Barney Lipscomb, Edward Schneider

*Memory Rose: A New Rare Species for Texas?—Isabella Wu, Kim Taylor

6:15 **Dinner and Awards Ceremony**

8:00 PM **End of day**

Day 2: Thursday

8:00 AM	**Registration and Breakfast**
8:30	Making Headway in Fort Worth: Managing Public Land for its Natural Value—Robert Denkhaus
8:45	A Rush to Collaborate or the Slender Rushpea Coalition—John Reilley, Chris Best, Shelly D. Maher
9:00	Leveraging Molecules and Museums to Identify Multidimensional Conservation Priorities in Texas—Daniel Spalink
9:15	GGI-Gardens From the Ground Up: Building a Network of Botanical Gardens and Biorepositories to Preserve Plant Biodiversity From Living Collections—Morgan Gostel
9:30	TPWD's TEAM Tool: Crowdsourcing Citizen Science and Ecosystem Analysis—Amie Treuer-Kuehn
9:45	Native Neighborhoods: Helping Pollinators Across Fort Worth—Michelle Villafranca
10:00	The Southeastern Grasslands Initiative: Charting a New Course for Conservation in the 21st Century—Dwayne Estes
10:15	**Morning Break**
10:45	Connecting Through Education: Practical Strategies for Creating Effective Community Outreach for Plant Conservation—Pat Harrison, Tracy Friday
11:15	**Tours of BRIT and Fort Worth Botanic Garden**
12:00 PM	**Lunch**
1:00	**Lightning Talks Session 3**
	*Effects of Single-Season, High-Stocking Rate, Short-Duration Grazing on Texas Wintergrass (*Nassella leucotricha*)—Katherine Hood, Darrel B. Murray, James P. Muir, Caitlyn E. Cooper
	*Landscaping with Native Plants on Federal Properties—Heather Bass, Keri Barfield, Amy Belaire, Heather Venhaus
	*Sustainable Ranching: A Beef Rancher's Perspective on Native Flora—Alyssa Austin
	*Conservation Collection Maintenance Strategies: A Case Study at Mercer Botanic Gardens—Anita Tiller, Suzzanne Chapman

Day 2: Thursday

1:00 (cont)	*A Two-Year Update on Texas Herbaria: Discovering and Preserving Texas' Botanical Heritage: Good for Science, Good for Conservation—Barney Lipscomb
	*Saving Native Trees in the Urban Environment: Part II—Gareth Harrier
	*Rescue of an Orphaned Herbarium Collection: NLU—Tiana F. Rehman, Jason H. Best, Peter W. Fritsch, Alyssa B. Young, Miranda Madrid, & Ashley Bordelon
1:45	**Working Groups**
3:00	**Afternoon Break**
3:30	**Working Groups continued**
4:45	**Closing Remarks**
5:00 PM	**End of day**

Day 3: Friday

8:00 am-5:00 pm **Red List Assessment Training Workshop**

Instructor: Dr. George Schatz, Missouri Botanical Garden

Become an official Red List Assessor for your specialty region or taxonomic group! George E. Schatz of the Missouri Botanical Garden/IUCN Species Survival Commission will provide training, and participating botanists will evaluate several plant species for Red List submission. As botanists and conservationists, we can participate in an important global biodiversity initiative and contribute to international conservation goals by conducting Red List assessments of the species that we know best. The IUCN Red List of Threatened Species is important because it allows us to evaluate the risk of extinction for any given species, providing open-source data that can be used for research, funding, and conservation prioritization. The workshop will be a full day. **Prior to the workshop, participants will be required to complete online training** in Red List assessment methodology, and come prepared with data on their species, including occurrences, population size, and threats. The morning session will include a review of terms, categories, criteria, concepts, and some examples. In the afternoon session, participants will assess species on their own or in small groups with assistance from the workshop leader. By the end of the workshop, each participant should have a Red List assessment ready to submit to IUCN.

Web Sites:

The IUCN Red List of Threatened Species—www.iucnredlist.org/

Online IUCN Red List Training Course—www.iucnredlist.org/technical-documents/red-list-training/online-training

Lunch willl be provided to all registered attendees.

Workshops

The Armchair Botanist: Engaging the Online Community to Improve our Knowledge of the Texas Flora

Jason Best & Tiana Rehman (Botanical Research Institute of Texas)

While more than 3 million botanical specimens exist in Texas herbaria, only a small fraction of these are digitally accessible for observation or inclusion in scientific studies. Producing images of these specimens is often the first step in liberating these data; the second step is engaging our citizen science community to help us extract the label information from these images. We'll explore the different citizen science projects and platforms that are helping herbaria in Texas compile specimen data then we'll dive in to the transcription process. We'll model how you might lead your own transcription blitz, liberating your own specimens or those from any other herbarium. Bring your computer and join us as we extract data from historical Texas specimens and do some virtual botanizing!

Seven Stages for Banking Seeds of Native Texas Flora

Minnette Marr (Lady Bird Johnson Wildflower Center), Anita Tiller (Mercer Botanic Gardens), Suzzanne Chapman (Mercer Botanic Gardens)

The Millennium Seedbank Project Standards and Center for Plant Conservation Ex Situ Plant Conservation Protocols offer guidance for long-term conservation of seeds. Workshop participants will learn how Lady Bird Johnson Wildflower Center and Mercer Botanic Gardens address each of the seven stages of seed conservation. Following hands-on activities with wildflower seeds, we will compare protocols for collecting species of greatest conservation need to protocols for collecting ecotypes of workhorse species. Then we will review techniques for processing the accessions with the help of volunteers, preparing seeds for storage, monitoring viability of seeds, managing the data, and distributing seeds for restoration and research projects. The workshop will end with a discussion of assessing and mitigating risks associated with natural disasters. Handouts will include the MSBP Standards, the Seeds of Success Field Data Form, the Texas Natural Diversity Database Reporting Form, and the Uniform Biological Transfer Agreement. Participants are encouraged to bring a small pocket knife with scissors, a pint container with a tight lid, and a smart phone or tablet.

Workshops

Developing Conservation Banks for Orchid Mycorrhizae and Seeds in Texas: Concept and methods

Jyotsna Sharma (Texas Tech University)

Orchids represent 10% of all angiosperm flora on the planet and are some of the most threatened plant species. Their unique biology and ecology demands equally unique and creative conservation measures. To safeguard the >50 species that occur in Texas, a partnership of Texas Tech University, BRIT, and NAOCC intends to establish mycorrhizal and seed banks to contribute to global and local biodiversity conservation. Workshop participants will be trained in sampling orchid root tissues and seeds by following protocols that ensure non-destructive, ethical, and timely collection. Instructions for sending materials to scientists at TTU and BRIT will be given, and other relevant topics will be discussed to help volunteers contribute to this mission.

Grass Identification

Brooke Best & Dan Caudle (Botanical Research Institute of Texas)

Feeling “glumey” due to poor grass ID skills? Then join BRIT staff for a refresher course on grass anatomy and grass identification tips and tricks. Grasses are dominant species in many Texas ecoregions, and accurately identifying them is important to vegetation assessments and community analyses. How can we conserve Texas plants if we can’t properly describe and define the communities in which they are found? Workshop will include hands-on dissections and microscope work.

Speaker Abstracts

Alphabetical by first author

Creating a novel population of the Tobusch fishhook cactus: How, when, and where?

Bonnie Amos, Angelo State University

Angelo State University has recently been awarded funds for a reintroduction project for approximately 125 Tobusch fishhook cactus (TFC). The plants will be harvested as mitigation for alteration of their habitat by a Gulf Coast pipeline project. TFC differs from many rare plants in that a number of studies addressing several aspects of the plant's basic biology have been conducted. This knowledge is critical for developing a reintroduction plan and provides some confidence for a successful outcome. This presentation will briefly outline the major aspects of the plan with special emphasis given to problematic issues (i.e., site selection) for the purpose of peer review and collaboration by the audience.

Sustainable ranching: A beef rancher's perspective on native flora or native flora diversity from the perspective of a beef rancher

Alyssa Austin, Texas Christian University, TCU Institute of Ranch Management, and Burgundy Pasture Beef

A study is being conducted on the principles behind the sustainable ranching methodology in use at Burgundy Pasture Beef Ranch in Grandview, Texas. Burgundy Pasture Beef is a cattle ranch located in Grandview, Texas, on the southeastern portion of Johnson County that raises beef without the use of pesticides or herbicides. Burgundy Pasture Beef values native flora and fauna and the restorative properties nature innately bestows on properly stewarded lands. The Institute of Ranch Management at TCU has been collecting data on the ranch for multiple years, however deeper analysis of the data began in the Fall of 2017. The goal of our research is to analyze how the interactions of both natural and ranching processes can collaboratively create an economically and environmentally beneficial ranching methodology. Data collection includes: plant species biodiversity, forage production, rotational grazing schedules, soil chemistry, and weather data; this data is being recorded and compiled to be used in educating others on the benefits of sustainable ranching and in future research.

Love it to death: Big red sage, *Salvia pentstemonoides*

Heather Bass, Botanical Research Institute of Texas

Big Red Sage (*Salvia pentstemonoides*) has a beautiful flower and is a beloved gardening plant for many, but it is also a rare and endangered plant according to the State of Texas. A study on the history and populations of Big Red Sage was done to review its species rank and a trend of horticultural influence emerged. Horticulturalists have discovered new populations and preserved the plant in their greenhouses and gardens, but they have also taken plants from the wild and decimated whole populations. An overview of the narrative of some of this plant's known populations will be discussed, as well as the threats to the species.

Speaker Abstracts

Landscaping with native plants on federal properties

Heather Bass[1], Keri Barfield[1], Amy Belaire[2], Heather Venhaus[3]
[1]Botanical Research Institute of Texas; [2]The Nature Conservancy; [3]Regenerative Environmental Design, LLC

A recent focus on sustainability for federal properties by the General Services Administration (GSA) has caused them to examine the impacts of their landscaping decisions in an effort to decrease energy and water consumption, as well as provide habitat to support native pollinators, such as the Monarch Butterfly (*Danaus plexippus*). A research project was done to parse out the impacts of various landscaping decisions on energy consumptions and ecosystem outcomes, as well as discover the tradeoffs and synergies of various decisions. This talk will briefly discuss the research methods and results, then present the High Performance Landscapes calculator tool that was produced.

The sampling problem in rare plant population studies

Chris Best[1], Norma Fowler[2]
[1]U.S. Fish and Wildlife Service; [2]Department of Integrative Biology, University of Texas at Austin.

Rare plant conservation and status assessments for protection under the Endangered Species Act require that we understand the size and geographic distribution of their populations. However, complete censuses are often impeded by the amount of field work involved and by limited access to private lands. The logical alternative is to model geographic distributions of potential habitats and estimate total population sizes from sample data. Representative sampling is difficult, because many rare plant species have patchy distribution and occupy a minute proportion of potential habitats. Valuable data on rare plants is often derived from permanent study plots established where colonies have been discovered by chance or through intuitive wander surveys. However, data from these non-representative samples should not be extrapolated to estimate total population sizes or demographic trends. For example, at Big Bend National Park, the Chisos Mountains population of the endangered Guadalupe fescue (*Festuca ligulata*) has been monitored since 1993. The population at 6 permanent plots established where plants were first found declined from 127 in 1994 to less than 50 by 2012. In 2017, surveys detected 225 new plants outside of plots, indicating that the population has drifted off the plots. We hypothesize that parasites and pathogens are likely to increase where host plants are concentrated, causing population declines at small plots over time; recruitment is more likely to be successful outside of existing clusters, leading to geographically dynamic distribution patterns. We recommend improved methods of population sampling and statistical analysis.

Conservation status of rare Texas plants

David Bezanson, The Nature Conservancy

Roughly 270 plant species in Texas are ranked as globally rare or threatened (G1 or G2) by NatureServe and tracked by Texas Parks and Wildlife Department (TPWD). Only 55% are known to occur in areas such as parks, refuges and conservation easements. This presentation will provide an update on the success of conservation efforts of rare plant taxa in Texas and mention a few recent acquisition projects by state and federal agencies and land trusts benefiting rare plants in Texas.

Speaker Abstracts

Networking for conservation - Getting projects going, plants in the ground

Jennifer Ceska, Georgia Plant Conservation Alliance

Jennifer will share her experience working with the Georgia Plant Conservation Alliance over the last 23 years, sharing postcards from the field. Jennifer will share the celebrations, failures, and watch outs from lessons learned and stories gathered working with 49 organizations and over 200 conservation professionals who are passionate, driven, dedicated, and well and truly busy. We all have more to do than we can do. But we find that working together profoundly helps. In Georgia we believe networking to be a powerful tool for conservation. There are thoughtful choices we made from the beginning to stay project driven. Networking for conservation comes with extra time pressures, the dire needs of critically imperiled species, the workloads carried by conservation professionals, the mirth of the seasons trying to collect and increase viable material, and the slow recovery of plants and their habits requiring years of commitment and repeated actions and treatments. The work is daunting, and the work is doable. By working together, we leverage limited resources of equipment, effort, energy, and time. And along the way we move from colleagues to friends to conservation family.

When size matters: Studies of the flowering phenology of the federally threatened Tobusch fishhook cactus (*Sclerocactus brevihamatus* subsp. *tobuschii*), a Texas endemic

Karen Clary, Hans Landel, Sean Watson, & Ryan Mecredy, University of Texas-Lady Bird Johnson Wildflower Center

Tobusch fishhook cactus, federally threatened, is known from eight counties in central Texas. Threats to survival include drought and human-induced land disturbance activities such as livestock grazing and habitat destruction, among others. We monitored the flowering habits of a greenhouse collection of approximately 300 Tobusch fishhook cacti salvaged from two pipeline construction sites in Val Verde and Edwards counties. Between 2013-2018, we measured yearly growth, initial age of plant to flowering, periodicity of flowering, number of flowers per plant and in a subsample of 124 of these plants (2015-2017), we counted number of style lobes per flower on each plant. Data from these studies support findings from earlier field research showing that as the size of plants increase, individuals produce more flowers for a longer period. We discovered that in addition to producing more flowers, the flower of a larger plant can produce more style lobes relative to younger, smaller plants. These data add support to a hypothesis that size is a major component of fitness in this species. That is, older plants are not only more likely be more fit (to produce more offspring) than younger plants because they produce more fruits, but also because each fruit may have more seeds. We also found that in the greenhouse, younger plants do not flower until approximately five years of age. These data support findings from field research that longevity is key to survival of the species and underscore the importance of conservation management focused on the species' reproductive habits, especially recruitment and survival of populations in the wild and particularly in the face of global warming.

Speaker Abstracts

Making headway in Fort Worth: Managing public land for its natural value

Robert Denkhaus, Fort Worth Nature Center & Refuge

Leopold's land ethic has rarely been applied to urban areas. The City of Fort Worth, like all cities, has a long history of land abuse as public lands have traditionally been managed to facilitate a single dedicated use as determined by the managing department. City departments suffered from a silo mentality. The past two decades have seen the evolution of collaborative efforts between City of Fort Worth departments to manage public lands using increasingly diverse natural resource management techniques on lands managed by the Park and Recreation, Water, and Storm Water Management Departments. An overview of these collaborative efforts will be presented along with a discussion of lessons learned and ways to encourage collaboration within cities.

Studying natural history collections to understand the ferns and lycophytes of the Dallas-Fort Worth Metroplex

Lani DuFresne[1], Alejandra Vasco[2]
[1]Rice University; [2]Botanical Research Institute of Texas

In the continental USA, Texas is one of the states with the highest diversity of native ferns and lycophytes. The Dallas-Fort Worth Metroplex (DFW) is the largest metropolitan area in Texas. To better understand the history, distribution, diversity, and conservation challenges of native ferns and lycophytes in this metropolitan area, we conducted a study using specimens deposited at the Botanical Research Institute of Texas herbarium (BRIT) and those from other herbaria uploaded into the online Texas Oklahoma Regional Consortium of Herbaria (TORCH). We found 25 different species of native ferns and lycophytes in the thirteen counties that comprise the DFW area. The correct identification of all specimens was checked, and all specimens were georeferenced. To recognize the most important areas for native fern and lycophyte diversity and density in the study area, we analyzed the complete dataset and created distribution maps. The presence of native ferns and lycophytes in conservation areas such as natural preserves or protected areas of land was also assessed. Results were then sorted by year and compared with historical information to account for natural regions that may have since been developed or subjected to changes so that they are no longer suitable for ferns or lycophytes. Our results highlight the importance of studying natural history collections to perform historical and current biodiversity surveys and to assess the continued conservation challenges of plants in Texas.

Conservation genetics of the threatened *Mononeuria minima* (*Geocarpon*, earth fruit, Tiny Tim) using microsatellite markers

Christine Edwards[1], Matthew Albrecht[1], George Yatskievych[2]
[1]Missouri Botanical Garden; [2]University of Texas at Austin

In response to a research need identified in the recovery plan for the federally threatened *Mononeuria* (*Geocarpon*) *minima* (Mack.) Dillenb. & Kadereit (a.k.a. *Geocarpon minimum* Mack., earth

Speaker Abstracts

fruit, tiny Tim), we studied genetic variation within and between populations of this tiny winter-annual member of the Caryophyllaceae. We used a set of 16 microsatellite markers to genotype populations sampled throughout the taxon's range to better understand factors, such as: (1) Basic attributes of the mating system and gene flow; (2) Whether any factors associated with small population size, such as inbreeding, genetic drift, or genetic bottlenecks, are threatening genetic diversity; (3) How genetic variation is partitioned within and among populations, and across the landscape, to inform conservation strategies to protect the full range of genetic diversity within the taxon; (4) The relative importance of different habitat types and spatial separation of populations in structuring *Geocarpon;* and (5) Whether the species might be harboring cryptic taxa. Results show that genetic diversity is very low within populations, but that populations have diverged relatively strongly from one another. This supports the hypothesis that the taxon is predominately inbreeding, with little to no gene flow between populations. The lack of geographic and habitat-based structuring to the genetic variation suggests that all populations have approximately equal importance for conserving diversity of the species. There is no support for the concept of cryptic taxa hidden within the current species concept.

The Southeastern Grasslands Initiative: Charting a new course for conservation in the 21st century

Dwayne Estes, The Southeastern Grasslands Initiative & Center of Excellence for Field Biology, Austin Peay State University

The southeastern U.S. grasslands are imminently threatened. They support approximately half of the rare plant communities, two-thirds of the rare plants, and one-third of the rare terrestrial vertebrates in the region. Several groups of organisms, especially birds and pollinators, are in steep decline due to the loss of grasslands and related open habitats. Yet, in spite of the tremendous needs of these species, it seems that much of the focus on conservation, at least in many parts of the Southeast (including eastern Texas and Oklahoma), is still overwhelmingly devoted to forests, forested wetlands, and streams. The Southeastern Grasslands Initiative (SGI), established in January 2018, is working to elevate the profile of grasslands and grassland-related communities across a 23-state region in an effort to help chart a new course for conservation in the 21st century. SGI has four programmatic priorities: (1) to establish itself as a clearinghouse for information related to the conservation, research, history, and biodiversity of Southern grasslands, and to work with our partners to identify priorities for grasslands conservation and research from local to national scales; (2) to provide leadership in on-the-ground conservation via coordination, education, and outreach; (4) to influence policies and advocate for grassland conservation from local to national levels; and (5) to become a granting organization whereby we plan to offer grants to empower conservation at a scale not presently possible. SGI is currently working with and seeking support from a variety of partners including private philanthropic foundations, corporations, non-profit conservation organizations, and state and federal government agencies. We look forward to establishing solid partnerships in the western portion of our focal area in Texas and Oklahoma.

Speaker Abstracts

Research avenues in the conservation of *Styrax platanifolius,* including the endangered Texas snowbell

Peter W. Fritsch, Botanical Research Institute of Texas

Styrax platanifolius, native to Texas and northern Mexico, is ranked as vulnerable to extinction, with one of its five subspecies, subsp. *texanus,* ranked as critically imperiled (G3T1, S1). In a taxonomic revision of this group in 1997, the status of three of the taxa changed from species to subspecies, one variety was changed to subspecies, and one subspecies was newly recognized. This change resulted in a lowered recovery priority for subsp. *texanus*. Subspecific rank for the taxa was based on relatively high similarity in morphology and isozyme profiles among sampled populations to justify a rank below species, combined with regional differences in leaf pubescence to justify the formal recognition of taxa. Conclusions regarding the 1997 taxonomy were limited by low numbers of sampled populations and individuals, a reliance on average range of genetic identity of angiosperms, and low phylogenetic resolution based on ITS and plastid genes. Further research should be conducted to assess the subspecies status of the entities in *S. platanifolius.* Data from morphometrics and next-generation DNA sequencing can address lingering questions of taxon delimitation, rank, and phylogenetic relationships. Furthermore, crossing studies and the production of F1 hybrids can now be assessed on a property where subspp. *platanifolius* and *texanus* are being cultivated together. Finally, the rediscovery of the sole population of subsp. *youngiae* in the Davis Mountains and other populations can expand population sampling. These new data will allow a better assessment of the taxonomic and conservation status of *S. platanifolius* than from currently available sources.

GGI-Gardens From the ground up: Building a network of botanical gardens and biorepositories to preserve plant biodiversity from living collections

Morgan Gostel, Botanical Research Institute of Texas

The Global Genome Initiative for Gardens (GGI-Gardens) is an international partnership dedicated to collecting and preserving genome quality plant tissues. There are an estimated 350,000 species of plants on Earth and, in addition, a large number have not yet been discovered. GGI-Gardens began in 2015 as a network of botanical gardens, arboreta, and greenhouses and has since grown to encompass a network including more than 20 of the world's most diverse botanical gardens. GGI-Gardens has recently moved its operations to BRIT and with this move we hope to build a regional consortium focused on preserving plant biodiversity from gardens throughout Texas. Our goal is to collect, voucher, and preserve genome-quality tissue resources from at least one species belonging to each family and 50% of the genera of plants on Earth. A recent study in Nature indicated that gardens contain more than 30% of all the described species, 50% of genera, and 75% of the families of vascular plants on Earth, however, these collections have been vastly underutilized for research. Through GGI-Gardens, we will tap into this hidden biodiversity to facilitate genetic and genomic research using specimens from these living collections. The coordinated activities of GGI-Gardens partners have resulted in the collection of thousands of vouchers and made their tissues discoverable through the Global Genome Biodiversity Network (GGBN). Ultimately, we hope this program increases the visibility and impact of living collections in gardens for botanical research, while helping to expand the genomic representation of plants from around the world.

Speaker Abstracts

Patterns of soil preference and regional genetic diversity of the Texas endemic plant, *Dalea reverchonii* (Fabaceae)

Seth Hamby[1], Russel Pfau[1], Darrel Murray[1], Allan Nelson[1], Jeffrey Brady[2]
[1]Tarleton State University; [2] Texas A&M Agrilife Research

Dalea reverchonii (S. Watson) Shinners, known as Comanche Peak prairie clover, is a globally and state imperiled endemic plant with a conservation rank of G2S2, having a high-risk of extinction due to a small number of populations, a narrow range, marked declines, and habitat loss. Because of its conservation designation, *D. reverchonii* is a prime candidate for ecological and molecular population studies. The purpose of this study is to inform conservation and restoration of the species. A double digest restriction site associated DNA sequencing (ddRADseq) was performed to measure levels of regional genetic diversity of *D. reverchonii* at the population and species level and to measure population sub-structuring (divergence). In an effort to determine which soil physiochemical properties are most important for presence, growth, and abundance of *D. reverchonii* in 4 distinct sub-populations, a comparison of physiochemical properties of soil with morphological characteristics of plants was conducted.

Saving native trees in the urban environment: Part I

Gareth Harrier, Bartlett Tree Experts

Studies prove that a lack of trees diminishes the quality of life for urban dwellers. While planting of adapted non-indigenous species has been common practice, is this the best course of action for urban planners and landscape architects? The Eastern Cross Timbers region in particular has been adversely affected by the urbanization of the region. We will explore some case studies and general guidelines to preserve native forests in the urban and suburban environment.

Saving native trees in the urban environment: Part II

Gareth Harrier, Bartlett Tree Experts

Genera distribution is a key component in predicting invasive pest and disease spread. We will discuss how this occurs, what the current threats are, and how we can reduce the likelihood of native forest devastation.

Connecting through education: Practical strategies for creating effective community outreach for plant conservation

Pat Harrison & Tracy Friday, Botanical Research Institute of Texas

How do organizations more effectively communicate the need for plant conservation to the next generation of environmental stewards in Texas? With so little focus on plants or conservation in education standards, how can we ensure there will be trained professionals in the future to carry on this work? This session involves participants in a discussion of how informal educators and plant researchers can work together to connect with schools to build a better foundation for the science of plant conservation in schools. Participants will review Texas education standards with its requirements for field investigations for schools and identify age-appropriate concepts

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for introduction to students, as outlined in Texas' scaffolded curriculum of knowledge and skills. Ideas for bringing these concepts alive through experiences in nature will be shared, along with a demonstration of effective methods for innovative teaching practice. Learn how connecting to "connectors" who are engaged with schools adds value through collaboration. Bring your ideas and strategies as we begin the discussion of how we influence change as we work together to bring along future generations to continue this vital work in plant conservation.

Effects of single-season, high-stocking rate, short-duration grazing on Texas wintergrass (*Nassella leucotricha*)

Katherine Hood[1], Darrel B. Murray[1], James P. Muir[1,2], Caitlyn E. Cooper[2]
[1]Tarleton State University; [2]Texas A&M AgriLife Research and Extension Center

The Texas Cross Timbers and Rolling Plains Ecoregions, once diverse grasslands, are succumbing to woody encroachment by honey mesquite (*Prosopis glandulosa* Torr.) and herbaceous takeover of Texas wintergrass (*Nassella leucotricha* Trin. & Rupr.). Documentation of this problem is extensive with no clearly stated solution. Using an average stocking density associated with high-intensity grazing (approximately 33,600 kg ha^{-1}) we will determine if a single defoliation event versus repeated defoliation influences Texas wintergrass seed production, habitat structure, and biomass and whether mowing or high-intensity short-duration grazing impacts soil health (bulk density, soil moisture, and nutrient composition) over one growing season at two locations. This high-stock system proposes benefits that include increased warm-season nutrient availability and forage yields via carefully timed defoliation events. Restoring these ecosystems could create habitat diversity for many native bird species, including bobwhite quail (*Colinus virginianus*), as well as improved forage and overall range health for cattle operations, all of which could improve system sustainability and family ranch income.

The genetic time machine: Investigating the response to climate change and land management via a 50 year-old herbarium collection from Guadalupe Mountains National Park

Matthew G. Johnson, Texas Tech University

In preparation for opening the Guadalupe Mountains National Park in far west Texas in 1974, Texas botanists made an extensive collection of plants, now housed at the E.L. Reed Herbarium at Texas Tech University. We have identified over 2500 specimens, including 47 species with 6 or more specimens, providing a unique snapshot in time coinciding with major changes in atmospheric carbon and land management. We plan to use a set of newly-developed DNA markers that capture 353 nuclear protein-coding genes for genetic analysis of all species with 6 or more samples, along with physiological and morphological measurements of preserved plant tissue. When combined with a corresponding modern sampling, we will be able to observe trends over a nearly 50 year time period for an entire plant ecosystem. We hypothesize that certain life history traits including herbaceous and/or annual plants will be correlated with more extreme response to climate change.

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Art for Conservation: Botanical Art to Educate and Inspire

Barney Lipscomb & Layla Luna, Botanical Research Institute of Texas

With nearly 300 rare and/or endangered plant taxa in Texas, how do we engage the public to understand, value, and support plant conservation? Societal interest and commitment are important. We propose art as a way to seduce and engage society toward common conservation values and goals and perhaps even funding. Art engages, art attracts and unifies people, reduces plant blindness, and builds consensus on the importance of preserving our natural world. Art works! Perhaps in each of our local communities are artists eager to collaborate with botanists and naturalists to learn about Texas rare native plants and contribute original contemporary botanical artworks of these plants for exhibition and for sale? Perhaps by 2020 a select number of Texas rare plants could be ready for a traveling Art and Conservation of Texas Rare Plants exhibition. Could art engage the public on rare plants and the importance of conservation? Let's proclaim 2020 as Texas Year of Botanical Art: Texas' Rare Flora. Linking people with plants through botanical art. Let the exhibition begin at BRIT.

A two-year update on Texas herbaria: Discovering and preserving Texas' botanical heritage: Good for science, good for conservation

Barney Lipscomb, Botanical Research Institute of Texas

Plant conservation relies upon ongoing floristics, systematics, plant collecting, and access to herbarium specimens. Botanists continue to explore, discover, and preserve Texas botanical heritage; specimens are deposited in Texas herbaria and elsewhere for science and conservation. I compiled data—mostly from Index Herbariorum—on the growth of Texas herbaria from 2016–2017, updating a 197-year report on Texas exploration and collecting presented at the 2016 Botany meeting. At the end of 2015, Texas herbaria contained about 3,167,118 total specimens with an estimated 1,148,715 being Texas specimens. At the end of 2017, there were roughly 26 active herbaria in Texas, containing about 3,652,118 total specimens and 1,178,382 Texas specimens. From 2016–2017 Texas herbaria accessioned approximately 549,472 total specimens either through collecting efforts of botanists or by gift or exchange from other institutions. In 2016 BRIT accessioned the orphaned NLU herbarium of 472,000 specimens thus accounting for 86% of the 549,472 specimens added to Texas herbaria for 2016–2017. Of the 549,472 new specimens added over the recent two year period, it is estimated that 29,667 represent collections from Texas. Of the 29,667 specimens about 5,667 were through collecting efforts of botanists and naturalists whereas about 24,000 of the Texas collections were from the orphaned NLU Herbarium. Staff at NLU estimated that the 472,000 specimen NLU herbarium contained approximately 24,000 Texas collections. The growth rate for Texas collections (collected in Texas) in Texas herbaria over the last two years (2016–2017)—not including the NLU gift of 24,000 Texas collections—was just over 2800 specimens, considerably less than the estimated average growth rate of ±13,000/year from 1954–2015. Is herbarium staff not updating Index Herbariorum or is exploration and collecting in Texas continuing to decline? Fifteen new state records (12 introduced and 3 native) and five taxa new to science were recorded for Texas from 2016–2017. The discovery rate for new state records is about the same as it was from 1900–2015 (8.3/yr), whereas the discovery rate of new taxa is down from the 6 per year average from 2001–2015 to an average of 2.5 per year for 2016–2017.

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Myxomycetes on American elms surviving Dutch elm disease in Texas

Vanessa M. Marshall[1], Harold W. Keller[2]
[1]University of Alabama at Tuscaloosa; [2]Botanical Research Institute of Texas

Ulmus americana (American elm) occurs in Texas and has mostly escaped the pathogenic fungus *Ophiostoma ulmi,* the causative agent of Dutch elm disease. This beautiful ornamental tree was planted in cities and towns throughout the Midwest as a monoculture, facilitating the spread of the fungal disease by elm bark beetle insect vectors and root grafts. The elms eventually succumbed to the disease, except in more remote areas along creeks, rivers, and some Texas nature parks. The bark of this tree at maturity is grey-brown, deeply furrowed, and spongey, thus absorbing and retaining moisture for longer periods and providing ideal conditions for the growth and development of myxomycete life cycle stages. Bark samples were collected from nine trees in Oliver Nature Park, two trees in the Fort Worth Botanic Gardens, and five trees in the Fort Worth Nature Center and Refuge near the Trinity River. Moist chamber bark cultures were created in plastic sterile Petri dishes (13.8cm) and wetted with 30mL sterile de-ionized water. These bark cultures were scanned with a dissecting microscope (100x to 150x magnification) while myxomycete fruiting bodies were recorded and identified, beginning after 48 hours and continuing for three weeks. The pH readings ranged from 5.64 to 8.54 and averaged near a pH of 6.71. To date, 45 moist chamber bark cultures have yielded 16 different myxomycete species, including one species of Licea new to science. Most of these species are corticolous myxomycetes (only from the bark of living trees), tiny, sessile, and less than 0.2mm.

Milkweeds & monarchs: Mapping native Texas milkweeds using citizen science data

Darrel Murray, Tarleton State University

Over the past decade, loss of native milkweed host plants (*Asclepias* species) for monarch butterfly egg-laying and larval development has been identified as one of the key factors contributing to the decline of the monarch population. Understanding distributions of native populations of milkweeds is important from a conservation perspective, both for monarch butterflies and milkweed species. In this project, we combined milkweed species presence-only point data with environmental data within the ecological niche modelling program MaxEnt to map potential distributions of native Texas milkweeds. In MaxEnt, the model for a species is determined from a set of environmental or climate layers for a set of grid cells in a landscape. Here, our landscape is the central Texas monarch butterfly flyway that includes a 300-mile wide path across Texas stretching from Wichita Falls to Eagle Pass that is utilized for monarch butterfly spring and fall migration. Data from citizen scientists has helped to identify and confirm this flyway. This project seeks to effectively locate populations of native wild milkweed in Texas, helping Texas Parks and Wildlife (TPWD) better understand their true distributions and in doing so, utilize citizen science data to better document these populations of native wild milkweed. Environmental data layers used in the models included: geology, soils, precipitation, maximum average temperature, minimum average temperature, slope, and aspect. These environmental layers were chosen to best represent abiotic environmental influences that determine where plant species are found. By combining citizen science observation data with herbarium data, including specimen

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location data and related environmental conditions, we were able to model potential distributions of 35 native Texas milkweed species located within the central Texas flyway. This project highlights the importance of citizen science data and promotes the TPWD Conservation License Plate program in conservation research.

Comparison of plants in 15 Texas river bottomlands and its implication for ecological restoration

Allan D. Nelson[1], Turner Cotton[1], Randall Rosiere[2]
[1]Tarleton State University Department of Biological Sciences; [2]Tarleton State University Department of Animal Science and Veterinary Technology

Data from 15 Texas rivers, two which have been recently surveyed and 13 from the literature were compared based on woody plant dominance data using Bray-Curtis dissimilarity. Analysis of woody plant dominance indicates that creeks and rivers in the Piney Woods are different from those reported from west and south Texas. Rivers and creeks from the West Cross Timbers and Blackland Prairie clustered together. The Guadalupe and San Antonio rivers form a cluster as do the Mission and Aransas rivers and all four have similarities in woody plant composition that cause them to cluster together. Edwards Plateau and South Texas Plains rivers form another grouping in the analysis. Richness, wetland vegetation, introduced species, and stability ratings for vegetation from ecoregions will be discussed. The importance of this type of data in riparian rehabilitation and restoration will be presented with an emphasis on the use of native plants associated with ecoregions where rivers occur rather than introduced species or inappropriate ecoregional plantings.

The Lichen-Forming Fungi of Mason County, Texas

Taylor Sultan Quedenlsey, Botanical Research Institute of Texas

An inventory of the lichen-forming fungi (lichens) of Mason County, Texas, commenced in fall 2017, and preliminary results are reported here. Mason County is situated on the northeastern edge of the Edwards Plateau. Although limestone is the most common substrate in this county, there are also substantial deposits of granite, sandstone, and gneiss, making Mason County one of the more geologically diverse counties in the region. Lichens were collected from all substrates on private and State-managed properties, and specimens were identified using anatomical, morphological, and chemical techniques and observations. A total of 137 taxa have been reported to date for Mason County, including two species first reported for Texas. A summary of findings and plans for completing the inventory will be examined.

Rescue of an Orphaned Herbarium Collection: NLU

Tiana F. Rehman, Jason H. Best, Peter W. Fritsch, Alyssa B. Young, Miranda Madrid, & Ashley Bordelon, Botanical Research Institute of Texas

In March of 2018, the University of Louisiana at Monroe (ULM) chose to divest itself of the botanical, ichthyological, and herpetological collections that were part of the ULM Museum of Natural History. The Botanical Research Institute of Texas (BRIT) was selected as the recipient of the herbarium specimens (herbarium acronym: NLU), consisting of approximately 472,000 herbarium sheets stored

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in 330 herbarium cabinets. The collection is acquired and accessioned, addressing issues in the categories of security and accessibility, and a portion of the collection is destined for repatriation to the state of Louisiana. We share here a summary of this rescue as a reference to the greater collections community.

A rush to collaborate or the Slender Rushpea Coalition

John Reilley[1], Chris Best[2], Shelly D. Maher[1]
[1]USDA-Natural Resources Conservation Service, E. "Kika" de la Garza Plant Materials Center; [2]US Fish & Wildlife Service

Slender rushpea (*Hoffmansegia tenella*) is a small perennial legume endemic to just two Texas counties, Kleberg and Nueces. There are only six known populations of the species resulting in its listing as a Texas federally endangered species. In 2009 the U.S. Fish and Wildlife Service (Service) awarded a grant, in the form of a cooperative agreement with the Nueces County Soil and Water Conservation District, to prevent the imminent extinction of slender rushpea. We will discuss the development and services of the diverse partnership of seven different entities that came together to form the Rushpea Coalition. This partnership of concerned parties, included the Natural Resources Conservation Service Plant Materials Center in Kingsville (PMC-K), researchers and students at Texas A&M University-Kingsville (TAMU-K), Texas Department of Transportation (TxDOT), San Antonio Botanical Garden, the North American Butterfly Association (NABA), Nueces County Soil and Water Conservation District, and the US Fish & Wildlife Service.

Leveraging molecules and museums to identify multidimensional conservation priorities in Texas

Daniel Spalink, Texas A&M University

There are many dimensions to plant diversity and rarity. These include both traditional floristic and emerging genetic and phylogenetic metrics. Often, these metrics reveal contrasting patterns. For example, the species richness in a community may be high, but the composite species may only represent a small clade in the plant tree of life. Ecosystems with high phylogenetic diversity, composed of species from throughout the tree of life, should exhibit high functionality and resilience to disturbance and change. Documenting the distribution and co-occurrence of species/lineages is the first step to identifying regions that are both species rich and phylogenetically diverse, or otherwise contain an abundance of both rare species and lineages. Efforts to manage and preserve these regions may be an effective and economical means to conserve the largest possible proportion of diversity. In this talk, I will present some preliminary findings on the spatial structure of floristic and phylogenetic diversity throughout Texas, based on records from herbaria throughout the state and a partially completed molecular phylogeny of the Texas flora. These findings show that areas of high species richness do not coincide with areas of significant phylogenetic diversity, and areas of high species endemism have little overlap those of high phylogenetic endemism. These results indicate that Texas has a complex spatial structure to its diversity, and as a starting point for more detailed analyses to identify conservation priorities.

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Status of the federally petitioned *Schoenoplectiella hallii* (Cyperaceae) in Texas

Kim Norton Taylor, Botanical Research Institute of Texas

Schoenoplectiella hallii (A. Gray) (Cyperaceae) is an annual tuft-forming sedge found in 10 states, mostly across the Midwest and Northeast, with historical occurrences in three more states. *Schoenoplectiella hallii* was first discovered in Texas in 2003 in Unit 66 of the Lyndon B. Johnson National Grasslands (LBJNGL), Wise County. Five populations of *S. hallii* were identified in Texas, all within the LBJNGL. Four of these populations were previously unmapped in the TXNDD. Plants were found in three of the five populations in the late spring of 2017. A total of 16,266 plants were estimated in these three populations. Plants are found on margins of sandy ponds in areas with little above ground competition. The presence of large populations of rhizomatous perennials appears to exclude *S. hallii* from sites where it was previously documented, though it presumably persists in the seed bank and could reemerge if perennial populations decline. Vegetation within these ponds is very transient with floristic composition varying from year to year in response to fluctuating water levels. These fluctuations impact *S. hallii* numbers as well, though most ponds have plants year after year. The ability of the plant to persist underwater through otherwise unsuitable climatic conditions also ensures the persistence of populations. With over 1000 man-made ponds in the LBJNGL, there is a remarkable amount of suitable habitat for *S. hallii.* The ponds with *S. hallii* present do not appear unique in any way, and environmental and vegetative conditions suitable for *S. hallii* are found in hundreds of additional ponds. Therefore, there is the potential for a drastic increase in numbers of populations if *S. hallii* continues to colonize additional ponds in the region as it has apparently done in the last 15 years.

Conservation collection maintenance strategies: A case study at Mercer Botanic Gardens

Anita Tiller & Suzzanne Chapman, Mercer Botanic Gardens, Harris County Precinct 4

Mercer Botanic Gardens (MBG), a Harris County (HC) Precinct 4 (P4) Parks facility is susceptible to periodic floods. Rainfall in the drainage basin of Cypress Creek adjacent to MBG ranged from 35-50" during the course of Hurricane Harvey in August 2017. As a participating institution for the Center for Plant Conservation (CPC), MBG maintains a seed bank, conservation nursery, display garden, and a nearby prairie preserve. The Mercer Botanical Center (MBC) research facility received 8-9" of flood water. The seed bank within the MBC received no damage since collections remained above flood water and no power was lost due to the building's standby generator. The CPC conservation nursery received over 10' of flood water. Even though plant stock remained under water for about 5 days, the collections suffered minimal damage. The Endangered Species and Native Plant display garden received about 8' of flood water and remained flooded for 5 days. Some display plants were lost and others are recovering. The conservation staff have much experience with preventative disaster maintenance strategies, thus conservation collections suffered minimal loss due to our maintenance protocols and diligent post flood cleanup. Immediate support received from HC P4 personnel, MBG volunteers and from partners and donors greatly assisted the recovery of MBG. Pre- and post-flood surveys at the nearby HC P4 Prairie Dawn Preserve document population trends of the federally-listed *Hymenoxys texana,* Texas prairie dawn (Asteraceae) and associate rare species.

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TPWD's TEAM tool: Crowdsourcing citizen science and ecosystem analysis

Amie Treuer-Kuehn, Texas Parks & Wildlife Department

Texas Parks and Wildlife's Landscape Ecology Program has developed a Google maps based application, Texas Ecosystem Analytical Mapper (TEAM), to deliver the Ecological Mapping Systems of Texas (EMS) data to Texas citizens. The TEAM application is an interactive mapping tool that assists users in understanding Texas habitats and integrate vegetation data with land management and resource planning of all types. Wildlife biologists, land managers, naturalists, planners, and conservationists are able to use TEAM to view and print the EMS data in relationship to other natural feature layers such as soils, geology, hydrology and ecoregion. TEAM allows the user to view and print custom maps and reports of habitat data from both uploaded filed or areas of interest drawn within the application. TEAM also allows Texans to contribute to the mapping effort via a new citizen-science data entry module. Crowdsourcing information regarding errors in the map will allow TPWD experts to identify areas of change and systemic errors in the vegetation data. The information gathered from users will assist with land management and conservation efforts. It also provides an avenue for community involvement in habitat understanding.

Native Neighborhoods: Helping pollinators across Fort Worth

Michelle Villafranca, Fort Worth Nature Center & Refuge

Pollinators are losing habitat at an alarming rate but cities can mitigate the loss by encouraging residents to plant native pollinator plants at their home. Native Neighborhoods, a City of Fort Worth program, works to improve habitat one home at a time by providing five free native plants, a tree, and a water conservation kit to Fort Worth residents. Hosted at City community centers, our experts offer guidance on native plants and their pollinators, landscape design, planting, maintenance, and water conservation. Native Neighborhoods is a collaboration between the Fort Worth Nature Center & Refuge, City of Fort Worth Forestry and the Water Department.

Synergistic effects of habitat fragmentation and climate change on conservation of an endangered orchid

Hsiao-Hsuan Wang[1], Frederico Mestre[2], Carissa Wonkka[3] , Michael Treglia[4], William E. Grant[1], Fred Smeins[5], and William E. Rogers[5]
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Navasota ladies'-tresses (*Spiranthes parksii*) is a federally listed endangered species which is endemic to east-central Texas. It occurs in thirteen Texas counties with ninety-three percent of known population sites in Brazos and Grimes counties, two counties in the Brazos River Valley of east-central Texas. This percentage is considered to be inflated due to the high concentration of survey efforts in this area. Expansion of oil, natural gas, lignite, and other natural resource-based industries, as well as urban expansion and exurban development pose significant threats to *S. parksii* populations. Conservation biologists and natural resource managers are growing increasingly concerned about the manner in which climate change and accelerating habitat fragmentation may negatively affect the long-term viability of threatened and endangered plant species. However, there

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is limited understanding of the effects of interaction between these two factors on *S. parksii*. We aimed to estimate the synergistic effects of fragmented landscape and changing climate on *S. parksii* by simulating the species metapopulational persistence under several landscape fragmentation scenarios and combining this with future climatic suitability as projected for a diversity of climatic models. Our results indicated that models that did not incorporate the synergistic effects of habitat fragmentation and climate change resulted in an overly optimistic prediction. The result of the proposed model provided more useful and realistic information relevant to *S. parksii* conservation. Our model could also be adapted for the planning of other threaten or endangered species of conservation concern.

Long term monitoring results for Texas wild-rice (*Zizania texana*) using three monitoring regimes

Casey Williams, BIO-WEST Inc.

Texas wild-rice is a federally listed endangered grass known to inhabit one location, the spring fed San Marcos River in Hays County. BIO-WEST has been responsible for monitoring this species annually since 2001 as part of an ongoing long-term biological survey funded by the Edwards Aquifer Authority. BIO-WEST surveys entail three monitoring regimes, a full system survey carried out at least once per year, surveys of predetermined small study sections carried out at least twice per year and the monitoring of individual plants deemed "vulnerable" also conducted twice or more per year. These three monitoring regimes provide different insights into the health of the total population of *Zizania texana* and each provide a piece to a more comprehensive understanding of the health and stability of the species which may be useful to other species monitoring plans. The response of *Zizania texana* to recent comprehensive restoration activities conducted by multiple entities will also be highlighted.

The comparison between two surveys for Correll's false dragonhead (*Physostegia correllii*) in Travis County

Casey Williams, BIO-WEST Inc.

Correll's false dragonhead (*Physostegia correllii*) is a recognized rare plant historically known to only a few counties in Texas. One site in Travis County is known to have a rather large concentration of this species but no previous large scale survey of the site had been conducted. An initial survey was conducted in 2014 by volunteers from BIO-WEST, Lady Bird Johnson Wildflower Center and TPWD to locate as many colonies of *Physostegia correllii* as possible. The coordinates of each colony were collected along with colony size measurements and qualitative data including associated species, overhanging canopy density and soil type. A repeating survey was carried out in 2018 to ascertain if the original colonies could be relocated and if any new colonies could be found. The comparative results of these two surveys are presented.

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Alphabetical by first author

The role of the USDA-NRCS Plant Materials Program in ecosystem restoration

Brandon Carr, USDA-NRCS Plant Materials Center

The success of large-scale restoration depends on many variables, some of which are out of our control. One important variable which is within our control is the use of tested and proven seed sources. The USDA-NRCS Plant Materials Program was established to develop techniques for conservation planning and planting, evaluate native plants that can be used throughout different regions to address various resource concerns, and supply the commercial market with proven seed sources. Currently, the Plant Materials Program maintains hundreds of native seed sources to ensure the commercial industry can meet the restoration needs. The importance of plant diversity in healthy ecosystems is critical for ecosystem restoration. This poster will focus on the NRCS plant evaluation, selection and release process and the collaboration with other entities.

Vegetation survey of local urban area begins long-term documentation of land use impacts on area biodiversity

Kelly Carroll[1], Dan Caudle[2], & Brooke Byerley Best[2]
[1]Trinity University; [2]Botanical Research Institute of Texas

This project set out to survey the vegetation of an urban property in western Fort Worth, surrounded by development. One portion of the property had been untouched by development and grazing until this summer, when a construction easement for a pipeline running through the property was approved. The other portion of the property has been grazed by cattle for decades, resulting in massive differences between the two areas. To complete the survey, we laid out and ran transects to record vegetative cover and collected voucher specimens (deposited at BRIT), recording 147 total taxa and collecting 110 vouchers of 84 distinct taxa. We mounted and digitized all vouchers, making the records publicly available via the Texas-Oklahoma Regional Consortium of Herbaria (TORCH) data portal (http://portal.torcherbaria.org). In addition, we updated a 1998 survey of the area by Roger W. Sanders and combined it with our results to create a checklist (Flora of All Saints' Episcopal School, Fort Worth) in the TORCH portal that records 285 total taxa. When designing the procedures for this project, we ensured that they could be adapted by later groups of university or high school students so that our results could serve as the baseline record for a documentation of long-term shifts in biodiversity and land use. Dan Caudle will lead another survey in the fall of 2018 and hopes to incentivize junior and senior high school students to participate in the project into the future.

When size matters: Studies of the flowering phenology of the federally threatened Tobusch fishhook cactus (*Sclerocactus brevihamatus* subsp. *tobuschii*), a Texas endemic

Karen Clary, Hans Landel, Sean Watson, & Ryan Mecredy, University of Texas-Lady Bird Johnson Wildflower Center

Tobusch fishhook cactus, federally threatened, is known from eight counties in central Texas. Threats to survival include drought and human-induced land disturbance activities such as livestock grazing and habitat destruction, among others. We monitored the flowering habits of a greenhouse collection

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of approximately 300 Tobusch fishhook cacti salvaged from two pipeline construction sites in Val Verde and Edwards counties. Between 2013-2018, we measured yearly growth, initial age of plant to flowering, periodicity of flowering, number of flowers per plant and in a subsample of 124 of these plants (2015-2017), we counted number of style lobes per flower on each plant. Data from these studies support findings from earlier field research showing that as the size of plants increase, individuals produce more flowers for a longer period. We discovered that in addition to producing more flowers, the flower of a larger plant can produce more style lobes relative to younger, smaller plants. These data add support to a hypothesis that size is a major component of fitness in this species. That is, older plants are not only more likely be more fit (to produce more offspring) than younger plants because they produce more fruits, but also because each fruit may have more seeds. We also found that in the greenhouse, younger plants do not flower until approximately five years of age. These data support findings from field research that longevity is key to survival of the species and underscore the importance of conservation management focused on the species' reproductive habits, especially recruitment and survival of populations in the wild and particularly in the face of global warming.

Extinction threats to white rosinweed

Alyssa Hutchinson, Calista Lothliam, & Bruce Benz, Texas Wesleyan University Biology Department

White Rosinweed (*Silphium albiflorum*: Asteraceae) is endemic to the Crosstimbers Ecoregion of North Central Texas. Destruction of its habitat is due to its preference for limestone soils that positions it in areas of dense human settlement. Populations of S. albiflorum are ecologically threatened by urban growth. Ongoing census and demographic studies show that most metapopulations have poor population viability with the majority having net reproductive values less than 1.0. Ongoing phylogeographic research of metapopulations throughout its geographic range seeks to characterize genetic diversity that will assist in establishing conservational needs. Examination of cpDNA sequence variation in more than fifty individuals representing thirty metapopulations seek to establish the history of species demographic relations and relationships to *S. laciniatum.*

GIS analysis of rare plant species of Texas

Emily Inglis & Tamie Morgan, Texas Christian University

This GIS analysis aims to provide a geospatial understanding of the plant rarity using a rare plant dataset that the Botanical Research Institute of Texas (BRIT) is actively working on. The data includes the rarity indexes by the federal and state levels, as well as, endangered and threatened status of the species. I mapped these species by county and ecoregions to determine spatial distribution. These maps enable us to have a better understanding of what areas need conservation efforts and areas that need to be studied based on number and density of these plants across Texas.

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The status of the Shinner's sunflower (*Helianthus occidentalis* ssp. *plantagineus*) in Texas, Arkansas, and Louisiana

Amber Miller, U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service (Service) will be evaluating the status of the Shinner's sunflower (*Helianthus occidentalis* ssp. *plantagineus*) using a Species Status Assessment (SSA) Framework and the best available scientific and commercial information. The SSA Framework provides a methodology for assessing the status of species under the Endangered Species Act (ESA). Completion of the analysis portion of the SSA is expected in the fall of 2018. The SSA will deliver foundational science to inform the 12-month finding for the Shinner's sunflower in the spring of 2019. Many of the historically, accessible sites in central Texas were survived for Shinner's sunflower in October 2017 by the Service and Texas Parks and Wildlife Department. Survey efforts found plants in both rosette and in flower form, additionally previously undiscovered sites were also located. In the fall of 2018, the Service is collaborating with partners from the Service, Natural Heritage Program, and academia from Arkansas and Louisiana to conduct surveys of other areas with historical records within the remaining geographic range. An understanding of the Shinner's sunflower throughout its range will better inform the SSA and ultimately, the Service's 12-month finding.

A preliminary report on the seed dispersal of *Sclerocactus brevihamatus* ssp. *tobuschii*, An endemic cactus

M'Kayla G. Motley & Bonnie B. Amos, Angelo State University

The Tobusch fishhook cactus (*Sclerocactus brevihamatus* ssp. *tobuschii*) (TFC) is a small dome-shaped cactus found in Ash Juniper-Liveoak associations in nine counties in the Edwards Plateau, Texas. It is the earliest flowering member of its community with yellowish green flowers formed as early as January and continuing to April with fruits ripening early May to mid June. The species was just moved from endangered to threatened in May 2018. Much is known about the taxon's breeding system and pollination; however, little is known about its seed dispersal. Our objectives were to: define fruit/seed attractants and identify fruit visitors and their behavior for TFC populations at Kerr Wildlife Management Area in Kerr County, TX. The only fruit visitors observed, in images, videos or field observations, were two species of ants, the fire ant (*Solenopsis invicta* or a hybrid *S. invicta* × *S. geminata*) and *Forelius pruinosus*. Neither visited the plants until the fruits opened but then swarmed the fruits (N = 10) feeding on the juicy pulp and harvesting pulp from the fruit. However, neither harvested seeds. Data analyses show that fruit visitation is short-lived with 1.5 to 3 days from first observation of ants to collapse and subsequent drying of the fruit. Seeds remain in the fruit and fall onto and around the plant. These observations differ from those of Emmett (1995) who reported the ant *Forelius maccooki* (= *F. foetida*) transported as much as 85% of TFC seeds back to the ant mound at three different sites. 2018 studies include obtaining additional visitor data, conducting exclusion experiments, and monitoring sugar content in fruits.

Poster Abstracts

Global Strategy for Plant Conservation 2020: Progress report for Texas, U.S.A.

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The Global Strategy for Plant Conservation (GSPC) outlines 16 targets to be achieved by 2020 with the goal of halting plant extinction. An assessment of progress towards targets 1 and 2 of the GSPC was completed. Significant work towards target 1, an online flora of all known plants, is underway. While it has been 48 years since the publication of the most recent complete state-wide flora, 22% of the state has a complete regional flora published in the 21st century. Despite the significant progress made towards understanding the state's flora, all of these works are static documents in print format. An online, interactive version is not available, and updates are rarely made. An online Symbiota portal for the Texas Oklahoma Regional Consortium of Herbaria (TORCH) houses herbarium specimen data for the state, and digitization efforts are underway. Thirty-four percent of the estimated 1.3 million specimens of Texas plants are currently available in the portal. Significant portions of the records are in need of additional transcription. Significant challenges exist which threaten to halt progress, most notably a lack of funding. Progress towards target 2, an assessment of the conservation status of all known plant species was also assessed. The GSPC calls for all taxa to be assessed using IUCN standards. To date, only 9% of taxa occurring in Texas have been assessed at the global level through the IUCN red list system. NatureServe Conservation Status Ranks have been applied at the global level for 91% of Texas taxa, but for only 21% of taxa at the sub-national or state level for Texas.

Memory rose: A new rare species for Texas?

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First collected in 2014 in Wise County, Texas, *Rosa memoryae* W.H. Lewis is known from only one population occurring on a sloped rural roadside in sandy soils. *Rosa memoryae* was recently described as a new species distinct from the populous *Rosa foliolosa* Nutt. ex Torr. & A. Gray in 2016 by W.H. Lewis. It is shorter, has smaller pink blossoms, and flourishes in sandy soils while *R. foliolosa* is taller, has larger white blooms, and grows in limestone. However, several of the distinguishing characters overlap, and flower color does not appear to be stable, bringing into question the taxonomic significance of the putative *R. memoryae*. If *R. memoryae* is a distinct entity, it would be a G1 globally imperiled species and would likely require conservation resources to ensure its survival. The goal of this study is to (1) assess the status of the putative *R. memoryae* population and (2) compare morphological characters with R. foliolosa to assess the validity of the putative *R. memoryae* as a species.

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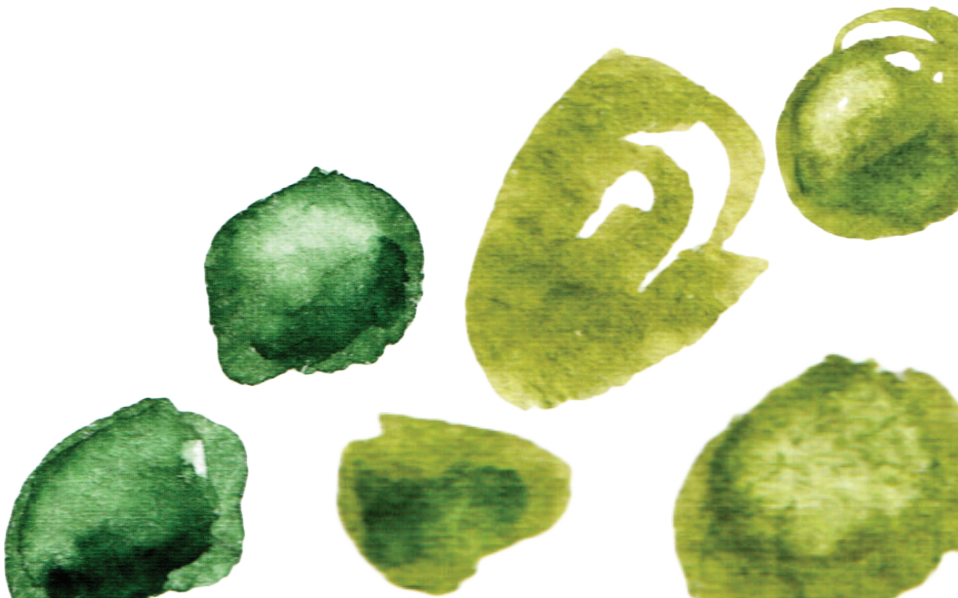

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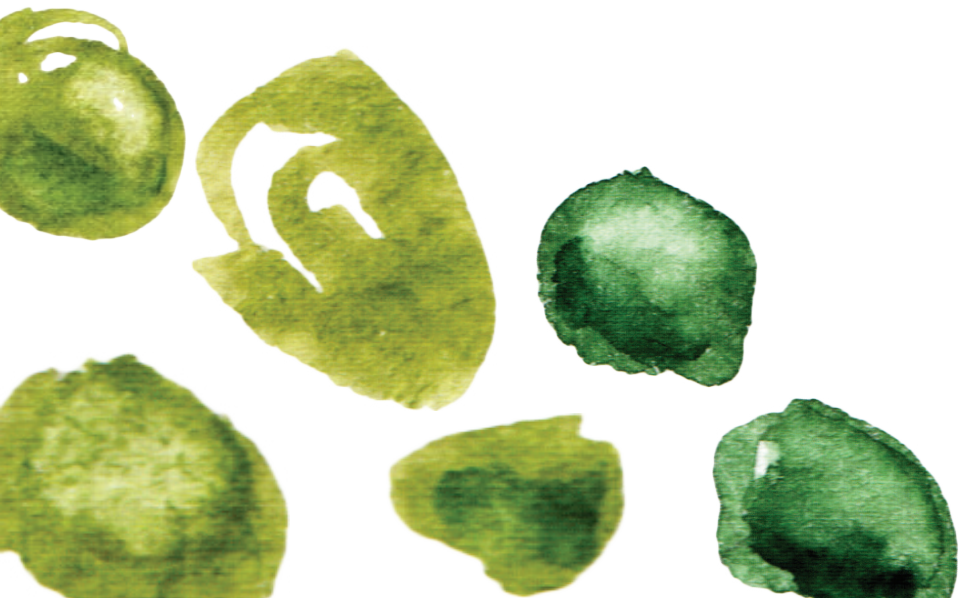

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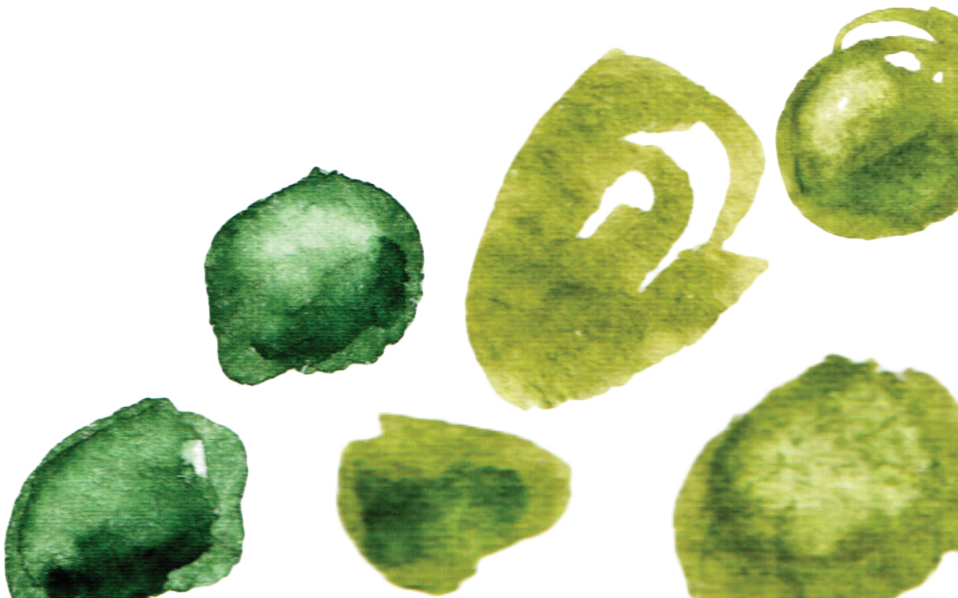

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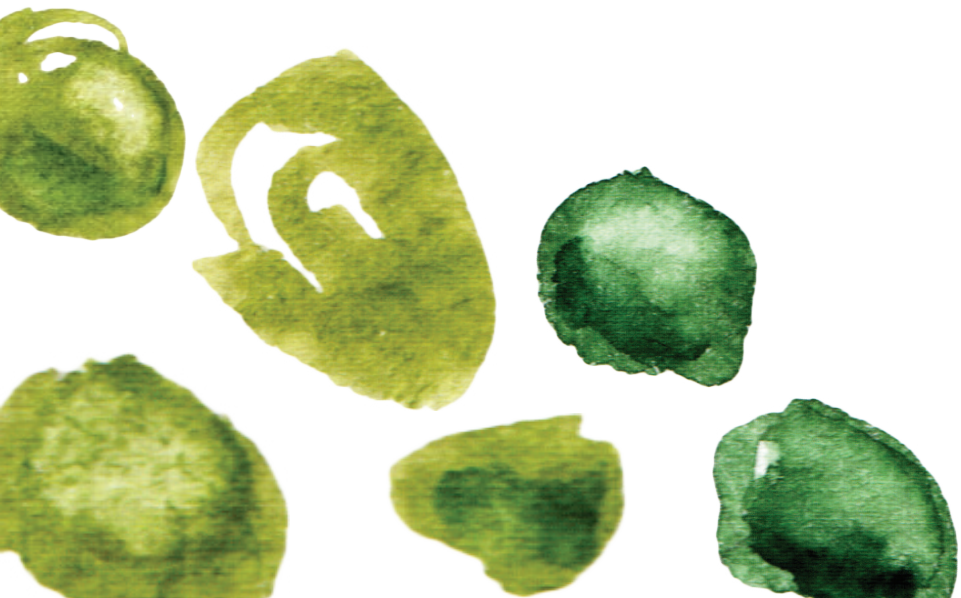

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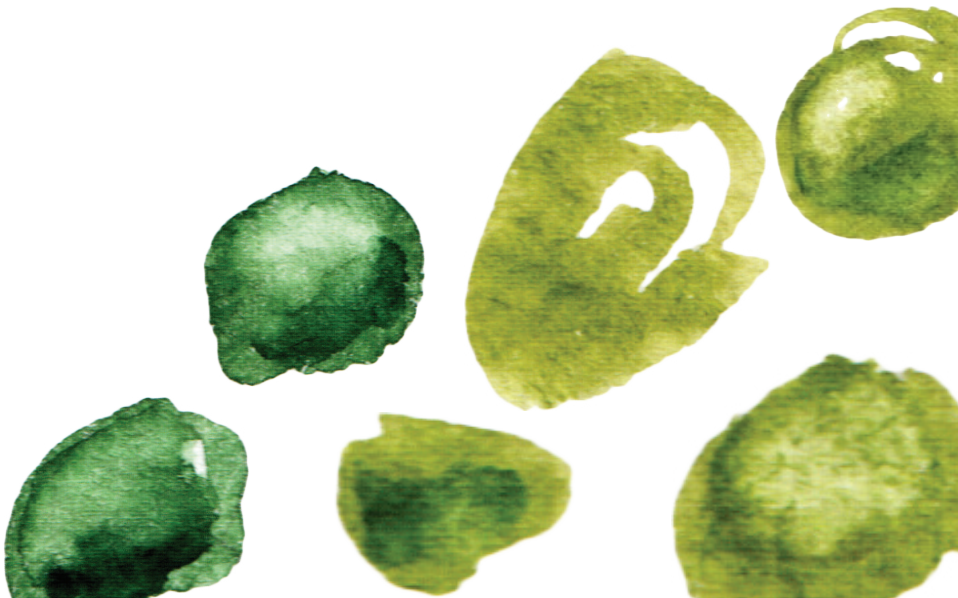

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