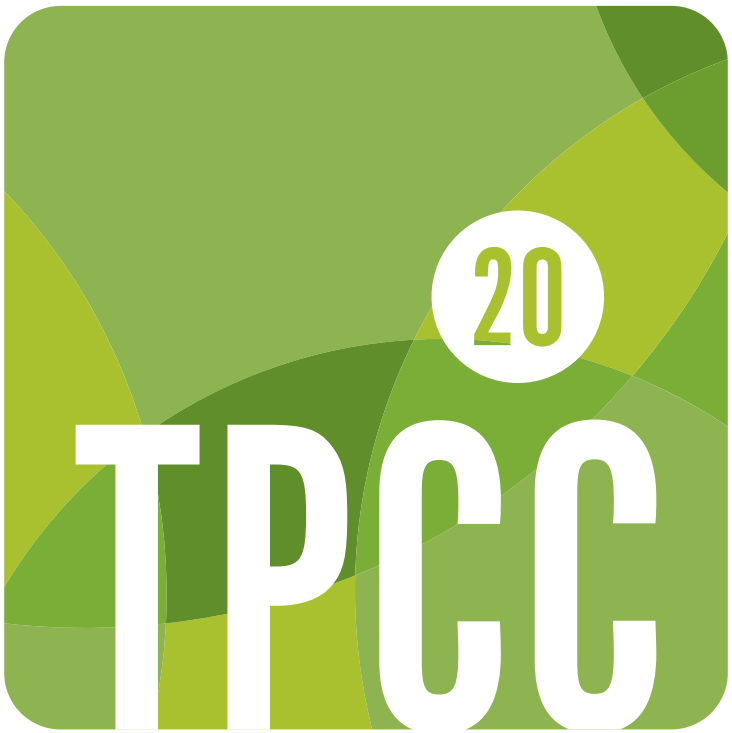

TEXAS PLANT CONSERVATION CONFERENCE

TABLE OF CONTENTS

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Botanical Research Institute of Texas

THURSDAY, 13 AUGUST 2020

1 – 2 PM Session 1: Floristics

Rediscovery of *Dendrothele* (white crust fungus) in North Texas: The Importance of Urban Tree Preservation – Ashley Bordelon, Harold W. Keller, Robert J. O'Kennon

Predictive Mapping of Rare Plants in Texas – Jordan Craven, Hemanta Kafley, Darrel Murray, Heather Mathewson, Kim Taylor

Biodiversity of the Pecan Creek Pollinative Prairie: A Classification of Observational Data (2016-2020) – Zoe A. Gilbert, Carson D. Nick, Jamie Baxter-Slye,

Update on the Illustrated Flora of East Texas – Barney Lipscomb

Monarda viridissima at Notch Cutter Wildlife Habitat Preserve – Minnette Marr, Betty Henley, Judy Turner

Mapping the Impact of Climate Change on Spatial Distribution of *Dalea reverchonii,* an Endemic Plant – Madhushree Munsi, Kim Norton Taylor

Recent Additions to the Threatened and Endangered Plant List of Texas – Anna W. Strong

Updating BONAP Maps for the State of Texas – Liz Pullman, Judy Turner, Misako Nishino, John Kartesz

Plant Conservation in Temporally Variable, Spatially Heterogeneous Environments – Hsiao-Hsuan Wang, Carissa L Wonkka, Frederico Mestre, Diogo Alagador, Tomasz E. Koralewski, Michael L. Treglia, Andrzej Pękalski, William E. Grant, Fred Smeins, William E. Rogers

2 – 3 PM Session 2: Monitoring

Chalcidoid Infestations of *Silphium albiflorum* (Asteraceae) Populations in Texas Reduce Population Viability – Julia Barkell, R. Caballero Montes, Jinhyeon Choi, Robert McManus

Population Viability of White Rosinweed (*Silphium albiflorum* A. Gray: Asteraceae) Populations in Texas – Julia Barkell, Raul Caballero Montes, Jinhyeon Choi, Robert McManus

Densities, Plant Sizes, and Spatial Distributions of Six Wild Populations of *Lophophora williamsii* (Cactaceae) in Texas, USA – Anna Ermakova, Carolyn V. Whiting, Keeper Trout, Colin Clubbe, Martin K. Terry, Norma Fowler

Invasive Plants, the Black Sheep of the Botanical Family – Ricky Linex

Conservation of Texas Prairie Dawn, Hymenoxys texana (Asteraceae) and Associate Endangered Species at the Harris County Precinct 4 Prairie Dawn Preserve – Anita A. Tiller, Suzzanne M. Chapman, Linda L. Costanzo, Chris C. Ludwig

An Updated Survey for the Federally Petitioned Plant, *Bartonia paniculata* ssp. *texana* (Gentianaceae) – Kim Norton Taylor

3 – 4 PM Session 3: Ecology

Saving Bois d'Arc: Shedding Light Ethnobotanical and Paleontological History of *Maclura pomifera* – Grace Lloyd Bascopé

Identifying Pollinator Networks Associated with Differing Seed Mix Traits in Local and Commercial Pollinator Seed Mixes in North-Central Texas – Jenny M. Chlipala, Adam B. Mitchell, Darrel B. Murray

Suburban Wetlands and Water Birds in Eastern Denton County, Texas – Jayce Proctor, Paul F. Hudak

Visualizing Riparian Ecotone Fragmentation in Urbanizing Watersheds: A Case Study of Upper Hickory Creek, North-Central Texas – Monica Veale Yesildirek, Paul F. Hudak

Marsh-mangrove Vegetation Dynamics in the Mission-Aransas NERR – Miranda Madrid, Katie Swanson, Edward Buskey

Is *Dalea reverchonii* Serving as a Nurse Plant in Texas Walnut Limestone Glades? –Allan D . Nelson, Rebecca R. Nelson

The Viability of Cultivars of Texas Native *Echinacea* Species in the Restoration of Pollinator Habitat – Meghan K Peoples, Adam B Mitchell, Darrel B Murray

Endofungal Bacteria Isolated From Mycorrhizal Fungi in a North American Terrestrial Orchid – Kris Petterson, Jaspreet Kaur, Jyotsna Sharma

Wetland Vegetation Survey Method for an Extended Dry-Detention Basin with Micro-Pools – Jayce Proctor, Michelle Wood-Ramirez

FRIDAY, 14 AUGUST 2020

1 – 2 PM Session 4: Restoration

Strategies for Restoring Tallgrass Prairies in Northeast Texas – Emily R. Bishop, Tyler C. Wayland, Keith A. Pawelek, Sandra Rideout-Hanzak, Forrest S. Smith, David B. Wester

Ocelot Habitat Restoration Acceleration – Jose G Cortez Jr, Sandra Rideout-Hanzak, David B. Wester, Michael E. Tewes, David Ruppert, Jonah Evans

Examining the Efficacy of Stock-Piling Topsoils and Seeding for the Restoration of Native Grasses – Dustin A. Golembiewski, Sandra Rideout-Hanzak, David B. Wester

Evaluation of Mechanical and Chemical Methods for Controlling Chinese Privet (*Ligustrum sinense* Lour.) in a Rural Lawn – Paul F. Hudak

Overview of the University of North Texas Pecan Creek Pollinative Prairie: An Undergraduate Education Experience Aiming to Reconstruct a Native, North Central Texas Prairie in an Urban Setting – Clarissa Molina, Savannah Thomas, Jaime Baxter-Slye

Herbaceous Community Changes in Restoration of Mesquite-Invaded Grasslands – Darrel Murray, Jim Muir, Devin Erxleben

Solarization Doesn't Kill King Ranch bluestem, But Still Increases Diversity – Charlotte Reemts, Rebecca Neill, Corbin Neill

Prescribed Fires Cause Minimal Damage to a Threatened Cactus – Charlotte M. Reemts, Jacqueline R. Ferrato

Cover Crop Considerations for Rangeland Restoration – Brianna M. Slothower, Anthony D. Falk, Sandra Rideout-Hanzak, Terry Blankenship, David B. Wester

2 – 3 PM Session 5: Genetics and Seed Conservation

Multiple Complementary Studies Clarify Which Co-occurring Congener Presents the Greatest Hybridization Threat to *Hibiscus dasycalyx*, a Rare Texas Endemic – Melody P. Sain, Julia Norrell-Tober, Megan Seawright, Alyssa Blanton, Katherine Barthel, Kate L. Hertweck, John S. Placyk, Jr., Randall L. Small, Lance R. Williams, Marsha Williams, Joshua A. Banta

QuerChaos! Are Oak Conservation Efforts Properly "Picking and Choosing" What to Conserve Among Apparent Trans-Pecos Quercus Hybrid Complexes? – Adam Black

Taxonomy and Conservation of the Native True Blueberries (*Vaccinium* sect. Cyanococcus) in Texas – Peter W. Fritsch, Paul S. Manos, Andrew A. Crowl

Towards a Genetic Database of Texas Flora Via Targeted Sequencing of 353 Genes – Haley Hale, Madeline Slimp, Matt Johnson

Texas Little Bluestem (*Schizachyrium scoparium*) Phenotypic Attribute Correlations to Collection Site Environment Characteristics – Kimberlee N. Howell, James P. Muir, Darrel B. Murray, Adam B. Mitchell, John R. Bow

Montezuma Cypress (*Taxodium mucronatum* Ten.): What is Needed to Optimize the Seed Germination Process? – August Plamann, Alejandro Fierro-Cabo

3 – 4 PM Session 6: Strategies and Networks

Global Conservation Consortia: Coordinating Collections for Exceptional Species – Amy Byrne

Assessing Conservation Priorities for Texas at the Interface of Botanic Gardens, Conservation, and Genomics – Jean Linsky, Abby Meyer, Morgan Gostel

Recovering America's Fish & Wildlife Act-An opportunity to Fund Rare Plant Work – Richard Heilbrun

Data Sharing in Support of Collaborative Plant Conservation: Lessons from California Plant Rescue – Katherine D. Heineman, Christa Horn, Naomi Fraga, Cheryl Sevilla, Heather Schneider, Vanessa Handley, Holly Forbes, Brett Hall, Evan Meyer, Tony Gunroe, Shannon Still, David Magney, Stacy Anderson, Bart O'Brien, Joyce Maschinski

Digitization of a Pteridophyte Herbarium: A Method to Curate and Inform Fern and Lycophyte Research in Texas –Tiana F. Rehman, Jessica L. Lane, Ashley Bordelon, Alejandra Vasco

American Crossroads: Digitizing the Vascular Flora of the South-Central United States – Tiana Rehman, Peter Fritsch, Diego Barroso, Jason Best, Mark Fishbein, Clay Barrett, Abigail J. Moore, Bruce W. Hoagland, Daniel Spalink, George A. Yatskievych

Cross-Border Rare Plant Conservation – Sula E. Vanderplank, Joyce Maschinski, Carlos Gonzalez

Challenges for Plant Conservation on a College Campus in the Era of Pandemic Budget Cuts – Sam Whitehead, Zach Stark

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ABSTRACTS **August 13, 1 – 2 PM**

Session 1: Floristics

Rediscovery of *Dendrothele* (white crust fungus) in North Texas: The Importance of Urban Tree Preservation [Video Presentation]

Ashley Bordelon, Botanical Research Institute of Texas; Harold W. Keller, Botanical Research Institute of Texas; Robert J. O'Kennon, Botanical Research Institute of Texas

A white crust fungus, *Dendrothele jacobi*, was first described in the early 2000s from Arlington, Texas, and not observed or collected in the area until nearly 20 years later. This fungus has gone largely unnoticed because it is not the typical fleshy mushroom that most people recognize, but flattened and unremarkable. The genus *Dendrothele* can easily be confused with bird feces or splattered white paint on tree bark surfaces. The authors identified *Dendrothele* on trees in nature parks and residential areas in North Texas recording 100 collections. The field search was narrowed to *Ulmus* (elm) trees but expanded to include nine tree species of varying families resulting in the discovery of additional *Dendrothele* species (*D. candida, D. commixta, D. gilbertsonii, D. nivosa*) and a similar-looking fungal species, *Lyomyces juniperi*. Many fungi and lichens occur on living trees for hundreds of years if undisturbed and contribute to a biodiverse ecosystem alongside mosses, liverworts, and myxobacteria on tree bark. A myxomycete species new to science was recently discovered on an American elm tree in a Tarrant County nature park. How many new tree bark species have gone undetected? What can these organisms teach us? Urban trees could hold these answers and communities should prioritize protecting them – not only for these organisms, but because trees play host to various insects, birds, and mammals and benefit humans as well. Where forests in cities have vanished and concrete buildings emerged, these microhabitats are often threatened before researchers can observe and study these species-rich trees.

Predictive Mapping of Rare Plants in Texas [Video Presentation]

Jordan Craven, Tarleton State University; Hemanta Kafley, Tarleton State University; Darrel Murray, Tarleton State University; Heather Mathewson, Tarleton State University; Kim Taylor, Botanical Research Institute of Texas

Species distribution models allow ecologists to reliably predict habitat and develop maps that can be used in subsequent species management planning. Using historical collection data, herbaria databases, and citizen science records, we will use presence-only data of occurrence for 17 species of rare plants to predict potential habitat throughout the state of Texas. The main objective was to identify potential locations of present-day populations of each species. We created predictive suitability models using MaxEnt and several environmental variables including bioclimatic data (WorldClim), solar radiation, soil, geological features (USGS), and land cover. The models were developed on a 30-m resolution scale. We determined the contribution of variables to model output using jackknife tests. We assessed predictive ability of the models using diagnostic ROC curves and AUC values. Each model indicated high probabilities of finding existing populations in the expected regions of Texas for each species. The Botanical Research Institute of Texas has been and will continue to perform field surveys for us to use to externally validate four species models. These models will be integral in the future management of these 17 species, especially if they were to become listed as threatened or endangered in the state of Texas.

Biodiversity of the Pecan Creek Pollinative Prairie: A Classification of Observational Data (2016-2020) [Poster Presentation]

Zoe A. Gilbert, University of North Texas; Carson D. Nick, University of North Texas; Jamie Baxter-Slye, University of North Texas

This poster presentation is complimentary to a video presentation documenting the University of North Texas Pecan Creek Pollinative Prairie project, a 100% student funded urban restoration project conducted by students, faculty/staff, and community members. The Pollinative Prairie consists of four acres that has been subject to a myriad of restoration practices, with a mission to increase native north central Texas prairie plant and animal biodiversity on an urban university campus, while providing educational and volunteer opportunities for conservation. Biodiversity of plants and animals within a prairie is a strong indicator of the resiliency and overall health; furthermore, biodiversity is essential to the efficiency of ecosystem services provided by these habitats, such as decreased soil erosion, increased carbon sequestration, decreased storm runoff, recreation, as well as increases in pollinator species abundance and richness. Since 2016, over 1,500 students have engaged in restoration practices such as solarization, seasonal seedings using native seed, mass plantings of nursery grown plants, along with removal of non-native or invasive species. Throughout, students have conducted "BioBlitz's" and routine observations using the iNaturalist application to catalogue the observable biodiversity. To date, we have documented 344 taxa from 1,419 individual iNaturalist observations. Eighty-six percent of the taxa are considered native, while 14% are non-native and 13% considered invasive. A taxa list is provided that highlights pollinator species, as well as species of concern. Methodology and problems currently faced at the prairie are also presented for viewer feedback in order to improve our techniques.

Update on the Illustrated Flora of East Texas [Video Presentation]

Barney Lipscomb, Botanical Research Institute of Texas

The *Illustrated Flora of East Texas* was initiated in 1999 as a collaborative venture between BRIT and Austin College (Sherman). This regional flora project is documents and preserves a rich and diverse botanical legacy of East Texas. An estimated 10% of the flora is of conservation concern. The two primary objectives of the flora are 1) to provide an educational and user-friendly source of current information about the rich plant life of East Texas, and 2) to scientifically document the valuable botanical heritage of the region. A three-volume flora is projected to cover about 3613 taxa or roughly 65% of the state's flora. Volume 1 (Introduction, Pteridophytes, Gymnosperms, and Monocotyledons) was published in 2006. Volume 2 will cover dicotyledon families A-F (Acanthaceae to Fabaceae) treating about 1424 taxa. Volume 3 will cover families F-Z (Fagaceae to Zygophyllaceae) and will treat about 1129 taxa.

Volume 2 update: After some starts and stops, Volume 2 is back up and running with some funding. Treatment writing and production of artwork are under way. Volume 2 progress includes a draft treatment of the largest family, Asteraceae, with some 467 taxa. Draft treatments of some 65 taxa of smaller families are also complete. The big and taxonomically uncomfortable mustard family (Brassicaceae) is in progress. The remaining families in Volume 2 will hopefully be easier and faster and Volume 2 can be published sooner than later.

***Monarda viridissima* at Notch Cutter Wildlife Habitat Preserve** [Poster Presentation]

Minnette Marr, Lady Bird Johnson Wildflower Center; Betty Henley, Notch Cutter Wildlife Habitat Preserve; Judy Turner, Lost Pines Chapter - Texas Master Naturalist Program

The mission of Lady Bird Johnson Wildflower Center is to inspire the conservation of native plants. In the spirit of the founders of the National Wildflower Research Center, we bank seeds to share for research and restoration projects. If a request is received for seeds that have not been banked, we collaborate with local volunteers to bank the seeds. The collection of *Monarda viridissima* provides an example of the potential of banking seeds to locate previously undocumented populations of Species of Greatest Conservation Need and to share the Center for Plant Conservation's Best Practices with new audiences.

Mapping the Impact of Climate Change on Spatial Distribution of Dalea reverchonii, an Endemic Plant [Poster Presentation]

Madhushree Munsi, Botanical Research Institute of Texas; Kim Norton Taylor, Botanical Research Institute of Texas

Climate change is one of the foremost threats that alter species distribution and diversity. Considerable change in climate may result in local population loss, which means extinction in the case of endemic species. Endemic plant species are particularly vulnerable due to their restricted niche and inability to migrate to newer locations. *Dalea reverchonii* (S. Wats.) Shinners (Comanche Peak prairie-clover) is endemic to north-central Texas. The current conservation status of the species in G2S2, i.e. the species is Imperiled at both global and subnational levels. The present work was carried out to map the impacts of future climate scenarios on the spatial distribution of D. reverchonii. Since information on geographic extent of the species is incomplete, we used MaxEnt, an Ecological Niche Modelling (ENM) tool, to model its spatial distribution. The species occurrence data points along with the bioclimatic and topographic variables were used to develop the model. Our results show that annual precipitation, precipitation of driest and coldest quarter, isothermality, temperature seasonality and mean temperatures are the most important factors that best explain the current distribution. The species has a very narrow niche. The prediction models indicate further reduction of suitable habitats, making the species more vulnerable in the near future. Prediction of suitable habitats allows identification of key areas for developing conservation strategies.

Recent Additions to the Threatened and Endangered Plant List of Texas [Video Presentation]

Anna W. Strong, Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department (TPWD) maintains state lists of threatened and endangered (T/E) plants. Until 2020, all additions to the state T/E plant lists were a result of plants first being added to the federal list of T/E species. However, species can also be added to the state T/E lists by TPWD independent of additions to the Endangered Species Act list. In 2015 TPWD began reviewing the conservation status ranks of the 449 plants on the state's Species of Greatest Conservation Need (SGCN) list associated with the Texas Conservation Action Plan. This was part of a larger effort to review the conservation status of all SGCN in Texas, including animals, using the NatureServe Conservation Status Methodology. NatureServe's methodology is a nationally-recog-

nized tool used by many states and conservation organizations to prioritize rare species in the United States. In March of 2020 the TPWD Commission approved the addition of eight rare plants to Texas' state threatened plant list. Although the SGCN list includes plants that are vulnerable, imperiled, and critically imperiled, only the latter two were considered for addition to the state threatened plant list. It is TPWD's hope that adding imperiled and critically imperiled plants to the state threatened list will give us greater opportunity to conserve and recover rare species in cooperation with public and private landowners before there is a need to list them at the federal level. Adding these species to the state threatened list also helps us highlight them and encourage voluntary conservation efforts.

Updating BONAP Maps for the State of Texas [Poster Presentation]

Liz Pullman, Lost Pines Master Naturalist; Judy Turner, Lost Pines Master Naturalist; Misako Nishino, BONAP; John Kartesz, BONAP

The Biota of North America Program (BONAP) provides current phytographic, nomenclatural and taxonomic research on the North American vascular flora and offers the most comprehensive county-by-county data and reference sourcing. BONAP's maps are used widely throughout the botanical community. To a great extent, continuity of the data behind these maps is contingent on up-to-date field and herbarium researchers providing current and accurate distribution data. We became involved with BONAP five years ago after Dr. John Kartesz, the BONAP Director, came across the Lost Pines Master Naturalist plant list for Bastrop County in The Wildflower Center (UT-Austin) "Special Collection" section of their website. To show a more accurate species diversity within our Texas counties, Dr. Kartesz urged us to investigate additional Texas counties with the objective of increasing the number of taxa reported for each county, especially for under-collected ones, some of which had fewer than 60 species reported! Perhaps it would be prudent for other states to initiate similar efforts for reporting more accurate species diversity within their counties, thereby embellishing the accuracy of BONAP North American Plant Atlas.

Thus far, we have assessed 210 Texas counties, doubling, tripling, quadrupling and in some cases, adding even more to the total number of taxa occurring within them. All potential new occurrences are reviewed, edited, often circulated to specialists for review and if accepted, added to BONAP'S distribution maps.

Plant Conservation in Temporally Variable, Spatially Heterogeneous Environments [Video Presentation]

Hsiao-Hsuan Wang, Texas A&M University; Carissa L Wonkka, Northern Plains Agricultural Research Laboratory, USDA-ARS; Frederico Mestre, University of Évora; Diogo Alagador, University of Évora; Tomasz E. Koralewski, Texas A&M University; Michael L. Treglia, The Nature Conservancy; Andrzej Pękalski, University of Wrocław; William E. Grant, Texas A&M University; Fred Smeins, Texas A&M University; William E. Rogers, Texas A&M University

Plant conservation has changed from an idealistic philosophy to a serious technology during the last two decades. In response to the need to address critical plant conservation problems of increasing breadth and complexity, development of the theoretical framework and associated methodologies for studying plant conservation has emerged as a major research area in ecology.

Species distribution models and ecological niche models are now widely applied tools in plant conservation. They use relationship between species occurrence and environmental conditions to predict the potential distribution of a species across an area of interest. Spatially-explicit, individual-/agent-based models are a popular method for investigating biological spread/movement processes. They usually operate on a regular grid of discrete cells, each of which represents an individual site. At any given discrete time step, each cell is characterized by one of a number of states. Model performance is controlled by rules, or state transition functions, specifying how the state of a cell is changed at each time step, depending on its own previous state and the states of its neighbors.

Here, we demonstrate use of these various types of models, both separately and in an integrated form, to address topics of current interest in plant ecology from endangered species to invasive species. We hope these methods will provide valuable information for those interested in plant conservation and management as well as a framework for the development of future studies in plant conservation.

ABSTRACTS **August 13, 2 – 3 PM**

Session 2: Monitoring

Chalcidoid Infestations of *Silphium albiflorum* (Asteraceae) Populations in Texas Reduce Population Viability [Poster Presentation]

Julia Barkell, Texas Wesleyan University; R. Caballero Montes, Texas Wesleyan University; Jinhyeon Choi, Texas Wesleyan University; Robert McManus, Texas Wesleyan University

Census of White Rosinweed populations in protected natural areas encountered flower heads subject to seed predators. Congeners are known hosts of a diversity of Chalcidoid wasps. The impact of these Chalcidoid wasps appears to reduce fecundity of White Rosinweed. Consultation with published literature, Hymenopteran taxonomic specialists and DNA barcoding suggests either, an unknown seed predator (cf. *Antistrophus silphii*: Cynipidae; *Torymus* sp.: Torminae) is preyed upon by *Eurytoma* cf. *lutea* (also a primary parasitoid or inquiline) that in turn is preyed upon by *Ormyrus* cf. *labotus* (a primary parasitoid) or that *E. lutea* is the seed predator that is preyed upon by *O. labotus*. In either case, or neither, plants infested by Chalcidoid wasps produced few or no seeds in one or more of the protected natural areas inhabited by White Rosinweed. We examine the hypothesis that infestation by these wasps is associated with proximity to human modified habitats. The intrinsic values of each species presupposes that all are worthy of conservation efforts despite their potential compromising reciprocal impacts.

Population Viability of White Rosinweed (*Silphium albiflorum* A. Gray: Asteraceae) Populations in Texas [Poster Presentation]

Julia Barkell, Texas Wesleyan University; Raul Caballero Montes, Texas Wesleyan University; Jinhyeon Choi, Texas Wesleyan University; Robert McManus, Texas Wesleyan University

Ongoing research about the Texas endemic White Rosinweed seeks to identify the critical factors involved in reproductive viability. Repeat annual census of populations in Tandy Hills Natural Area recorded population structure and seed production. Stage-based static life tables estimate reproductive value, intrinsic rate of increase, and generation time of White Rosinweed over nine years in Tandy Hills Natural Area and seven protected areas in 2019. Reproductive value is for all eight localities is consistently greater than one though a significant proportion of populations in these localities are less than one (1.0). Euler estimates of the intrinsic rate of increase for all eight localities persist below zero. Populations infested by what we hypothesize is a complex of gall-forming wasps and associated parasitoids contribute to variation in reproductive viability, stalks with more flowers are more consistently parasitized.

Densities, Plant Sizes, and Spatial Distributions of Six Wild Populations of *Lophophora williamsii* (Cactaceae) in Texas, USA [Video Presentation]

Anna Ermakova, Imperial College London; Carolyn V. Whiting, University of Texas at Austin; Keeper Trout, Cactus Conservation Institute; Colin Clubbe, Royal Botanic Gardens Kew; Martin K. Terry, Cactus Conservation Institute; Norma Fowler, University of Texas at Austin

Lophophora williamsii (Cactaceae) is thought to be threatened by habitat loss and overharvesting. However, basic demographic and environmental information to evaluate its conservation status have been lacking. We surveyed six wild populations of this species, three in South Texas and three in West Texas, to begin to address this gap. We found high levels of heterogeneity in plant presence and density at multiple spatial scales. While plant densities were not consistently different between South and West Texas, plants were significantly larger in West Texas. The two regions differ strongly in precipitation, temperature, elevation, and topography, all of which are correlated at the regional scale. Therefore, it was not possible to identify which of these variables, or other factors such as competition and human harvesting, may be responsible for the regional differences in plant size. Our results provide initial information for determining the conservation status of this species

Invasive Plants, the Black Sheep of the Botanical Family [Video Presentation]

Ricky Linex, USDA Natural Resources Conservation Service

Like the other fifty states Texas is seeing an increase in the number of invasive species and in their distribution across the state. As we move forward with conservation and promotion of native plants, we must fight the encroachment of invasive introduced plants. Invasive thistles such as wooly distaff thistle *Carthamus lanatus*, blessed milk thistle *Silybum marianum*, and scotch thistle *Onopordum acanthium* are marching northward into North Texas. We need to practice diligence in the identification and notification of expanding invasive species into the native prairies and roadsides. We must continue to spread the word about the dangers of invasive establishment, displacement of native plants and changing composition of plant species upon the rangelands of Texas. Education is critical to conservation of our valuable native plants. We must never surrender the fight to control these invasive species.

Conservation of Texas Prairie Dawn, Hymenoxys texana (Asteraceae) and Associate Endangered Species at the Harris County Precinct 4 Prairie Dawn Preserve [Poster Presentation]

Anita A. Tiller, Mercer Botanic Gardens; Suzzanne M. Chapman, Mercer Botanic Gardens; Linda L. Costanzo Mercer Botanic Gardens; Chris C. Ludwig, Mercer Botanic Gardens

Texas prairie dawn, *Hymenoxys texana*, ranked G2S2 and listed as an endangered species by the U.S. Fish and Wildlife Service in 1986, is a rare vernal annual wildflower endemic to saline coastal prairie habitats in East Texas. On July 29, 2005, Harris County Precinct 4 Parks Department committed to the long-term protection and management of a 3.6-acre tract containing *H. texana* within a site of proposed construction of West Greens Road from SH 249 to Cutten Road. A 2004 biological assessment prepared by the Texas Department of Transportation and Turner Collie and Braden, Inc. guided construction in 2013 of an enclosure preserve designed to repel contaminated runoff and maintain hydrology for the long-term survival of *H. texana*. Seeds and plants of *H. texana* and rare associate species, Houston camphor daisy, *Rayjacksonia aurea*, ranked G1S1 and Texas windmill grass, *Chloris texensis*, ranked G2S2 were rescued in 2012 from areas threatened by construction. As a member institution of the Center for Plant Conservation, Mercer Botanic Gardens maintains a seed bank of rare native flora for restoration and research. Eight years of annual surveys of H. texana and methods to maintain native plant diversity including efforts to prevent erosion of vulnerable saline soils at the

preserve will be discussed. The long-term success or failure of *H. texana* at this small preserve provides valuable information for management strategies, particularly in urban environments, for the unique coastal prairie habitat essential for this species' and its rare associates' survival.

An Updated Survey for the Federally Petitioned Plant, *Bartonia paniculata* ssp. *texana* (Gentianaceae) [Poster Presentation]

Kim Norton Taylor, Botanical Research Institute of Texas

Bartonia paniculata ssp. t*exana* (Texas screwstem) is a Federally petitioned plant species occurring in eastern Texas and western Louisiana. An updated survey on the status of known populations of Texas screwstem was conducted in the Fall of 2018. In the state of Texas there are 23 known populations of *B. paniculata* ssp. *texana.* Of the 23 populations, 14 had not been observed in the last 30 years. Fourteen of the populations lacked specific geographic coordinates, including seven populations with descriptions too broad to confidently map. Fifteen of the 23 populations were visited in the Fall of 2018. Plants were observed at six of these populations. A total of 64 plants were observed with a mean of seven plants observed in each population. Population sizes ranged from 4 to 19 plants. One historic population, which had not been seen in 51 years, was relocated; and two populations with broad location descriptions were relocated. Four of the populations with plants found in 2018 occur on public lands and two occur on private property. One new population was located.

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ABSTRACTS **August 13, 3 – 4 PM**

Session 3: Ecology

Saving Bois d'Arc: Shedding Light Ethnobotanical and Paleontological History of *Maclura pomifera* [Video Presentation]

Grace Lloyd Bascopé, Botanical Research Institute of Texas

The bois d'arc, horse apple, or Osage orange tree, *Maclura pomifera*, has fallen out of favor. Like the hackberry, many want these "trash" trees removed from their property. Perhaps if the tree's deep paleo-history was more widely known it would gain the respect it deserves and be allowed to thrive in its natural environment. This presentation discusses why, in its early years the tree puts energy into growing thorns and produces a fruit, its seed dispersal vehicle, very few animals will eat today. It also explores the importance of the tree to horse culture Native Americans. Finally, the presentation touches on the surprisingly wide distribution of its wood as documented in the archaeological record.

Identifying Pollinator Networks Associated with Differing Seed Mix Traits in Local and Commercial Pollinator Seed Mixes in North-Central Texas [Poster Presentation]

Jenny M. Chlipala, Tarleton State University; Adam B. Mitchell, Tarleton State University; Darrel B. Murray, Tarleton State University

Pollinator diversity and population densities are declining in prairie ecosystems, prompting a need to restore habitat for pollinators in impacted landscapes. This need is often reflected in the abundance of commercial and local seed mixes employed as a restoration tool. However, seed phenology (i.e. seasonal blooming times), seed ratio of forbs: grasses, and plant species composition are often overlooked regarding pollinator species, especially spring and fall pollinators, nocturnal insects, and underrepresented taxa. I seek to understand how differing seed mix traits in commercial and local seed mixes may affect pollinator networks in North-Central Texas prairies. My objectives are 1) determine differences in pollinator richness, abundance, and composition among seed mixes of differing phenologies, seed ratios, and plant compositions, and 2) identify interactions between plants in commercial and local seed mixes to fall, spring, nocturnal, and underrepresented pollinator taxa (non-bee and non-butterfly groups). I will propagate plants from commercial and local seed companies in Texas that provide seed mixes focusing on spring/fall blooming plants to establish mobile pollinator stations across North-Central Texas. I will sample pollinators using an insect vacuum and light traps over the spring and fall. I will also sample wildflower communities adjacent to study sites to determine baseline pollinator communities. My results will provide insight into the management of underrepresented pollinators of North-Central Texas while providing baseline data of insect species and their plant hosts associations in prairie landscapes.

Suburban Wetlands and Water Birds in Eastern Denton County, Texas
[Poster Presentation]

Jayce Proctor, University of North Texas; Paul F. Hudak, University of North Texas

Approximately each week for a year, on 45 survey dates, water birds were observed at 13 constructed suburban wetlands in the Blackland Prairie of eastern Denton County, Texas. Collectively, the wetlands form four clusters: two were heavily planted with diverse native flora and then lightly managed; and two consist of grass and a sparse diversity of shoreline plants (mixed monoculture), managed with frequent mowing and periodic chemical applications, mechanical plant removal, and fish stocking. Thirty species of 5,724 birds were observed, including three to nine species in each of six classes: dabblers, divers, open water waders, dense vegetation waders, moist soil foragers, and aerial piscivores. Dabblers were most abundant in count and number of species present, followed by divers and open water waders. Highly represented species were mallards, gadwalls, and American coots among dabblers; lesser scaup and ringed-neck duck among divers; and great blue heron and great white egret among open water waders. A mixed monoculture wetland had the highest total bird count (1,080) and highest number of divers. Two of the lightly managed wetlands had the second (877) and third (720) highest totals, with the highest number of dabblers, open water waders, and dense vegetation waders; one of these wetlands also had the highest species diversity. Killdeer and snowy plover, a near threatened species, frequently foraged a spillway at a mixed monoculture wetland. Generally, more dabblers and divers were observed in fall and winter, and more waders were present in spring and summer.

Visualizing Riparian Ecotone Fragmentation in Urbanizing Watersheds: A Case Study of Upper Hickory Creek, North-Central Texas [Poster Presentation]

Monica Veale Yesildirek, University of North Texas; Paul F. Hudak, University of North Texas

Many pollution sources and heavy runoff often plague urbanizing watersheds. Riparian ecotones can filter pollutants and attenuate runoff; however, changing land cover tends to diminish this buffering capacity. Visualizing riparian ecotone fragmentation at the watershed scale can help prioritize management efforts. A geographic information systems approach was developed to illustrate land cover and soil properties affecting buffering potential along riparian corridors. An application to the Hickory Creek watershed in north-central Texas shows significant riparian ecotone fragmentation, suggesting high-priority areas for preservation and restoration.

Marsh-mangrove Vegetation Dynamics in the Mission-Aransas NERR
[Poster Presentation]

Miranda Madrid, University of Texas Marine Science Institute, Mission-Aransas NERR; Katie Swanson, University of Texas Marine Science Institute, Mission-Aransas NERR; Edward Buskey, University of Texas Marine Science Institute, Mission-Aransas NERR

The central Texas coast presents an ideal location to study a subtropical wetland transition zone. The Mission-Aransas National Estuarine Research Reserve (MANERR), located in Port Aransas, Texas, is characterized by warm annual temperatures, variable rainfall patterns, and high evaporation rates. The climate and low-lying shoreline elevation

of the shallow bay systems in the MANERR make the emergent vegetation especially susceptible to changes in climate. Coastal foundations ecosystems, like salt marshes, are at risk of displacement due to tropicalization, drought conditions, sea level rise, and extreme high tide events. To investigate the spatiotemporal change in emergent vegetation, we ask (1) how wetland plant communities vary over time and across sites in the MANERR and (2) whether the dominant species have changed over time across sites. Salt marsh and mangrove vegetation surveys began in 2011 as part of the established NERRS biomonitoring program. Within the MANERR, black mangroves (Avicennia germinans) have a historical presence but are observed to be growing denser and expanding. Preliminary results indicate that decreases in salt marsh cover are due to unvegetated (bare ground and water) and wrack covers becoming increasingly dominant while A. germinans is slowly but consistently increasing in abundance. Monitoring the salt marsh-mangrove ecotone for change has a significant applied importance to management decision-making. Detecting change at the local level will provide key information to quantify the implications to critical ecosystem services and provide a baseline as upcoming industrial development projects may impact the estuarine wetlands.

Is *Dalea reverchonii* Serving as a Nurse Plant in Texas Walnut Limestone Glades? [Poster Presentation]

Allan D. Nelson, Tarleton State University ; Rebecca R. Nelson, Tarleton State University

Dalea reverchonnii (Comanche Peak prairie clover) is endemic to Walnut Limestone Glades in North Central Texas. Preliminary data, from a previous study comparing glades to barrens, indicates that the presence of *D. reverchonii* causes there to be a significant difference in mean richness and percent cover of associated plants in quadrats that were sampled containing the plant as compared to those without Comanche Peak prairie clover. The most common associated plants in the preliminary investigation were *Tetraneuris linearifolia* and *Plantago helleri*. Based on this preliminary data, we hypothesize that *D. reverchonii*, with its prostrate growth form, captures soil allowing for establishment of other plants in the glade ecosystem. To test this hypothesis, we propose to quantify diameter of plants of *D. reverchonii*, richness of 0.25 m. quadrats containing Comanche Peak prairie clover, and soil depth within the quadrats. If soil depth and associate plant richness correlates with Comanche Peak praire clover diameter at significant levels, this may indicate that *D. reverchonii* functions as a nurse plant in the harsh glade environment.

The Viability of Cultivars of Texas Native Echinacea Species in the Restoration of Pollinator Habitat [Poster Presentation]

Meghan K Peoples, Tarleton State University; Adam B Mitchell, Tarleton State University; Darrel B Murray, Tarleton State University

Widespread decline in pollinator populations has prompted interest in native habitat restoration and a corresponding demand for native plant material in the nursery and landscaping industry. Often, the limited available plants in wholesale circulation are cultivated varieties, or ‘cultivars’ of native species, raising concerns in the conservation community that heavily selected, genetically manipulated, or hybridized cultivars impact their ability to provide floral resources or attraction for pollinating insects. Our study will compare species and cultivars of commercially available coneflower plants (genus Echinacea) to determine the change in presence, abundance, and diversity of pollina-

tor insects. We will measure pollinator activity among the market base species (*E. purpurea*), its 5 commercially available cultivars ('Cheyenne Spirit', 'Pow Wow Berry', 'Pow Wow White', 'Magnus', and 'White Swan'), and a wild species (*E. angustifolia*) through a common garden experiment. We will plant study groups in parallel test plots under controlled conditions and measure pollinator activity by visual counts, videography, and insect vacuum. We will identify pollinator abundance, diversity, and time spent during floral visitation. We hope to provide insight into the viability of cultivars of different physical traits in their ability to attract pollinators for both native landscaping and restoration projects. These results can be extrapolated to other cultivated genera to better understand how artificial selection can affect, and at what point, the ecological functionality of native plant species in conserving pollinator habitat and restoring ecosystem services in Texas prairies.

Endofungal Bacteria Isolated From Mycorrhizal Fungi in a North American Terrestrial Orchid [Poster Presentation]

Kris Petterson, Texas Tech University; Jaspreet Kaur, Texas Tech University; Jyotsna Sharma, Texas Tech University

Orchidaceae is among the largest and most diverse plant families consisting of approximately 30,000 orchid species worldwide with the majority of these being rare in nature because of their specialized ecological niches. To gain a mechanistic understanding of their complex ecological interactions, and to inform in-situ conservation, it is important to first discover and describe the diversity of organisms that orchids associate with. All orchids form obligate mycorrhizae with orchid mycorrhizal fungi (OMF), and accordingly, OMF diversity and interactions are commonly studied. However, endophytic bacteria are also known to enhance biomass and survival of orchid seedlings in vitro, suggesting another important symbiotic niche for orchids. Yet, orchid associated bacteria remain understudied, especially with respect to their role as mycorrhizal helper bacteria (MHB). We report here the first results of our investigation of culturable: endophytic fungi, endophytic bacteria, OMF, and most notably, the endofungal bacteria (EFB) that reside within fungal hyphae. We selected a North American terrestrial orchid, Platanthera chapmanii, for our studies, and sampled its roots across two years from two disjunct occurrences in Texas and Florida. Cultured fungal and bacterial isolates were identified by amplifying and sequencing the nrITS and 16S regions, respectively. We also ascertained the endosymbiotic status of bacteria within fungal hyphae by using scanning electron microscopy (SEM). To the best of our knowledge, ours is the first report of isolation of endofungal bacteria from orchid mycorrhizal fungi.

Wetland Vegetation Survey Method for an Extended Dry-Detention Basin with Micro-Pools [Poster Presentation]

Jayce Proctor, Tarrant Regional Water District; Michelle Wood-Ramirez, Tarrant Regional Water District

In Spring 2020, three wetland vegetation surveys were conducted in a re-designed stormwater wetland at the Tarrant Regional Water District (TRWD) campus in Fort Worth, Texas, located in the Cross Timbers ecoregion. The stormwater wetland is the terminal green stormwater infrastructure (GSI) component in TRWD's Rainscapes, a campus-wide low-impact development approach to stormwater management. The

wetland is specifically designed for stormwater credits with the City of Fort Worth as an extended dry-detention basin with micro-pools. Making the designed features in the wetland as bounded sections, the vegetation survey used an adapted ranking system for percent cover of each species found within each section. Additionally, presence/absence of original plants that were installed there during the construction phase was assessed. 58 total species were observed, compared to the original 17 plants that were planted there one year before. Of these original plants, only two were not found during the survey. This study outlines a rapid, simple vegetation survey method for wetlands of this category, and incorporates the distinct geographic characteristics of the area.

ABSTRACTS **August 14, 1 – 2 PM**

Session 4: Restoration

Strategies for Restoring Tallgrass Prairies in Northeast Texas [Poster Presentation]

Emily R. Bishop, Texas A&M Kingsville; Tyler C. Wayland, East Texas Natives; Keith A. Pawelek, Texas Native Seeds; Sandra Rideout-Hanzak, Texas A&M Kingsville; Forrest S. Smith, Texas Native Seeds; and David B. Wester, Texas A&M Kingsville

Native tallgrass prairies are a threatened ecosystem that is increasingly difficult to find. The rich diversity of tallgrass prairies provides important ecosystem services that should be preserved through enhanced restoration. The first step in ecosystem restoration is the selection of locally-adapted seed sources; and this information is lacking in northeast Texas. We planted 30 varieties of native grasses and 4 mixes of native grasses and forbs in over 630 plots on 250 acres on a Red River floodplain in Fannin County, Texas. We will monitor subsequent plant density in monocultures and mixtures to better understand establishment dynamics. Historical seedbanks will be sampled as a function of distance from the river. Soil microbial communities will be assessed in monoculture and mixture plots and compared to an intact tallgrass prairie and an operational soybean farm to better understand above- and below-ground processes in these communities. We hypothesize that (1) native grasses will be more successful when grown with other native grasses and forbs; (2) proximity to the Red River will have a major impact on seed bank composition because of flooding events; and (3) the soil microbiome on our site will resemble an operational soybean farm more closely than an intact prairie. All of these findings will be used to inform best practices for tallgrass prairie restoration in northeast Texas.

Ocelot Habitat Restoration Acceleration [Video Presentation]

Jose G Cortez Jr, Caesar Kleberg Wildlife Research Institute-Texas A&M University Kingsville; Sandra Rideout-Hanzak, Caesar Kleberg Wildlife Research Institute-Texas A&M University Kingsville; David B. Wester, Caesar Kleberg Wildlife Research Institute-Texas A&M University Kingsville; Michael E. Tewes, Caesar Kleberg Wildlife Research Institute-Texas A&M University Kingsville; David Ruppert, University of Maryland; Jonah Evans, Texas Parks and Wildlife Department

The Tamaulipan Thornscrub habitat can be described by thick brush with dense cover. This habitat type can be found in the southernmost tip of Texas in the Lower Rio Grande Valley. Many species of animals, including the ocelot (*Leopardus pardalis*), utilize this habitat and thrive in it. Over many decades, this once abundant thornscrub has been decimated in order to make room for a growing urban population, with many acres of land being transformed into farmland and pastures for crops and livestock. Due to the large amounts of habitat loss, the ocelot has suffered greatly, and its population is dwindling. Habitat restoration efforts are critical to maintain and restore the ocelot population of South Texas.

Our project focuses on testing protocol with the hopes of accelerating habitat restoration for the endangered felid. By simulating treatments that include shredding, mulching, and a combination shred plus mulch treatment, we are attempting to “speed up”

growth of thick brush to restore habitat at a faster pace. We are also examining growth rates of brush when browsing is excluded. We are applying these treatments on both naturally-established and newly-planted saplings to see when treatments are most effective. We are studying several native South Texas brush species that compose the Tamaulipan Thornscrub. Our preliminary data show that these treatments are significantly changing growth in brush crown area over time. Results could potentially us to improve current restoration efforts for ocelot habitat.

Examining the Efficacy of Stock-Piling Topsoils and Seeding for the Restoration of Native Grasses [Video Presentation]

Dustin A. Golembiewski, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville; Sandra Rideout-Hanzak, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville; David B. Wester, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville

Energy extraction is a growing industry throughout Texas. Extraction can take a toll on local habitats, influencing biodiversity and ecosystem functions. To aid in the reclamation of native plant communities in semi-arid climates, certain precautions can be taken. One common recommendation is topsoil stock-piling. Topsoil is piled in a nearby location and reapplied when extraction is complete. This topsoil is theoretically a better substrate for restoration than subsoils that remain post-extraction. Our study area, a retired fracking pond, was restored in 2017 with 5-yr old stock-piled topsoil collected prior to construction. We segregated the existing stock-pile into 3 layers that were 1-1.5 m in thickness and distributed these layers (along with a non-amended surface) in separate strips over the pond. Each surface layer was split into 15 plots, each receiving one of 3 seeding treatments: (1) 13 native grasses, (2) 13 native grasses plus an annual cover crop, or (3) non-seeded. We are documenting restoration success by monitoring plant density in this portion of the study. Results indicate that satisfactory plant densities (> 10 desirable plants per meter square) are achieved on all surfaces, regardless of surface type. Seeding increased grass density on the top and control surfaces, but not middle or bottom. There was not a significant difference between surface type two years post-restoration. The analysis of third-year plant density will allow for an up-to-date examination of this long-term study. Our goal with this research is to quantitatively assess the use of stock-piled topsoil following disturbance.

Evaluation of Mechanical and Chemical Methods for Controlling Chinese Privet (*Ligustrum sinense* Lour.) in a Rural Lawn [Poster Presentation]

Paul F. Hudak, University of North Texas

A year-long study was conducted in a mixed-plant rural lawn infested with Chinese privet. Two plots were studied, each approximately 90 m2 in size. At the beginning of the study, a notched hand spade was used to uproot 95 privet seedlings in the first plot, and seedlings were chemically treated in the second plot. Chemically-treated seedlings were hand sprayed with 1%, 3%, or 5% glyphosate solution, with 26 plants in each category. A fourth, control category of 26 seedlings was not chemically treated. None of the mechanically removed privet in the first plot returned throughout the study. In the second plot, significantly more control plants survived after 4.3 months. At the end of the study, 20 control plants and no treated plants survived. Throughout the study, no significant differences were observed between the three treatment levels; lower glyphosate doses performed similar to higher doses within the range considered.

Overview of the University of North Texas Pecan Creek Pollinative Prairie: An Undergraduate Education Experience Aiming to Reconstruct a Native, North Central Texas Prairie in an Urban Setting [Video Presentation]

Clarissa Molina, University of North Texas; Savannah Thomas, University of North Texas; Jaime Baxter-Slye, University of North Texas

This video presentation is a compliment to a poster presentation documenting the University of North Texas Pecan Creek Pollinative Prairie project. The Pollinative Prairie is a native north central Texas prairie reconstruction project located on four acres University of North Texas campus. North Texas was once home to 40,000 acres of prairie land and 2,223 native plant species (Diggs et al. 1999). Today, less than 1% of prairie habitat exists in north Texas from the pre-settlement era. The Dallas-Fort Worth Metroplex area has experienced rapid urbanization in recent years, with habitat fragmentation occurring on a large scale. The remaining habitat fragments are surrounded by a matrix of unsuitable habitat patches that drive wildlife populations to restoration/conservation sites. The UNT prairie reconstruction project provides a unique educational opportunity as an outdoor laboratory/classroom. Volunteers have been critical to the growth and development of the Pollinative Prairie, with over 1,500 UNT undergraduates, staff/faculty, and members from the local community providing ground preparation, seeding, planting, invasive species removal, and observational data. Several methods have been implemented and include: solarization, herbicide application, hügelkultur, addition of biosolid/mulch material, hand seeding, and installation of nursery grown plants. This video presentation aims to provide 1) a snapshot of the progress made to restore a native robust and diverse cast of native flora and fauna, and 2) request feedback from conference attendees that address our three main issues: reduction and removal of invasive species, effective seeding and germination of native plants, and volunteer participation during the COVID pandemic.

Herbaceous Community Changes in Restoration of Mesquite-Invaded Grasslands [Video Presentation]

Darrel Murray, Tarleton State University; Jim Muir, Texas A&M AgriLife; Devin Erxleben, Texas Parks and Wildlife Department

Throughout large areas of Texas, native grassland plant communities have become encroached by honey mesquite (*Prosopis glandulosa*). Concurrent with encroachment, cool-season C3 grasses have increased while warm-season C4 grasses decreased. Complexes of honey mesquite and Texas wintergrass (*Nassella leucotricha*), a C3 perennial bunch grass, are common and represent species poor and structurally homogenous areas with reduced value to grassland bird species. As part of a study to determine effective management actions for reducing Texas wintergrass and increasing native warm-season grasses and forbs following removal of mesquites, we documented changes in herbaceous community composition and structure. Changes in herbaceous percent cover, structure, and diversity associated with mesquite tree removal, seeding, and treatments of herbicide, prescribed burning, and prescribed grazing were documented. These treatments were performed at two different sites in North Central Texas with different grazing histories. Effects of mesquite removal, seeding, and treatments were found to be site-dependent, with prior site conditions and community composition impacting the herbaceous community.

Solarization Doesn't Kill King Ranch bluestem, But Still Increases Diversity [Poster Presentation]

Charlotte Reemts, The Nature Conservancy; Rebecca Neill, The Nature Conservancy; Corbin Neill, The Nature Conservancy

Solarization (covering soil and vegetation with clear or black plastic) has long been used in agriculture to control undesirable plants and their seeds, but its effectiveness in rangelands has been mixed and species-specific. We tested solarization (tarping) with black plastic as a control method for King Ranch bluestem (*Bothriochloa ischaemum* var. *songarica*). We applied three treatments to a grassland in central Texas: solarization (from August to November), trimming, and a control. By the second growing season after treatment, King Ranch bluestem cover in solarized plots was reduced to 54% ± 10% (mean ± standard error), clearly different from control (78% ± 6%, p=0.01) and trimmed plots (82% ± 5%, p=0.002). Forb cover in solarized plots (15% ± 4%) was much higher compared to trimmed (4% ± 1%, p=0.001) and control plots (3% ± 1%, p<0.001). Forb richness was also slightly higher in solarized plots (16 ± 2 species) compared to control (10 ± 2 species, p=0.08) and trimmed plots (10 ± 1 species, p=0.08). Solarized plots had more bare ground (7% ± 1%) compared to both control (2% ± 1%, p<0.001) and trimmed plots (1% ± 1%, p<0.001), providing an opportunity for seeding or planting but also for other non-native species to establish. Solarization can be used to create islands of diversity, especially if combined with seeding or planting of native species. However, repeated treatments or alternative techniques (e.g., applying clear plastic over wet soils) will be needed for full control of King Ranch bluestem.

Prescribed Fires Cause Minimal Damage to a Threatened Cactus [Video Presentation]

Charlotte M. Reemts, The Nature Conservancy; Jacqueline R. Ferrato

The effects of fire on cacti varies based on individual plant characteristics, fire intensity, and local conditions. Tobusch fishhook cactus (*Sclerocactus brevihamatus* ssp. *tobuschii*) is a small (< ~7 cm in diameter), globose cactus endemic to the Edwards Plateau of central Texas. This species grows in open sites with shallow, rocky soils, surrounded by oak-juniper woodlands and shrublands. Fire is thought to maintain the open character of the sites, but little is known about the effects of fire on this species. We investigated the effects of two prescribed fires on Tobusch fishhook cacti (n > 600) in long-term monitoring plots. The fires killed only one cactus and visibly damaged < 28% of cacti, none of which died within the first two growing seasons. Visibly damaged cacti grew less than undamaged cacti in the first and/or second growing seasons, but fruit set was not reduced. Fire damage was best predicted by cactus diameter (> 1 cm), cactus height (> 1 cm), and proximity to bunchgrasses (< 3 cm). Prescribed fire can be used to maintain Tobusch fishhook cactus habitat but should avoid times when the cacti have flowers or fruit (~January through May).

Cover Crop Considerations for Rangeland Restoration [Poster Presentation]

Brianna M. Slothower, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville; Anthony D. Falk, South Texas Natives Project, Caesar Kleberg Wildlife Research Institute; Sandra Rideout-Hanzak, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville; Terry Blankenship, Rob & Bessie Welder Wildlife Foun-

dation; David B. Wester, Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville

Oil and gas activity on rangelands can lead to impacts and unintended consequences to native vegetation. Creating a network of pipelines to transport petroleum products can leave soil surfaces vulnerable to invasive plants. Invasive plants often establish after a disturbance event because of a lack of initial competition and increased available resources. We are investigating interactions between cover crops, native grasses and invasive plants following a pipeline installation in southern Texas. Cover crops can suppress weeds, decrease soil compaction, and protect the soil surface from erosion. This study will quantify interactions among seeded cover crops, native grasses and invasive plants during times of unpredictable precipitation in warm (July 2020) and cool (January 2021) seasons. We will document the impact of the combination of cover crops and native grasses by monitoring plant density over the course of the next two years at permanently-marked sampling points. This study will (1) expand our knowledge of how cover crops affect the establishment of native seed mixes either simultaneously or separately, and (2) distinguish between seeding a grass versus legume cover crop. This information will improve our understanding of best management practices for restoration of rangelands following disturbance.

ABSTRACTS **August 14, 2 – 3 PM**

Session 5: Genetics and Seed Conservation

Multiple Complementary Studies Clarify Which Co-occurring Congener Presents the Greatest Hybridization Threat to *Hibiscus dasycalyx*, a Rare Texas Endemic
[Video Presentation]

Melody P. Sain, University of Wisconsin-Madison; Julia Norrell-Tober, University of Texas at Tyler; Megan Seawright, University of Texas at Tyler; Alyssa Blanton, University of Texas at Tyler; Katherine Barthel, University of Texas at Tyler; Kate L. Hertweck, University of Texas at Tyler; John S. Placyk, Jr., University of Texas at Tyler; Randall L. Small, University of Tennessee-Knoxville; Lance R. Williams, University of Texas at Tyler; Marsha Williams, University of Texas at Tyler; Joshua A. Banta, University of Texas at Tyler

The Neches River Rose Mallow (*Hibiscus dasycalyx*) is a rare wildflower endemic to Texas that is federally protected in the US. While previous work suggests that H. dasycalyx may be hybridizing with its widespread congeners, the Halberd-leaved Rose Mallow (*H. laevis*) and the Swamp Rose Mallow (*H. moscheutos*), this has not been studied in detail. We evaluated the relative threats to H. dasycalyx posed by hybridization with H. laevis and H. moscheutos by 1) examining their relatedness to one another via modern phylogenomic methods, 2) examining the species' ecological (dis)similarities to one another using ecological niche modeling, and 3) looking for genomic evidence of hybridization among the three species. Our results suggest that *H. dasycalyx* is very closely related and ecologically similar to *H. laevis*, and suggest that *H. laevis* is interbreeding with *H. dasycalyx* in the wild. Conversely, *H. moscheutos* appears to be more distantly related to *H. dasycalyx* and more ecologically dissimilar, and the two are most likely not hybridizing. For these reasons, we believe that *H. laevis* poses a greater threat to *H. dasycalyx* than *H. moscheutos*. We offer some hypotheses as to why *H. dasycalyx* and *H. laevis* are coming into secondary contact where hybridization can occur.

QuerChaos! Are Oak Conservation Efforts Properly "Picking and Choosing" What to Conserve Among Apparent Trans-Pecos Quercus Hybrid Complexes?
[Poster Presentation]

Adam Black, BotaniConserve, Inc.

Many Texas native oaks (*Quercus* spp.) of conservation concern in certain areas of the Trans-Pecos region appear to be part of localized, exceptionally rampant hybrid complexes to a degree where great confusion arises with morphologically-based identification and therefore species delineation. Conservation seed collections tend to be targeted from individual parent trees that appear most consistent with the species description, yet the resulting seedlings often display exceptional variability, lending further evidence of the genetic instability. Through cultivation, there are indications that certain highly-localized "species" of conservation concern including *Q. robusta* and *Q. tardifolia* may simply be part of the hybrid complex, considering their intermediate features and the morphological instability of their seedlings. Adding to the confusion is the potential for expression of latent ancestral genetics of entities that no longer exist in the region in their pure form, or the occasional genetic contributions via wind-blown pollen from Mexican species occurring in the nearby Sierra del Carmen. Factoring in the environ-

mental changes that have occurred since the Pleistocene in the Trans-Pecos, offspring of apparent relictual *Quercus* spp. that appear to persist in-situ today in a stressed state seem to show an infusion of vigor through hybridization with apparently adaptable sympatric *Quercus* spp. With environmentally-induced speciation likely taking place to adapt to changing conditions, I propose that conservation efforts of Trans-Pecos oaks focus not only on the typical species, but broadly consider the local syngameon that may likely stabilize in the future into more delineated species better adapted to future conditions. Molecular studies would be critical for further guiding sound conservation efforts and our understanding of the past, present and future of the Trans-Pecos oaks.

Taxonomy and Conservation of the Native True Blueberries (*Vaccinium* sect. Cyanococcus) in Texas [Video Presentation]

Peter W. Fritsch, Botanical Research Institute of Texas; Paul S. Manos, Duke University; Andrew A. Crowl, Duke University

The taxonomy of *Vaccinium* section Cyanococcus, the true blueberries, is currently unstable. Five species are recognized in Correll and Johnston's Manual of the Vascular Plants of Texas, whereas four of these are combined into one species in the treatment of the section in the later Flora of North America (FNA) treatment. As part of a comprehensive herbarium study of the North American collections of Vaccinium in the combined BRIT-SMU-VDB-NLU collection, we examined several hundred sheets of V. sect. Cyanococcus collected from Texas. We found that the patterns of morphological variation largely support the treatment of Correll and Johnston versus the FNA treatment, except that 1) the reported differences between *V. amoenum* and *V. virgatum* could not be detected, 2) *V. arkansanum* is likely misapplied to plants of *V. fuscatum*, and 3) *V. darrowii* may be misapplied to plants of *V. myrsinites*. That latter is of conservation significance, because the sole record of this species in Texas is a specimen collected from Starr County in 1935 along the Rio Grande, ca. 800 km from the western edge of the main range of *V. darrowii* in eastern Louisiana. Further, the specimen is more similar to *V. myrsinites*, a species distributed even farther to the east than *V. darrowii*. The results from this study have been used as preliminary data for a proposed larger effort focusing on the still poorly understood systematics and evolution of this economically important section of *Vaccinium*.

Towards a Genetic Database of Texas Flora Via Targeted Sequencing of 353 Genes [Video Presentation]

Haley Hale, Texas Tech University; Madeline Slimp, Texas Tech University; Matt Johnson, Texas Tech University

Targeted sequencing - capture of exons and flanking non-coding sequences (aka HybSeq) has proven feasible for phylogenetics and population genetic studies thanks to improvements in molecular technologies and drastic decreases in per sample costs. HybSeq with universal probes such as Angiosperms353 is ideal for non-model species and the use of low-concentration fragmented genomic DNA from herbarium specimens. Here, we discuss the goal of creating a genetic database of Texas flora. A preliminary study was conducted of 95 herbarium samples across 24 species collected 50 years ago in Guadalupe Mountains National Park that showed promising results of genetic variability captured at and below the species level. By expanding the database of sequences to all Texas Flora, we will be able to the create more accurate phylogenetic reconstructions; better understand genomic variability within and among populations; and even use as an identification tool in environmental samples such as the soil seed bank.

Texas Little Bluestem (*Schizachyrium scoparium*) Phenotypic Attribute Correlations to Collection Site Environment Characteristics [Poster Presentation]

Kimberlee N. Howell, Tarleton State University; James P. Muir, Texas A&M Agrilife Research; Darrel B. Murray, Tarleton State University; Adam B. Mitchell, Tarleton State University; John R. Bow, Texas Native Seed Program

There is little knowledge about genetic versus environmental phenotypic expression within the prairie grass little bluestem (*Schizachyrium scoparium*) (LBS). Little bluestem accessions collected within the Texas Native Seed (TNS) program have been collected from highly variable ecosystems throughout Texas along with historically collected material from the USDA NRCS Plant Material Centers representing a diversity of environmental conditions and are now grown together in a common environment. The goal of TNS is to domesticate and commercialize native plant species for restoration. We hypothesize that LBS accessions within that collection grown in a single environment will show differences in phenotypic expressions correlating with their original geographic location. Our objective is to evaluate plant physiological characteristics at inflorescence and post-frost and correlate it to soil, latitude, and climate variables at the original location of germplasm collection. The physiological characteristics to be measured include initial boot date, height, basal circumference and tiller density. Having a better understanding physiological characteristic at inflorescence and post-frost as these relate to the original germplasm collection site characteristics such as soil, latitude, climate and historical management may guide future restoration projects as they select for ecotypic variation within the TNS LBS collection.

Montezuma Cypress (*Taxodium mucronatum* Ten.): What is Needed to Optimize the Seed Germination Process? [Poster Presentation]

August Plamann, University of Texas Rio Grande Valley; Alejandro Fierro-Cabo, University of Texas Rio Grande Valley

Germinability of Montezuma cypress (*Taxodium mucronatum*) seeds is frequently cited as being low. Two experiments evaluating the effectiveness of various seed treatments were conducted to identify practices enhancing the germination process of this ecologically, culturally, and economically valuable riparian tree species. Seeds were collected on two occasions, one year apart, from the only remaining natural *T. mucronatum* tree stand in the United States. The seeds were subjected to various soaking and stratification conditions. Across all treatments, germinability ranged between 30%-40%, with slightly higher values occurring among the second seed cohort. Overall, no significant differences in germinability were detected in either study, however, soaking seeds in water for 96 hours and stratifying them in moist conditions for 3 weeks significantly accelerated the germination process. Seeds soaked briefly in a NaOH solution followed by 48-hour water soaking had more synchronous germination. Control conditions in which seeds were not soaked or stratified exhibited the slowest germination. These findings are consistent with previous evidence showing that *T. mucronatum* seeds do not exhibit physiological dormancy and that treatments promoting seed water imbibition enhance the germination process. This study adds to the limited available research on *T. mucronatum* propagation practices and offers novel data on the germination parameters of seeds sourced from a natural U.S. stand, rather than seeds from few scattered individual trees, as in previous reports. Seed germination recommendations garnered from this study can improve nursery production of *T. mucronatum* to benefit ornamental production and riparian ecological restoration efforts in south Texas.

ABSTRACTS **August 14, 3 – 4 PM**

Session 6: Strategies and Networks

Global Conservation Consortia: Coordinating Collections for Exceptional Species [Presentation]

Amy Byrne, The Morton Arboretum

A 2019 study by Griffith, et al. showed that gardens must collaborate to conserve genetic diversity, especially for exceptional species whose seeds cannot be properly seed banked. This process of capturing the genetic diversity of exceptional species in ex situ collections requires a tailored strategy for each species, emphasizing the need for a coordinated effort by botanic gardens. By working through networked consortia, botanic gardens can implement innovative solutions to safeguard these species in a changing world.

In this presentation, I will introduce the Global Conservation Consortia, highlighting a new initiative to conserve genetic diversity of exceptional species through a coordinated effort of gardens with oaks as a case-study. I will outline the challenges and opportunities of conserving exceptional species within distinct plant groups, providing solutions and recommendations that can guide collection efforts for other groups. The hope is that this presentation will gain new consortium members, growing a diverse, coordinated network of institutions and experts who will advance the consortia's goal in preventing the extinction of the world's exceptional species. Ultimately, by working through networked consortia, the sum of our efforts is greater than its parts.

Assessing Conservation Priorities for Texas at the Interface of Botanic Gardens, Conservation, and Genomics [Poster Presentation]

Jean Linsky, Botanical Research Institute of Texas; Abby Meyer, Botanic Gardens Conservation International, US; Morgan Gostel, Botanical Research Institute of Texas

An increasing number of bioinformatic and conservation resources are available to help achieve global conservation and research goals. During the past year, Botanic Gardens Conservation International-US (BGCI-US) and the Global Genome Initiative for Gardens (GGI-Gardens) have begun collaborating to assess gaps at the interface of botanic garden conservation programs and tissue preservation for genomic research. This collaboration has resulted in a global gap analysis that compares biodiversity genomics resources and living collection inventories from gardens worldwide. Results from this assessment help reveal the importance of botanic gardens for ex situ plant conservation and suggest a call to action is in order for botanic gardens – large and small. This gap analysis compared vascular plant genera not yet sampled within the Global Genome Biodiversity Network (GGBN) – over 9,300 – with those genera reported in BGCI's PlantSearch database. Of those genera not yet sampled in GGBN, 4,302 are represented by species within 833 living plant collections globally. Further analysis comparing BGCI's ThreatSearch database and GGBN's database reveal threatened species which belong to genera not yet sampled. Among the most surprising findings from these gap analyses is

that among the global list of threatened plant species, 1,608 (34% of those not sampled within GGBN) are reported from only a single living collection. In Texas, botanic gardens have been at the forefront of plant conservation for years. Results from a restricted, state-wide gap analysis in Texas are shown that highlight conservation priorities with the goal of helping achieve conservation goals across the state.

Recovering America's Fish & Wildlife Act-An opportunity to Fund Rare Plant Work [Video Presentation]

Richard Heilbrun, Texas Parks and Wildlife Department

There are more than 1,300 species of concern in Texas and 12,000 nationwide. Nearly 500 plant species in Texas alone are rare, imperiled, or need more research. Our greatest asset in recovering sensitive populations is the ability to work on them before numbers reach a critically low threshold. But how do we do that? In July 2020, the US House of Representatives approved $1.4 billion annually for rare species work, and for the first time, included plant work in that bill. We have an opportunity to advance this once-in-a-generation if we activate our networks and make our voices heard. This presentation will cover the details of the bill, the timelines for the legislation, how some vocal advocates were able to get plants added to the funding protocol, and actions the plant community can take to push for this to pass the US Senate this year. Now is the time to make your voice heard with Senators Cornyn and Cruz. Details: The Recovering America's Fish & Wildlife Act was included as an amendment to HR 2, "INVEST in America Act [Moving Forward Act]," which provides funding for transportation, infrastructure, and resilience projects. The bill now moves to the US Senate. The bill allows states to receive an extra 5% if they spend it on imperiled plants. If passed, Texas could receive $57 million/year for the next 5 years to improve ecological resilience and recover imperiled fish, wildlife, and plants.

Data Sharing in Support of Collaborative Plant Conservation: Lessons from California Plant Rescue [Video Presentation]

Katherine D. Heineman, Center for Plant Conservation, San Diego Zoo Institute for Conservation Research; Christa Horn, San Diego Zoo Institute for Conservation Research; Naomi Fraga, Rancho Santa Ana Botanic Garden; Cheryl Sevilla, Rancho Santa Ana Botanic Garden; Heather Schneider, Santa Barbara Botanic Garden; Vanessa Handley, University of California Botanic Garden; Holly Forbes, University of California Botanic Garden; Brett Hall, University of California-Santa Cruz Botanic Garden & Arboretum; Evan Meyer, University of California-Los Angeles, Mildred E. Mathias Botanic Garden; Tony Gunroe, San Diego Botanic Garden; Shannon Still, University of California-Davis, Botanic Garden & Arboretum; David Magney, California Native Plant Society; Stacy Anderson, San Diego Zoo Institute for Conservation Research; Bart O'Brien, Regional Parks Botanic Garden; Joyce Maschinski, Center for Plant Conservation, San Diego Zoo Institute for Conservation Research

California is home to one third of the globally rare plant species in the United States. To secure this incredible flora, ten botanical institutions in California have joined together to form the seed banking collaborative, California Plant Rescue. By sharing our acces-

sion data and integration of combined dataset with our natural heritage database, we created a suite of tools in support of seed collections. These tools include a web-based accessions database, a mapping application for collections targeting, and a web-app that prioritizes species for collection based on location, conservation status, and phylogenetic diversity. From our dataset, we also conducted a gap analysis of current collections in order to direct our seed strategy moving forward. Our analysis evaluated the spatial, phylogenetic, landownership, and ecological patterns of seed collections in California. Some patterns were intuitive: Our seed collections were heavily biased toward Southern California where the majority of our permanent seed banks, including our most prolific collector, is located. Ecological patterns were somewhat less intuitive: despite high interannual variation in population size, annuals are more likely to be represented in seed collection than perennials perhaps owing toward larger seed set and lower incidence of recalcitrance. Finally, our landownership analysis demonstrated that the greatest potential for seed collection in California is on US Forest Service land, which has the highest density of extant rare plant occurrences. We identified five specific National Forests which are home to 20 or more uncollected rare species, an insight that will be crucial for prioritizing permitting and relationship building with agency collaborators. In 2019, California Plant Rescue was awarded $3.6 million by the State of California to seed bank the remaining 650 rarest plant species in California. We will leverage these tools and insights to take full advantage of this exciting opportunity.

Digitization of a Pteridophyte Herbarium: A Method to Curate and Inform Fern and Lycophyte Research in Texas [Video Presentation]

Tiana F. Rehman, Botanical Research Institute of Texas; Jessica L. Lane, Botanical Research Institute of Texas; Ashley Bordelon, Botanical Research Institute of Texas; Alejandra Vasco, Botanical Research Institute of Texas

In 2018 we started a project with the goal of digitizing all holdings of ferns and lycophytes in the BRIT, SMU, VDB, and NLU collections deposited in the Philecology Herbarium of the Botanical Research Institute of Texas (BRIT). We used the project as a platform to improve the filing organization, curation, and preservation of these specimens, as well as their physical and digital discovery. With effort from staff and volunteers, four collections are now combined in adjacent cabinets and organized to reflect the latest taxonomic classification from the Pteridophyte Phylogeny Group. Data from 44,955 BRIT fern and lycophyte specimens are available online. Of these, 2,898 were collected in Texas, representing 177 counties, 24 families, 48 genera, and 168 species. Analysis of data from this digitized pteridophyte collection gives us a more accurate representation of the pteridophyte collection at BRIT. This allows curators to plan for growth and prioritize future collection efforts, and allows researchers to track species of conservation concern from historic collections to current populations. This digitization project is mainly funded by the National Science Foundation through the Pteridophyte Collections Consortium (PCC) http://www.pteridoportal.org/portal/.

American Crossroads: Digitizing the Vascular Flora of the South-Central United States [Video Presentation]

Tiana Rehman, Botanical Research Institute of Texas; Peter Fritsch, Botanical Research Institute of Texas; Diego Barroso, Botanical Research Institute of Texas; Jason Best, Botanical Research Institute of Texas; Mark Fishbein, Oklahoma State University; Clay Barrett, Oklahoma State University; Abigail J. Moore, University of Oklahoma; Bruce W. Hoagland, University of Oklahoma; Daniel Spalink, Texas A&M University; George A. Yatskievych, University of Texas at Austin

The two-state region of Texas and Oklahoma constitutes a major crossroads of North American ecological and biological diversity, spanning extreme environments and substrates, resulting in a rich regional flora comprising ca. 31% of all native species in North America north of Mexico. This diversity has been documented through at least 1.9 million herbarium specimens made over the past 200+ years, deposited in herbaria primarily within the region, but also at larger institutions throughout North America. Nevertheless, these herbarium specimens are not well represented in online databases, leaving a large biogeographical gap in our knowledge, which hampers our ability to monitor and project species ranges, or to predict vegetation response to ongoing climate change and other anthropogenic factors.

Mobilizing these records will provide data for species of conservation concern, invasives, and environmental health indicators. The Texas Oklahoma Regional Consortium of Herbaria Thematic Collections Network (TORCH TCN) is a four-year collaborative effort among >40 herbaria in these two states, and 5 more herbaria across the U.S., to fully digitize (database, image, and georeference) vascular plant specimens collected in Texas and Oklahoma (NSF Award No. 1902078). Approaching the end of the first year of the grant (July 2020), >730,576 specimen records(663,782 Texas; 66,794 Oklahoma) and 425,248 associated images are accessible through the project portal (http://portal.torcherbaria.org), contributed by TORCH TCN participants and other herbaria. Project participants, workflows, and progress will be shared, as well as access to protocols, equipment lists, and methods of community involvement.

Cross-border Rare Plant Conservation [Video Presentation]

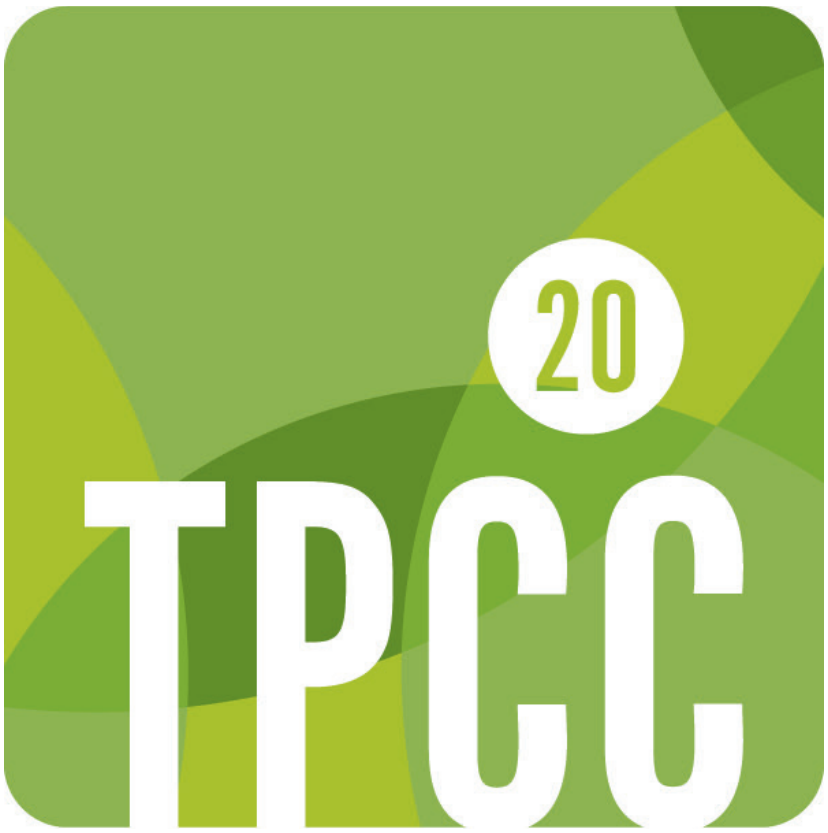
Sula E. Vanderplank, Pronatura Noroeste; Joyce Maschinski, Center for Plant Conservation; Carlos Gonzalez, Universidad Autónoma de Baja California

This talk will present recent advances as part of the new collaborative initiative to conserve plants that are rare both sides of the US/MX border. San Diego Zoo Global, the San Diego Natural History Museum, and the National Seedbank of Mexico are working together in Baja California to make conservation seedbank collections, update population status at each occurrence, and evaluate genetic diversity of the rarest plants of our borderlands. Each is considered Rare, Threatened, or Endangered on both sides of the US/Mexico border. In many cases it has been challenging to relocate these rare species, and assure their accurate identification. We are currently working with around 65 target species, and we hope that this initiative could be a model for other borderlands states.

Challenges for Plant Conservation on a College Campus in the Era of Pandemic Budget Cuts [Video Presentation]

Sam Whitehead, Concordia University Texas Dept. of Environmental Science and Conservation; Zach Stark, Concordia University Texas Office of Environmental Stewardship

Concordia University Texas in Austin is an ideal location for experiential learning in the natural sciences. Concordia owns and co-manages a 250-acre tract of the Balcones Canyonlands Preserve, which is home to many rare plant species threatened by development and invasive, non-native plants. Concordia's Environmental Science and Conservation major works with its Office of Environmental Stewardship to restore native plant communities, control invasive plants, and educate the public. In fact, Concordia's students take active leadership roles in these programs as part of their degree plan. This has taken on a new degree of importance as Concordia has had to prune its budget because of the pandemic, mostly due to declining enrollment. One of our strategies has been to use experiential and project-based learning to lure students back to campus this Fall, and plant conservation provides numerous opportunities in this regard. In this talk, I'll describe our student conservation leadership strategies and how we will expand those programs in response to rapid change.



Presenters, attendees, and sponsors: We are grateful for your understanding and patience as we adjusted to a virtual format.

We hope to be back together in person for the next Texas Plant Conservation Conference. See you in 2022!

THANK YOU!