Poster Presentations and Abstracts
Monday, June 26 | Salon 1 & 2

Poster 1 - Tracy Rosenberg, Abbey Grasslands of the Prairie Coteau LLC; tracyarosenberg@gmail.com

P1 *Restoration of former Blue Cloud Abbey's 980 acre remnant northern tallgrass prairie*

Blue Cloud Abbey, a Benedictine monastery, situated on the east flank of the Coteau des Prairies, settled in South Dakota in the 1950's to serve Sioux indigenous tribes. In 2012, Blue Cloud Abbey closed due to an aging population of monks. In 2013, they sold their 980 acres of remnant rangeland and hay meadows to former Iowan, Tracy Rosenberg. Rosenberg, born and raised on an Iowa farm, had witnessed her family's century farm undergo conversion to cropland throughout the 60s and 70s. In midlife, she sought to purchase prairie remnant (scant in her home state) which led her to the monks at Blue Cloud. For the past decade, Rosenberg has been restoring the remnants which had formerly been heavily utilized by livestock ranching and left compacted, degraded, and eroded. In 2022, she was awarded the national Women in Conservation (NRCS WiN) Conservationist of the Year, and awarded Society of Range Management (SRM) Excellence in Range Management for Region 1 of South Dakota for her restoration efforts on the former Blue Cloud Abbey land, now Abbey Grasslands of the Prairie. Though not formally educated in ecology, Rosenberg owes her restoration success to mentorship from many supportive agencies and prairie enthusiasts.

Poster 2 - Roberta Bumann, Minnesota Master Naturalist; Winona, MN; rmbumann@gmail.com
Gabe Ericksen, LandSpirit Design Landscaping, Inc., Winona, MN; gtericksen@gmail.com
Amanda Gentry, Winona County Soil & Water Conservation District, Lewiston, MN; amandagentry@winonaswcd.com
Joshua Lallaman, Saint Mary's University of Minnesota, Department of Biology, Winona, MN; jlallaman@smumn.edu

P2 *Bringing back the rusty patched bumblebee through a Minnesota Lawns to Legumes Demonstration Neighborhood Project*

Located in the Driftless Area in southeastern Minnesota, Pleasant Valley is a diverse ecological habitat with a verified population of Rusty Patched Bumblebees (RPBB). In 2020, Healthy Lake Winona selected Pleasant Valley for a community project and received a Lawns to Legumes Demonstration Neighborhood (L2L-DN) grant, a Minnesota state-funded grant to assist homeowners to plant native plants for at-risk pollinators. The aims of this project were to:

1) Provide habitat for RPBB and other pollinators by creating a network of pollinator habitats.
2) Construct a demonstration neighborhood of pollinator habitat using best practices for ecological landscaping.

A team was formed to work with homeowners to install 4 types of pollinator plantings. Outcomes were collected on 1) selected metrics on all projects, 2) observations for RPBB and other pollinators during each year of the project, and 3) a homeowner satisfaction survey. Thirty-seven (37) out of 47 homeowners completed 40 projects adding 8.41 acres of new pollinator habitat during the 3 years of the grant. RPBBs were observed at 4 sites in 2020, 7 sites in 2021, and 11 sites in 2022. In a survey, homeowners reported satisfaction with project support, helpful feedback on plants supporting pollinators, and support for continued networking.

Poster 3 – Seth Breeding, High School student, Winterset, IA; sgbreeding2004@gmail.com
Max Breeding, High School student, Winterset, IA

P3 Madison County private prairie inventory

This poster will be about a prairie inventory and observational study. It is a scientific poster about the biodiversity of species in Madison County Prairies. The inventory was taken during the summer of 2022 from late June through early October. We observed plants, pollinators, and any other prairie life we found interesting. The purpose was to document how healthy the landowner's prairie was, as he was curious if he could do anything to better maintain the land. The prairie we documented was located in Madison County south of the small town of Peru in Walnut Township. The prairie consisted of tallgrass planted prairie, a woodland remnant, an Oak Savannah, and a remnant prairie. The inventory consisted of us going out every two weeks and observing and documenting new species that we found, taking pictures of the species and marking the species location. We posted the pictures on iNaturalist to ensure our identifications were correct. Also, we compiled the data into

a spreadsheet and turned the spreadsheet into a Shutterfly book and Poster. We inventoried 200 species with 136 plant species, 52 insect species , 5 fungus species, 3 arachnid species, 3 bird species, and 1 mammal species.

Poster 4 - Erin M. Garrett, University of Illinois Extension, Urbana, IL; emedvecz@illinois.edu

P4 Increasing the public's grass identification skills

Many overlook grass identification because it is considered too challenging. With increasing popularity of prairie restoration, planting grasses in home landscapes, and spread of invasive grasses, being able to identify grasses is important. Extension Educator Erin Garrett created a series of grass identification resources to make the process approachable and achievable. Her intended audience is natural resource managers, landowners, plant enthusiasts, and Extension volunteers. She developed the Which Grass is Which? Webinar Series, comprised of 5 programs. She uses field identification practices rather than microscopes and includes her own detailed photography. Garrett delivers this programming through in-person presentations, hikes, webinars, and YouTube recordings. She distributed a needs assessment and based on the responses, increased asynchronous materials by starting a blog, building website content, and creating 1-minute videos of how to identify individual grasses. In four years, she reached 1,750 participants through direct programming, garnered over 17,000 views of her recorded webinars, generated 9,500 views of her blog posts in one year, and received 2,500 views of her short videos in three months. Feedback received on evaluations exhibits the success of these resources in increasing grass identification knowledge and likelihood of participants putting their new skills to use.

Poster 5 – Melissa A. Duda, Chicago Botanic Garden, Northwestern University, Evanston, IL; melissaduda2024@u.northwestern.edu
Andrea T. Kramer, Chicago Botanic Garden, Northwestern University, Evanston, IL
Jeremie B. Fant, Chicago Botanic Garden, Northwestern University, Evanston, IL

P5 Common pollinators of two gentian species and their hybrid, Gentiana x billingtonii

Natural hybridization involves successful mating between individuals from two species. For rare species, hybridization may accelerate extinction rates through the loss of traits that make that species unique, but paradoxically, it can also allow a species to gain traits to adapt to changing conditions. I investigated hybridization between two species of Gentian, G. puberulenta, a dry prairie species considered rare in some of its range, and G. andrewsii, a common species found in mesic prairies. These two species co-occur at many sites, but their hybrid (Gentiana x billingtonii) only occurs at a subset of sites. Minimal research exists for this hybrid complex, but some stewards are actively removing hybrid plants. For my study, I asked what conditions promote hybridization between these taxa at some sites but not others. I conducted pollinator observations and collected flowering phenological data. I found that masked bees (Hylaeus spp.) visit all taxa of gentian more often than any other pollinator, suggesting that this pollinator promotes hybridization. I found an overlap of ~2.5 weeks among all taxa, suggesting Hylaeus spp. moving pollen between taxa may result in hybridization. This study can inform land managers seeking to understand the risk of extinction in rare species displaying hybridization

Poster 6 - Ethan D. Rose, Michigan State University. East Lansing, MI; roseetha@msu.edu
Lauren L. Sullivan, Michigan State University, East Lansing, MI
Eric W. Seabloom, University of Minnesota, Minneapolis, MN
John L. Orrock, University of Wisconsin-Madison, Madison, WI

P6 Rainfall, herbivory, and nutrients modify seed predation patterns in North American grasslands

Large-scale climate patterns are known to influence the abundance of organisms and their interactions. However, studies examining large-scale climate effects on biotic interactions are limited in scope and mechanisms remain elusive. Relationships between climate and trophic interactions may be sensitive to top-down effects like herbivory and bottom-up effects like nutrient limitation. We quantified the effects of herbivory and nutrient limitation on climate-granivory relationships by measuring predation of Avena sativa seeds and vegetative biomass across temperate North America using a standard experimental design including N, P, and K addition as well as herbivore exclosure treatments. We hypothesized that 1) herbivory reduces seed predation by removing vegetative cover for granivores, 2) nutrient addition increases seed predation by increasing vegetation, and 3) treatment effects are influenced by large-scale precipitation patterns. We found a significant effect of N addition on seed removal, as well as N x precipitation and herbivore x precipitation interactions. This study is the first to examine how climate, herbivory, and nutrients structure seed predation at the continental scale. An additional study will examine top-down effects on plant community structure from reintroduced bison, a keystone herbivore, and bottom-up effects from moisture availability throughout the climatically diverse and endangered tallgrass prairie ecosystem.

Poster 7 – Andrew Olson, Tallgrass Prairie Center, University of Northern Iowa, Cedar Falls, IA; andy.olson@uni.edu

P7 Towards widespread adoption of prairie conservation strips

The Tallgrass Prairie Center's ongoing project, "Towards widespread adoption of prairie conservation strips," aims to increase the expertise of professional farm managers, landowners, and farmers in implementing prairie conservation strips to address the negative impacts of Upper Midwest corn-soybean agriculture on soil and water quality, biodiversity, and rural communities. Despite the increasing disconnection of landowners from the land they own, with around half of cropland in the contiguous United States being rented and 80% of rented acres owned by non-operator landowners, the case studies presented in this poster offer an in-depth guide to various prairie installation implementations across several Midwestern farms. The poster showcases landowner, farmer, and farm manager perspectives, along with compelling images and financial information, to illustrate the practical aspects of planting prairie on a farm. With more than 85% of Iowa being cropland, the state offers a significant opportunity for prairie restorations. This poster provides valuable insights and practical guidance for those interested in adopting prairie conservation strips on their farms.

Poster 8 - Bret J. Lang, South Dakota State University, Brookings, SD; bret.lang@sdstate.edu
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P8 Minding the gap: Seed availability in the Northern Great Plains

The restoration of prairies in North America's northern Great Plains region relies heavily on seeds. The native seed market in this region, however, is underdeveloped with few seed suppliers, low species representation, low seed inventories, and seeds with unknown provenances. Evidence suggests that for some plant species, nonlocal provenances are not always adapted to local climatic conditions potentially leading to outbreeding depression or poorly adapted populations. A recent restoration project identified 287 native plant species suitable for restoration in an upland prairie site in eastern South Dakota. However, after a comprehensive search of commercially available seeds, it was discovered that a sizable portion of the species targeted for restoration was not available. This study assesses native seed availability for species native to eastern South Dakota.

We discovered that only 201 of the 287 species (70.0%) were commercially available. Forb species were the most underrepresented having 164 out of 242 species (67.8%) available followed by grasses and sedges with 37 out of 45 species (82.2%) available. Additionally, only 34 species (19.1%) were produced or collected within the restoration site's seed transfer zone. We believe this experience highlights an opportunity to expand native seed production within the region.

Poster 9 - Brooke L Burris, Kansas State University, Division of Biology, Manhattan, KS; blburris@ksu.edu
Walter Dodds, Kansas State University, Division of Biology, Manhattan, KS
Emily Burnett, Kansas State University, Division of Biology, Manhattan, KS
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P9 Riparian and stream influences of bison and cattle grazing in tallgrass watersheds

Riparian zones are a key controller of water quality in all biomes including grasslands dominated by large ungulate grazers. We sampled 13 different sites with various grazing (bison and cattle) treatments for riparian vegetation coverage, sediment size, and fecal matter in the riparian and up to 100 m from the stream channel. Cattle grazing in areas with riparian tree cover had more open soil than bison or ungrazed areas. Streams with cattle also had smaller stream sediment sizes, and amount of fecal matter within 10 and 100 m of stream channel. Low intensity cattle and bison grazing had similar effects and both grazers were more likely to excrete farther from stream sites and on less steep areas. Bison fecal material was more common in spring areas of streams with year-round water availability.

Poster 10 - Alec J. Glidden, Kansas State University, Division of Biology, Manhattan, KS; aglidden@ksu.edu
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P10 Long-term plant community responses to season of fire

Tallgrass prairies are a disturbance dependent ecosystem that requires recurring fires to maintain a grassland state. Timing of fire affects plant community responses, but few studies have compared effects of fire in different seasons over multiple decades. We analyzed 29-years of data from the Konza Prairie Biological Station to determine plant community responses to dormant and growing season fires (fall, winter, spring, and summer fires each replicated on two watersheds). Dormant season fires were annual while summer fires were biennial. Canopy cover of all species was recorded in five 10-m2 plots along 50-m transects (4 upland and 4 lowland transects per watershed). Both burn season and topographic position influenced community composition and change over time. Spring burning decreased the cover of cool-season graminoids, enhanced the dominance of warm-season grasses, and reduced the cover of native forbs. Summer burns increased cover of cool-season graminoids, reduced cover of warm-season grasses, and produced higher forb cover and richness. Effects of winter and fall burns generally were intermediate relative to spring and summer burns. Our study demonstrates that timing of fires influences the trajectory of native plant communities and prescribed fires in different seasons should be considered for specific management goals.

Poster 11 - Caitlyn M. Sims, Missouri Botanical Garden, St. Louis, MO; csims@mobot.org
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P11 Botanical inventory of early successional species following pipeline construction along a dynamic urban creek in the Midwest

Litzsinger Road Ecology Center (LREC) is a 15.78 hectare (39 acre) private, educational facility of the Missouri Botanical Garden located outside of St. Louis, MO. Beginning in 2019, a 2 hectare (5 acre) section of the property was destroyed for the installation of a sewer pipeline. This area comprised a section of bottomland woodlands and reconstructed prairie. A vascular plant inventory of the pipeline path was conducted immediately following the completion of the sewer project in August 2022 and Spring 2023. The goals of these surveys were (1) to observe the succession of species within the first year of the fallow pipeline path and (2) to serve as the baseline for a new reconstruction and vegetation monitoring project that will continue throughout the remaining 2023 growing season and following years. The combined inventories found 208 species, of which 126 (60.58%) were native and 82 (39.42%) were introduced. The total mean C-value was 1.6 and the native C-value was 2.6. The species composition of the path has fundamentally changed with C-values considerably lower than the surrounding reconstructed habitats. Plans of native plant introduction and management for invasive species will certainly influence plant communities over time following prairie reconstruction of the pipeline path.

Poster 12 - Junior J Francois, University of Illinois Chicago, Chicago, IL; jfrano3@uic.edu
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P12 Effects of microtopography on soil greenhouse gas fluxes and soil biogeochemistry in a remnant prairie

Tallgrass prairie conversion for agriculture in the Midwest has contributed to climate warming via soil greenhouse gas (GHG) emissions. In this study we ask: Are remnant prairie soils GHG sources or sinks? How does microtopography and season affect the GHG sink or source? Our study focused on the James Woodworth Prairie (JWP), a 2-hectare untilled tallgrass prairie in Chicago. We established a transect across the prairie microtopography from lower to higher elevation, and four chambers at each plot to collect gas and soil samples. Gas samples were collected bi-weekly from July to November 2022, while soil samples were taken once in November, spanning a 0 to 50 cm depth.
Our findings reveal that JWP soils function as a source of CO2 (mean = 1.95 mgC-CO2 m-2 d-1), with higher fluxes in summer and fall and lower fluxes in winter. In contrast, soils act as a sink for CH4 (mean = -1.02 µgC-CH4 m-2 d-1) and N2O (-0.13 µgN-N2O m-2 d-1), with relatively consistent fluxes across seasons. We found that microtopography influences greenhouse gas fluxes, with lowland areas favoring positive CH4 and N2O fluxes and lower CO2 flux, while upland areas favor higher CO2 flux and CH4 and N2O uptake.

Poster 13 - Brianna L. Hull, Tallgrass Prairie Center, University of Northern Iowa, Cedar Falls, IA; hullb@uni.edu
Mallory K. Sage, Tallgrass Prairie Center, University of Northern Iowa, Cedar Falls, IA

P13 Green Iowa AmeriCorps: Developing land stewardship through professional practice, An example from members serving at the Tallgrass Prairie Center

The Tallgrass Prairie Center (TPC) is associated with the University of Northern Iowa and houses four programs that serve all of Iowa and beyond through the work of seven permanent staff. Since 2019 the TPC has served as a host site for two full-time 11-month and two part-time three-month Green Iowa AmeriCorps (GIA) land and water stewards. The Center's staff were previously limited in the amount of research, land management, outreach, and education they could perform. GIA members have been capacity builders for the Center through volunteer recruitment, volunteer event planning, educational

programming, assistance with land management, and the creation of outreach and education materials. Members also receive regular professional development training to expand their skills, including certification in chainsaw maintenance, safety, and use; water quality testing; prescribed burning; and pesticide application. Through their work at the TPC, GIA members have completed 236 outreach events with 479 volunteers, and 114 education events reaching 8659 participants between September 2019 and May 2023. Members have completed a variety of land management projects including the removal of invasive species, suppression of noxious weeds, removal of woody vegetation, and assistance with planting thousands of native prairie plants for the Plant Materials program.

Poster 14 - Jeremy S. Giannone, University of Minnesota, Minneapolis, MN; giann077@umn.edu

P14 Phosphorus transport in soil: Locating and identifying a limiting element

The phosphorus (P) cycle is not well understood. While carbon (C) and nitrogen (N) have gas phases, P does not. Phosphorus runoff in waterways and its shortage are both understood since their causes are due to agricultural demands. Fertilizers increase the rate of phosphorus in the soil leading to greater runoff which then accumulates in the surrounding bodies of water. 1 From an economic perspective the phosphorus availability and food prices have a direct correlation. The instability of phosphate prices may have direct causation to the instability of the food and agriculture markets. 2 In order to deal with these issues, P transfer from sediment through soil must be understood.

Unlike C and N, P does not have a gas phase at atmospheric pressure which makes the exchange difficult to study. Information on the composition and dynamics of soil phosphorus (P) remains limited, but is integral to the understanding of soil biogeochemical cycles. 3 This research will combine the analytical techniques of FT-IR and NMR to expand the knowledge of P in soil biogeochemistry. Learning how P transfers from sediment through soil will both clarify how the P cycle operates and yield foresight to agriculture markets.

Poster 15 - Laura Fischer Walter, Tallgrass Prairie Center, University of Northern Iowa, Cedar Falls, IA; laura.walter@uni.edu

P15 The evolving roles of the Plant Materials Program at the Tallgrass Prairie Center

High quality prairie restoration requires genetically diverse, regionally adapted seed. Commercial production of native seed enables restoration at scales beyond the size of an individual project and promotes restoration at the institutional level. To make more species of regionally adapted native prairie seed available and affordable for seedings along Iowa's federal, state, and county highways, a plant materials program was initiated in 1990 at the University of Northern Iowa, in partnership with several agencies. The program has released 89 species of Iowa source stock seed, developed from remnant prairie collections, to growers for commercial production of source-identified seed. Several functional groups are represented: warm season and cool season grasses, sedges, legumes, forbs, and prairie shrubs. As the program and native seed market have matured, the Plant Materials Program has taken on a coordinating role among native seed stakeholders. Communication can partially offset the challenges of a volatile and unpredictable seed market. We discuss the evolving role of the Plant Materials Program in supporting a healthy market for diverse, regionally appropriate native seed.

Poster 16 - Mary Damm, Prairie Quest Farm, McGregor, IA; marydamm@gmail.com
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P16 Prairie microgeography: The study of the tangled prairie

We introduce the term microgeography to highlight an aspect of plant community ecology that has received little attention. Plant ecologists commonly study spatial patterns and measure richness and diversity at scales ranging from continents to communities to plots. However, plant ecologists less regularly examine these patterns at a scale less than a square meter. Microgeography considers the spatial structure of plants at a geographical scale of centimeters and documents a variety of patterns including species richness of a single point, spatial arrangement of plants with respect to neighboring conspecifics and other species, and species composition similarity over distances of centimeters. We used a microgeographical approach to examine the spatial structure of native and reconstructed tallgrass prairies in Iowa. Using a 0.5 m2 point-intercept frame with intercepts 10 cm apart, we recorded all species present at each of 49 points. We sampled seven frames in each of three native and two reconstructed black-soil prairies. We found that the two prairie types differ in spatial structure. Native prairies have greater species richness than reconstructed prairies all the way down to a single point. Native prairies also have lower similarity than reconstructed prairies between neighboring points at distances of centimeters.