23rd Annual Nebraska Grazing Conference August 8-9, 2023

by Daren Redfearn, Chair, Nebraska Grazing Conference

The 2023 Nebraska Grazing Conference is rapidly approaching. This year's Conference will be held Tuesday and Wednesday, August 8 and 9, 2023, at the Younes Center in Kearney, Nebraska. The Conference will begin on Tuesday morning with a Tour focused on Stress-Free Livestock Management.

We are honored to have Sherry Vinton, Director of the Nebraska Department of Agriculture, provide the opening comments. The afternoon also includes a Producer Panel of former Leopold Conservation Award winners and a session on Emerging Issues in Grazing Lands Management.

The Wednesday morning session is devoted to Precision Livestock Management and includes an extended time for discussion with exhibitors in the "Technology Corner" in addition to hearing from a Producer Panel on their use of the latest technology. To register go to grassland.unl.edu/nebraska-grazing-conference. We look forward to seeing you in Kearney!

REGISTER NOW!

GRASSLAND.UNL.EDU/NEBRASKA-GRAZING-CONFERENCE

August 8th and 9th, 2023
Younes Conference Center, Kearney, NE

- Former Leopold Conservation Panel
- Emerging Issues in Grazing Lands Management
- Precision Livestock Management
- Stress-Free Livestock Management
- Precision Livestock Exhibits
- Role of Nebraska's Grazing Lands

LaQuinta Inn and Comfort Inn, Kearney, NE

Hotel Booking Link: https://www.choicehotels.com/reservations/groups/GX76G2

Director's Column

by Jerry Volesky, Interim Director, Center for Grassland Studies, Lincoln, NE / Range and Forage Specialist, WREEC, North Platte, NE

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The Center for Grassland Studies is a unit within the University of Nebraska-Lincoln Institute of Agriculture and Natural Resources. It receives guidance from a Policy Advisory Committee and a Citizens Advisory Council.

Note: Opinions expressed in this newsletter are those of the authors and do not necessarily represent the policy of the Center for Grassland Studies, the Institute of Agriculture and Natural Resources, or the University of Nebraska – Lincoln.

To simplify technical terminology, trade names of products or equipment sometimes are used. No endorsement of products is intended nor is criticism implied of products not mentioned.

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Grass and rangeland managers have had some hope for a better growing season with some good rainfall this May across the drought-stricken areas in Nebraska. We can hope that these timely rains will continue.

It has been a busy spring and early summer for the Center for Grassland Studies (CGS). The schedule for the Center's Fall Seminar series has been set and includes speakers covering a variety of grassland related topics. The seminars begin Monday, August 28 at 3 pm. The complete schedule will be posted on our website later this summer.

The Center for Grassland Studies, along with the Center for Resilience for Agricultural Working Landscapes (CRAWL), is continuing its active role with the Beef Innovation Hub. The hub consists of faculty and external advisory committees and are developing short- and long-term goals for the hub.

The summer of 2023 has a couple of educational programs and events with CGS or CGS faculty involvement. These include the Nebraska Ranch Practicum, and the Nebraska Grazing Conference. The Ranch Practicum began on June 6 and is a multi-disciplinary, hands-on educational program designed to give participants the skills and education needed to succeed in today's ranching industry. This "three-season" program is designed to integrate information producers encounter throughout the beef production year into a framework for decision making. July 25 will be the date for a Field Day at the UNL Barta Brothers Ranch. This event will highlight work that is being done on a collaborative adaptive management project that began in 2022. A group of stakeholders have been integrally involved in the process and management treatments have been selected. The 23nd annual Nebraska Grazing Conference will take place on August 8 and 9 in Kearney. The conference planning committee has been working hard to assemble a program filled with valuable information for ranchers, farmers, wildlife managers, land managers, and others with conservation interests.

If you would prefer to receive an electronic copy of this newsletter instead of a print copy, please let us know by emailing abranting2@unl.edu. Thank you.

New Barta Brothers Ranch Manager

Jacob Harvey

I became the Research Project Coordinator at the Barta Brothers Ranch (BBR) in the eastern Sandhills at the beginning of January 2023. I look forward to reconnecting with folks at the Center for Grassland Studies. I grew up in Holdrege, NE and graduated as a Chancellor's Scholar with my degree in Fisheries and Wildlife and a minor in Grassland Ecology and Management from the University of Nebraska-Lincoln in December 2020. During my previous time at UNL, I worked as a student drilling assistant with Conservation and Survey Division, a Cabela's apprentice in the Chizinski Human Dimensions lab, and a student prairie manager at Nine-Mile Prairie. I was also involved with the UNL Range Club and enjoyed representing the club at the state chapter meeting. In December 2022 I finished my master's degree in Wildlife, Aquatics, and Wildlands Science and Management from Texas Tech University. The focus of my thesis research has involved monitoring feral swine landscape use across the Rolling Plains of northern Texas and how their activity compares with livestock and native wildlife. Other projects I have been heavily involved in include planting native grass restoration plots with seed drills and surveying invasive grass physiology using a LI-COR 6800 photosynthesis machine. While at TTU, I have also been part of reinvigorating their student chapter of the Society for Range Management as a graduate student advisor and coach for the URME team.

My wife, Sydnie, and I are excited to move back to Nebraska and out to the ranch. I first worked out at BBR in Summer 2020 and absolutely enjoyed being out there assisting in research. When this position was offered, it was an opportunity I could not pass up. My plan for BBR is to make it a place for both graduate research as well as a potential site for off-campus undergraduate coursework or a field-trip site for the UNL Range club. I enjoyed my time as an undergraduate in SNR and the Center for Grassland Studies and I am thankful to get this opportunity to join UNL and IANR as the new point of contact for the Barta Brothers Ranch.

Congratulations 2023 Graduates!

The Center for Grassland Studies wishes the following May 2023 graduates much success on their future endeavors.

Grassland Ecology and Management Major– **Jay Cleveland, Kyle Griger, and Cole Laible**

Grassland Ecology and Management Minor- **Benjamin Janssen**

Grazing Livestock Systems Major-**Boone Svoboda**

Grazing Livestock Systems Minor- **Caitlin Buck and Kelsey Swantek**

Other Range Club Members- **Erik Henry (Environmental Science, Fisheries & Wildlife), Lydia Regier (Plant Biology)**

Bison Conservation in a Changing Climate

By Nic McMillan UNL, Asst Professor, Grazing lands Ecologist   Photo By Deniz Bertuna Edited By: Anthony Cook

Nothing is quite as emblematic of the American West than the plains bison (*Bison bison* L.). Prior to their near extermination at the hands of the United States government in the late 19th century, bison inhabited nearly the entire North American continent: spanning as far North as New England and Canada, West to California, South into Mexico, and as far East as my homeplace in the Carolinas. Bison were not only critical to maintaining grassland structure across their range, but they also played a central role in sustaining many of the people who call North America their native home. It is not surprising, then, that bison restoration and conservation is deeply rooted in our identity here in this place – the Great Plains.

In a recent paper, myself and co-authors from Oklahoma State University, the Nature Conservancy, and the University of Montana used fine-scale GPS collar data from two of the largest bison herds in North America to ask: do bison movements change with weather? At first, it may sound a little oversimplistic or silly, but part of our motivation goes back to the mythology surrounding modern bison restoration and conservation. Bison are widely believed to be *tough as nails*, and able to easily handle all of the extreme, notoriously temperamental weather patterns that are characteristic to the Great Plains. Although bison are integral to the culture and history of many indigenous peoples of North America, there is very little data describing very basic parts of their biology that are critical to their continued conservation. Why? The reason is simple: bison were nearly gone – reduced to around 2,500 individuals – before scientists and conservationists could learn anything about them.

Using 12-minute resolution GPS data, we found that bison movements were strongly tied with air temperature and drought. Bison moved more as temperatures increased from subzero to around 30°C (86°F). However, beyond 30°C bison movements significantly decreased, suggesting a physiological response – perhaps it was too hot, and their need to cool off was stronger than other needs. What's more, our results were nearly identical to a study in Canada showing that wood bison (*Bison athabascae*) movements closely track air temperature as well. The congruency of our disparate studies suggest that we may have uncovered a fundamental physiological response to air temperature that transcends all bison species. Our bison in Oklahoma also tended to move more during drought, which at first might seem counterintuitive. However, bison like most large grazers get nearly all of their daily water requirement from forage – until the water content in that forage goes down. Therefore, when moisture conditions deep in the soil profile are considered *powdery dry*, bison move more presumably to meet their basic physiological needs – forage and water – to survive during those extreme times.
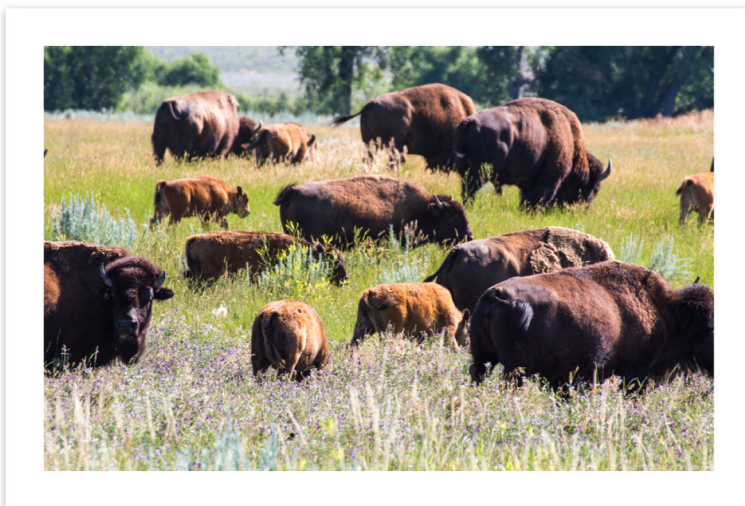
So the big question is why does this matter? Who cares? Well, bison restoration efforts are accelerating across North America, and socio-political conflicts surrounding their movement in-and-out of conservation areas has elicited a lot of controversy across the Plains. For example, bison movement out of Yellowstone National Park is an ongoing concern with neighboring ranching communities, and bison are frequently hazed back into the park boundaries or culled when they leave. If bison are currently – and frequently – leaving the park, it is likely that their needs are not being met there, and our research suggests that these sorts of conflicts will only get worse with climate change. As weather gets more extreme, bison will need to move to moderate those extremes for their continued survival. Therefore we are faced with an ethical dilemma: are the landscapes that we currently think of as important for bison conservation and reintroduction able to support them into the future? Managers, advocates, conservationists, and policy makers will need to address that question if we are going to keep such an emblematic animal roaming our North American grasslands.

Introduction to Network for Integrated Resilience Agricultural Research

By Craig Allen, Director, Center for Resilience in Agricultural Working Landscapes, University of Nebraska-Lincoln, Lincoln, NE, Shana Sundstrom, and Tala Awada.

Craig Allen

Modern agricultural systems are fundamental for global food security and social stability and include both biological and social dimensions. Resilient agricultural systems are those that can continue to provide food, livelihood security, and important ecosystem services in the face of climate, economic, and other global changes currently threatening agricultural systems. We created a NSF-DISES funded North American Research Coordination Network that focuses on broad scientific questions of resilience in agricultural systems at multiple spatial and temporal scales. The goal is to improve our understanding of how modern agricultural practices and policies, in combination with external drivers like land use and climate change, impacts the vulnerability of agricultural systems to collapse or other undesired change. Historically, agricultural sciences have focused on scales from the molecular and plant to plot and field. Innovation in this space has led to increased efficiency in agricultural production at local scales, but it remains a challenge to scale up such knowledge to explain dynamics in soil, water, nutrients and biodiversity at larger spatial and temporal scales, or to account for complex interactions and feedbacks between the human and biological dimensions. An example of the relevance of such research comes from the Dust Bowl of the early 1900's, where feedbacks between a slow driver (prolonged drought) and unsustainable, over-zealous cultivation of grasslands reduced resilience such that the region experienced widespread collapse in both the environmental and human components of the system. It took decades and the investment of substantial resources to reverse the collapse, but experience in other types of complex systems has demonstrated that collapse can be irreversible. The Research Coordination Network utilizes four existing four formal agriculture research networks and informal networks in Mexico to create a 'network of networks' that uses existing data and resources to begin to address some of these large-scale, big-picture knowledge gaps. It builds a robust transdisciplinary and collaborative community that acts as a hub for conducting long-term, multi-scale research focused on resilient agricultural systems; drives theoretical and data science advances; and develops practical applications to understand, reduce, and mitigate the vulnerability of agricultural systems to collapse within and across multiple scales. These advances will contribute directly to food security and sustainable natural resources.

The Network for Integrated Resilience Agricultural Research (NIARR), established in 2022, is a US NSF-funded network-of-networks that spans North America and brings together scientists and partners from the Long-Term Agroecosystem Research network (USDA), the Canadian Agroecosystem Living Labs Network (AAFC), NSERC-funded ResNet (Canada), the international Resilience Alliance and researchers in Mexico. Its objectives are to transcend geopolitical, institutional, and disciplinary boundaries to develop critical collaborative priorities and facilitate shared learning between partners and across borders, and to co-generate and execute a research agenda focused on addressing agriculture resilience and vulnerability to regime shifts at multiple spatial and temporal scales within North America. The network is uniquely positioned to advance knowledge about the resilience of integrated agricultural systems beyond the plant/plot/field/farm scale and will address the coupled human and environmental components. It is novel in its creation of a network of networks that leverages the diverse domains of expertise, and scales of inference, of each network. The project also takes advantage of existing data collection programs by multiple U.S. agencies (e.g., NEON, ClimateHub), and provides the opportunity for the novel application of those data sets to research questions that will be significantly broader than the institutional mandate of each individual network. It is grounded in, and will directly contribute to, theory and research on resilience science and the application of resilience science to core questions regarding the resilience and sustainability of integrated agricultural systems. Because the network is unlike any other existing professional community, there is the opportunity to generate new paradigms that more adequately encompass the diversity and complexity of agriculture in North America. These insights will be crucial to provide an empirical basis for goals of food security in an increasingly uncertain and non-stationary time for human societies.

NIARR has recruited and brought together more than 100 scientists from these organizations. The positive and open collaborative space NIARR has created enables multiple broader impacts for each participating network. NIARR leverages the learning and innovations of the individual networks and diverse expertise of the participating scientists to address broad questions of resilience that would be difficult to accomplish within the confines of each individual institution. The research projects under development will also generate new learning to feed back into each institutions' site-based research. Projects under development include, among others: developing resilience indicators that go beyond a single scale, a single variable, and a single discipline; understanding the capacity of farmers to actually adopt and implement innovations and the relationship of that capacity to regime shifts, using North American case studies; and generating spatial boundaries relevant to agriculture that will allow extrapolation of site-based results to non-adjacent sites that are categorically and statistically 'similar' (including across geopolitical borders). Projects like these reflect the power of collaboration, co-management and shared discovery to advance knowledge beyond the plot/field/farm scales.

New Training for Wildland & Prescribed Burning

By: David Wedin, Assistant Director, Center for Grassland Studies; Professor, School of Natural Resources. Photos by: Ethan Freese

Nebraska's long 2022 fire season showed the risk of wildland fire is increasing across the Great Plains. At the same time the use of prescribed fire as a grassland management tool is increasing, with programs such as The Great Plains Grassland Initiative providing new funding to manage woody species encroachment of rangelands and prairies. Do our undergraduate students have the fire literacy and experience necessary to meet these challenges? To address this need, UNL's School of Natural Resources, the Nebraska Forest Service, and the Center for Grassland Studies recently began new fire-related programs with funding from IANR and the

Lienemann Charitable Foundation. Key to these programs is new staff member Wyatt Koehler, our *"Habitat Management and Prescribed Fire Education Coordinator".* Wyatt spent six years working with federal agencies in wildland fire before graduating from UNL with a Regional and Community Forestry degree in December 2022. He brings extensive experience with fire, federal NWCG training (National Wildfire Coordinating Group), and familiarity with habitat management (brush cutters, mowers, chainsaws, herbicides, etc).

In cooperation with the Nebraska Forest Service, we offer our students the 36-hour "Basic Red Card" training and certification. This is officially known as S-130/S-190 training, which qualifies the student as a Type 2 Wildland Firefighter upon completion of the fitness component (Pack Test). About 25 students, alumni, and staff participate in our training each year. We view this certification as an important resume builder for any student considering employment with federal or state land management agencies. The NWCG Red Card training emphasizes fire behavior, wildland fire safety, and the National Incident Command System. Although NWCG Red Card training does not focus on grassland prescribed fire, it is increasingly required by some agencies and conservation organizations, such as The Nature Conservancy, conducting prescribed fire. Maintaining a current Red Card requires annual recertification of the Pack Test and a brief refresher course, both of which Wyatt can provide at UNL.

We are also developing a new course and curriculum for prescribed fire. Our approach will integrate classroom sessions, participation in small, highly controlled teaching burns, and participation in larger prescribed burns led by UNL staff or cooperating agencies and groups. There is no single certification accepted by all agencies and groups indicating that someone is qualified to participate in or lead prescribed grassland fires in the Midwest and Great Plains. Our goal therefore is to have a prescribed fire education program that has regional name recognition for producing well qualified graduates.

The demand for prescribed fire personnel was obvious to Wyatt this spring as he sought out regional agencies and groups as partners for prescribed fire experience with our students. In our first spring (2023), Wyatt and 19 UNL students participated in prescribed fires on 31 management units totaling 5700 acres. These burns were led by UNL or cooperating agencies including Lincoln Parks & Recreation, Iowa DNR, Nebraska Game & Parks, Tri County Burn Association, and University of Nebraska – Omaha. That is an incredible start for our prescribed fire program, but much remains to be done coordinating curriculum and cooperative agreements with these partners.

Our UNL grassland properties, such as Nine-Mile Prairie and the Barta Brothers Ranch, play a key role in our fire education program. These properties provide opportunities for experiential learning by UNL students, and in turn our students and interns provide critical habitat management, including prescribed fire, on our UNL grasslands. This was our pitch in a successful $40,000 proposal to the Lienemann Charitable Fund. We reasoned that we have "deferred maintenance" needs at Nine-Mile Prairie caused by accelerating shrub encroachment and invasive species, but we also have "deferred training" needs for hands-on experience with habitat management and prescribed fire in our undergraduate program. Nine-Mile Prairie provides a unique local opportunity to address both needs. The 235-acre property has over 20 small teaching burn units (< 2 acres) with well-mowed fire breaks in addition to larger management units. Our goal is to burn at least a dozen of these small units per year with groups of 5 to 10 students, preparing them for participation in larger prescribed fires. About 15 of these small burn units are near the Nine-Mile Prairie entrance, where visitors can see different stages of fire recovery side by side.

UNL Obtains Gold Rating for Sustainability

By: David Wedin, Assistant Director, Center for Grassland Studies; Professor, School of Natural Resources
Photo by: Ethan Freese. Prairie Violets at Nine-Mile Prairie are a host plant for the endangered Regal Fritillary Butterfly.

Nine-Mile Prairie, which is managed by CGS, played an important role in UNL's recent submission to the Sustainability Tracking, Assessment and Rating System (STARS) managed by the Association for the Advancement of Sustainability in Higher Education (AASHE). In May 2023, it was announced that UNL had earned a gold standard from STARS.

The report discusses Nine-Mile Prairie and other UNL properties in its section on Biodiversity within the Grounds category. Nine-Mile Prairie is a 230-acre tall grass prairie on the northwest edge of Lincoln, NE owned by the University of Nebraska Foundation and managed by UNL's Center for Grassland Studies. It has been on the National Register of Historic Places since 1986 and has a Nebraska State Historical Marker recognizing its history of conservation and research since the 1920's. The STARS report noted that 10 threatened or endangered plants and insects are found at Nine-Mile Prairie.

In addition to Nine-Mile Prairie, grassland conservation, research, and management have been done at other UNL properties including: Barta Brothers Ranch, Gudmundsen Sandhills Laboratory, Dalbey Prairie, Cedar Point Biological Station, and Reller Prairie. These native and restored grassland acres total 23,000 acres, with the majority located in the Nebraska Sandhills. Forestry conservation and research occurs at UNL properties totaling 1140 acres managed by the Nebraska Forest Service including Prairie Pines, Cedar Canyon, Timmas Farm State Ecological Reserve, and Horning State Forest. All of these UNL sites have been the location of research studies on the ecology and management of particular plant or wildlife species. Methods vary for each study and species of concern. Nine-Mile Prairie has on-going surveys for prairie plant diversity, including plant inventories dating back to the late 1920's. The Barta Brothers Ranch also has replicated plots started in the late 1990's where plant species composition is recorded annually.

Rangeland Cup team takes 1st place

By Ashley Branting University of Nebraska-Lincoln Photo by: Jessica Windh

The 76th Annual Society for Range Management event held in Boise, Idaho turned out great for the UNL Rangeland Cup Team. We would like to congratulate them on bringing home the actual cup and taking first place. Pictured Erik Henry, Jacob VanDress, Caitlin Copenhaver.

We would also like to recognize the Plant team who took 6th place and the URME team who took 10th place. Congratulations to these amazing students and the hard work they put in this year to take home these awards.

Thanks to the faculty and staff mentors who helped our students prepare. Also thanks to the Agronomy and Horticulture, SNR, CASNR, and The Center for Grassland Studies for financially supporting these students.

Address Service Requested

Center for Grasslands 2023 Fall Seminar Series

By Ashley Branting University of Nebraska-Lincoln

The Center for Grassland Studies Fall Seminar Series features guest lecturers from on and off campus who speak on topics related to the Center's mission to enhance the efficiency, profitability, and sustainability of grasslands. Each series features a Frank and Margaret Leu Distinguished Lecturer, a person who is nationally recognized for their expertise in grassland management. Speakers will present Monday's at 3pm-4pm in Keim Hall room 150. List of speakers and dates they will be speaking:

August 28– **Troy Gilmore,** *How groundwater feeds the unique and steady streams in the Nebraska Sandhills.*
September 11– **TJ Walker,** *Grassland Conservation in Nebraska*
September 18– **Nic McMillian,** *A plea for scale, and why it matters for invasive species management, biodiversity, and conservation.*
September 25– **Gwendwr Meredith,** *Social-Ecological Rangeland*
October 2– <u>Leu Speaker</u> **Alexander Smart,** *Protecting and Sustaining South Dakota Grasslands*
October 9– **Dan Uden,** *Resilience Spatial Scientist and Grasslands*
October 23– **Craig Allen,** *Introducing Network of Integrated Agricultural Resilience Research*
October 30– **Brian Teeter,** *Prescribed fire and grassland conservation*
November 6– **Jay Parsons,** *Ranch and rangeland production systems*
November 13– **Neal Feeken,** *Central Grasslands Roadmap. A collaborative model toward conservation at scale.*
November 27– **Andrew Little,** *An Ever-Changing Landscape: How Do We Find the Balance Between Production Ag and Conservation in the 21st Century?*
December 4– **Julie Bain,** *Keeping the Grasslands Grass*