
FIELD UPDATES FROM THE BARTA BROTHERS RANCH

2023



Newsletter Introduction

Greetings from the Barta Brothers Ranch (BBR). My name is Jacob Harvey. I serve as the Research Project Coordinator for BBR. My wife, Sydnie, and I live on site with our dog, Camper. We moved to the ranch this last January.

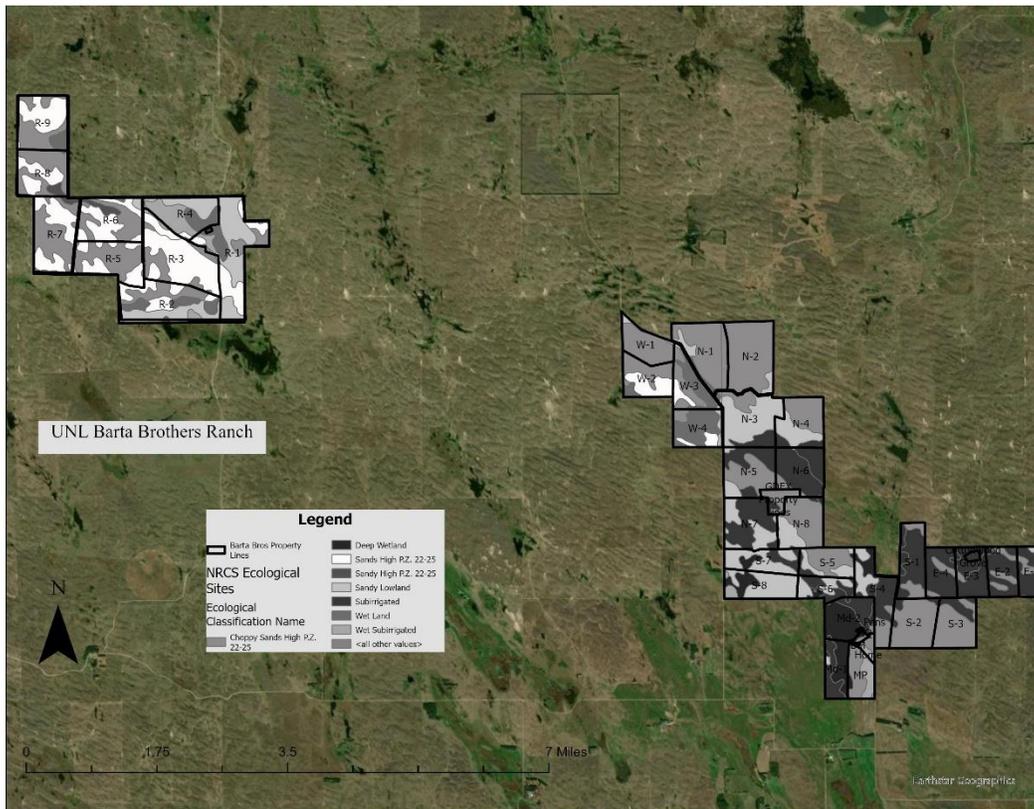
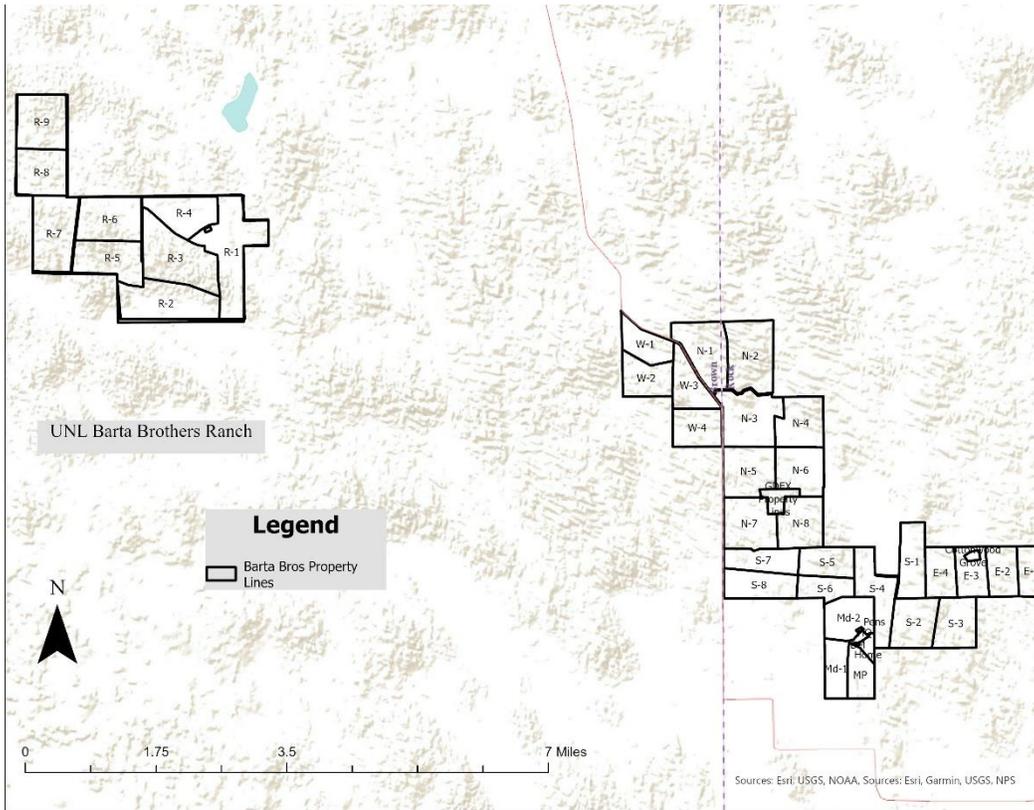
As winter begins, I wanted to start an annual newsletter showing the involvement of a wide variety of research and events that can be done out in the Nebraska Sandhills. I appreciate all the contributions from the researchers to help put this newsletter together. For those interested in learning more about this research or wanting to discuss opportunities for future projects, please feel free to contact me at jharvey27@unl.edu.

By Jacob Harvey

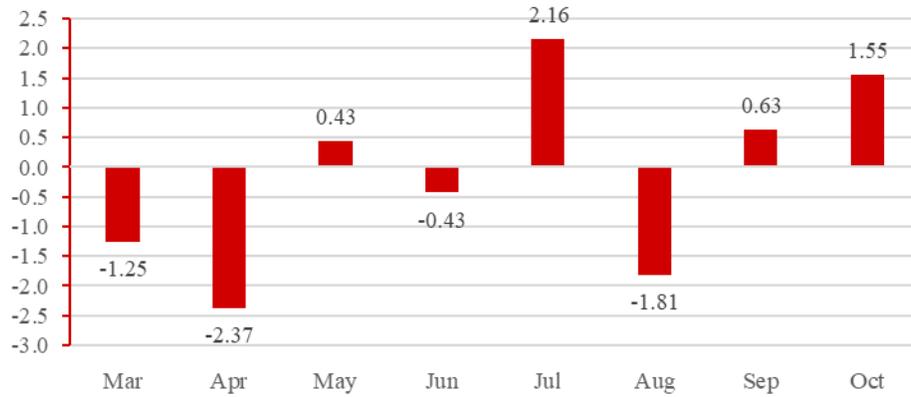


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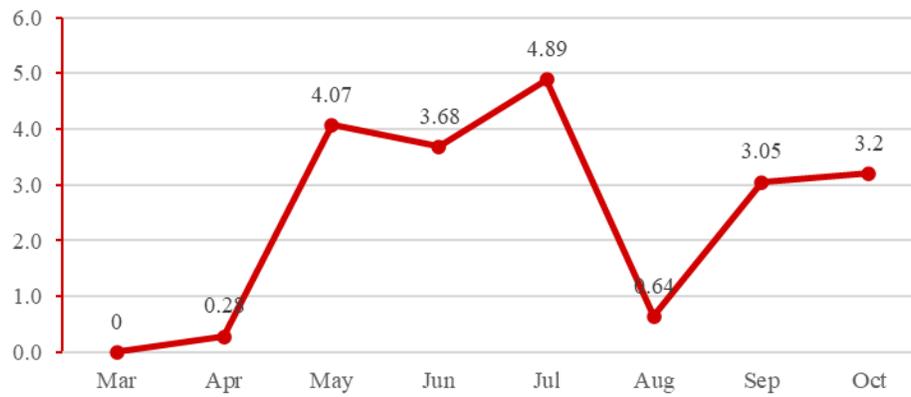
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Precipitation Differences from Historic Averages
Barta Brothers Ranch
Growing Season 2023



Precipitation Totals
Barta Brothers Ranch
Growing Season 2023



Graduate Student Summer: Catherine Chan

Catherine Chan is a fourth year Ph.D. student in the School of Natural Resources under the advisement of Drs. John Gamon and Daniel Uden. Her project uses remote sensing data to characterize biodiversity and functional types of grassland vegetation in response to topography and microclimate of the Nebraska Sandhills. The remote sensing data consist of hyperspectral imagery (narrowly resolved bands, approximately 160, along a continuous spectrum) acquired by an airplane. To infer information on objects in the remote sensing images, ground validation is needed.

Catherine has sampled historic transects in the Barta Brothers Ranch pastures throughout mid-August into September. These historic transects are set up by dune complexes, where each complex has a transect along the dune top, north-facing slope, south-facing slope, and interdune. 1-m² quadrats were sampled every 5 meters along each 50-m transect. 2 dune complexes for pastures N2 through N8 were sampled, except N7 where 4 were sampled, providing a total of 16 dune complexes. Microclimate variables were also sampled at each complex using Kestrel data loggers. Four loggers were set up on each transect where relative humidity, temperature, and wind speed were collected every 30 seconds for 5 hours between 8:30 AM and 3:00 PM.

By Catherine Chan, Ph.D. student in SNR



Graduate Student Summer: Nolan Sipe

Nolan Sipe is an M.S. student in the School of Natural Resources under the advisement of Dr. Craig Allen. His research is centered in the Collaborative Adaptive Management (CAM) project, which aims to address key uncertainties related to grassland management. This is the second year of the CAM project using alternative prescribe fire and grazing practices at the Barta Brothers Ranch. He has continued his work this summer to understand the impacts that these practices have on the Sandhills plant communities' diversity and structural heterogeneity as well as the impacts on the grassland avian communities. The plants communities were surveyed in plots scattered throughout the pastures, where plants were identified to the species level structural and measurements such as vegetation height, density, and cover were taken. Points counts were conducted across the ranch where bird species seen and heard were recorded to give insight into any changes in their community.

These alternative fire and grazing practices are designed to push the rangelands and see what might be possible. To ensure that no harm is being done and to inform future decision making, he has also been monitoring soil condition in the burned pastures. Before and after soil samples were taken to catch any change in the chemical composition of the soil. Soil movement is being monitored by measuring the soil erosion/deposition at set points in the pasture.

By Nolan Sipe, M.S. student in SNR



Second-Year Burn in CAM Project

Prescribed fire is an important tool to 1) help reduce woody encroachment at the ranch and 2) provide opportunities to increase heterogeneity and high-quality forage for livestock. As part of ongoing research, we are exploring the use of prescribed fire and grazing as tools to manage for multiple for multiple rangeland objectives. Following last year's burn in N5 by researchers in the collaborative adaptive management (CAM) group, a burn took place in pastures N6 and N4. While it was outside of the CAM borders, N4 served as a good comparison as grazing was deferred until mid-September.

Because of a late winter with heavy snowfall that melted and followed by red flag warnings in March and April, this year's burn was pushed back to mid-May. The burn boss for the day was Chad Bladow with the Nature Conservancy (TNC). Bladow and his crew came down from the Niobrara Valley Preserve with engines and UTVs. Another TNC engine came up from the Platte River Prairies. Nebraska Game and Parks were also represented at this burn, alongside UNL researchers.

A test fire was lit in the northeast corner of N4 at 1:30 PM, and the burn was underway. Routine weather checks rolled in as the two flanks made their way around the first burn unit. A slow and steady effort made for an overall safe day with zero spillovers from either burn unit. Weather changes due to an incoming front significantly reduced fire behavior in N6 in the evening and coupled with a good green up, around only 50% of the planned burn unit was done.

Looking towards next year's burn, N8 is the next target, alongside its own set of challenges due to topography and redcedar encroachment. A mow line has already been prepped by UNL's Ryan Benjamin and Kate Zander.

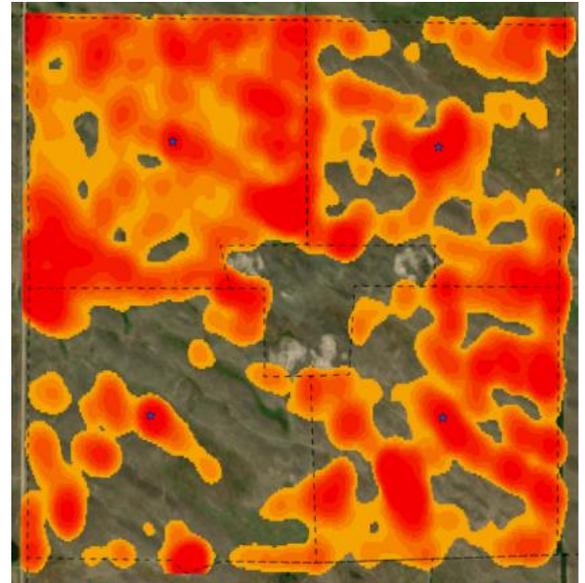
By Jacob Harvey



Livestock GPS Tracking in CAM Project

GPS tracking collars help researchers better understand how prescribed fire influences grazing distribution across the study pastures. These collars take GPS fixes every 10 minutes from late-May to mid-September. The high density heat map area in the top left section of the map was the burn unit in 2022. Cattle spent 1.5 to 2 times more time grazing in this unit compared to the unburned areas in 2022.

By Mitch Stephenson, Ph.D., Associate Professor of Range and Forage Sciences, Associate Director of the Panhandle Research, Extension, and Education Center (PREEC)

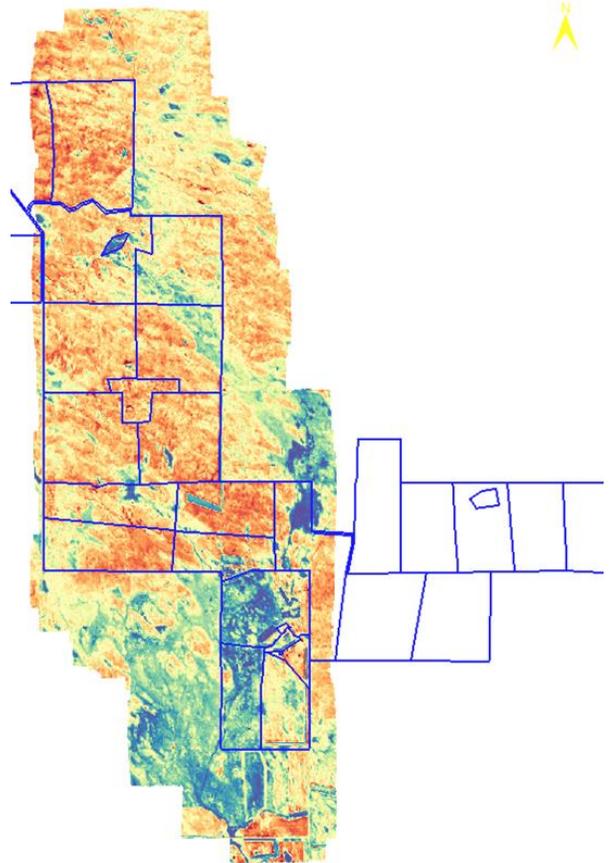
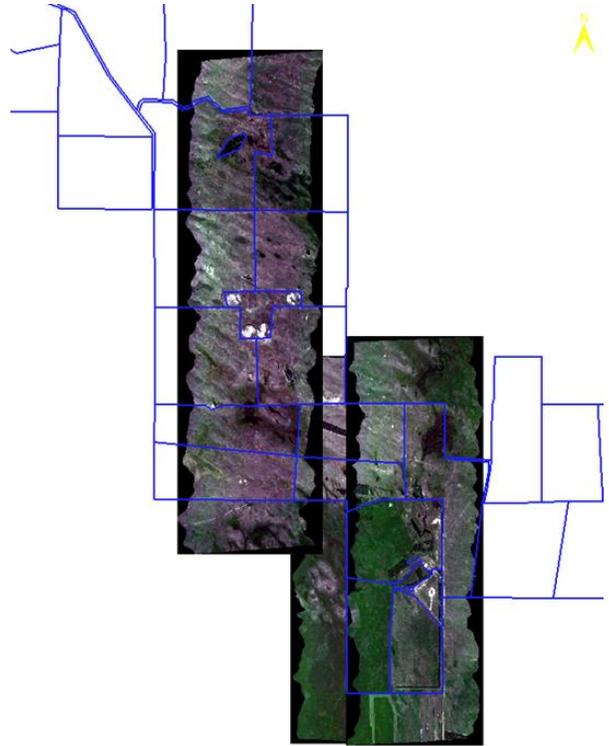


CALMIT Flight over BBR

In collaboration with Aaron Schepers from Cornerstone Mapping, a team of UNL researchers from the Center for Advanced Land Management Information Technologies (CALMIT) collected airborne data over Barta Brothers Ranch on July 23, 2023. This complements a similar dataset collected in July 2022. While the airplane passed overhead and used hyperspectral (top right) and thermal (bottom right) sensors to collect information on vegetation responses to fire and grazing treatments across ranch pastures, a ground crew set up calibration tarps and collected reference data under low reflectance (black tarp), medium reflectance (silver tarp), and high reflectance (white tarp) conditions (Page 9, Top). It takes a team of at least four to set up the tarps and take measurements, especially under windy conditions (Page 9, Bottom).

The airborne data provides an unparalleled view of Barta Brothers pastures from across the electromagnetic spectrum. Within the context of Catherine Chan's Ph.D. research, this data will be used in coordination with vegetation field surveys and satellite imagery to compare the outcomes of management treatments (deferred rotational grazing vs. fire and grazing), differentiate and map plant communities (cool-season and warm-season grasses), and understand and map the diversity of Sandhills ecosystems.

By Dan Uden, Ph.D., Assistant Professor,
Resilience Spatial Scientist in the School of Natural Resources (SNR)



CALMIT Flight over BBR (Continued)



Collaborative Adaptive Management (CAM) Field Day

The second year of the collaborative adaptive management (CAM) project at the Barta Brothers Ranch (BBR) continues to reach important milestones. In addition to completing and analyzing year 1 and 2 of data collection and informally publishing results from year 1 of the research, the CAM Project was featured at an open house event held at the BBR on July 25th. Stakeholders from the CAM project, area ranchers, and land managers from the region were invited to learn about study results and view the patch/burn grazing experiment directly. The continuity between stakeholder-driven approaches and monitoring of results is foundational to structured decision making and learning on the ranch. The meetings also provided real-time feedback about the University's work in the region, acting a conduit to continue leveraging resources at the ranch for enhancing ranch productivity from both economic and environmental perspectives. The second year of the CAM project will formally conclude with a meeting of project stakeholders in late October.

To learn more about the preliminary results from the CAM Project at BBR, please visit: <https://centerforresilience.unl.edu/pdfs/CAMReport.pdf>

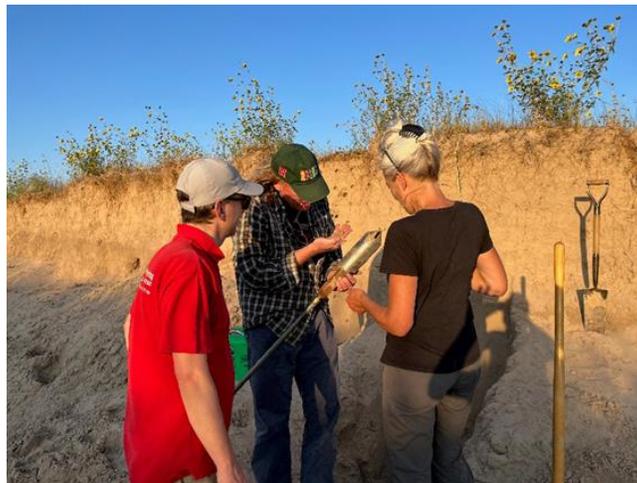
By Kyle Martens, Program Coordinator II in the Center for Resilience in Agricultural Landscapes (CRAWL)



International Team Seeks Breakthroughs in Understanding Prehistoric Changes to the Nebraska Sand Hills

The Conservation and Survey Division (CSD) at the University of Nebraska-Lincoln hosted visiting scientists from two prestigious European universities in August and September as part of a long-term research collaboration. The team worked at UNL's Barta Brothers and Gudmundsen Sand Hills ranches and included Prof Paul Hanson (CSD, UNL), Dr Sebastian Kreutzer and Dr Annette Kadereit (both Institute of Geography, Heidelberg University, Germany), and Dr Christoph Schmidt (Institute of Earth Surface Dynamics, University of Lausanne, Switzerland). The research team is studying prehistoric blowouts in the dunes using optically-stimulated luminescence (OSL) dating, a technique which estimates the last time sand grains were exposed to sunlight. In addition to dating these features with quartz, a mineral commonly used in OSL dating, the team will develop a method to date the deposits using OSL on the mineral zircon. Zircons are more challenging to work with, but they may provide improved precision for these relatively young blowouts. The team's results will shed new light on recent landscape changes and the evolution of Nebraska's unique Sand Hills, the largest dune field in the Western Hemisphere.

By Paul Hanson, Ph.D., Quaternary Geologist, Director, Great Plains Cooperative Ecosystems Study Unit (GPCESU)



American Burying Beetle Research Returns to BBR

The American burying beetle (*Nicrophorus americanus*) is a critically endangered species of carrion beetle. Scattered populations are found in eastern Oklahoma, Texas, Kansas, and parts of Arkansas as well as the Nebraska Sandhills and southern South Dakota. As part of the monitoring programs for this species, Nebraska Game and Parks Commission (NGPC) conducts annual surveys throughout the Sandhills.

Shaun Dunn with NGPC visited BBR in early August to assist with conducting a survey at Barta Brothers Ranch. Historic trap locations were done on the property and in the right-of-way. Starting this year, additional locations were spread throughout the rest of the property with a total of 13 traps deployed during the survey period.

Trap design is simple: a 5-gallon bucket buried with bait. Beetles crawl along the ground towards the scent of the bait and fall into the bucket. A lid covers the bucket so cattle and other larger animals cannot disturb the trap. During daily checks, counts of all carrion beetles, regardless of species are taken. Estimation of sex and age class are taken from any American burying beetles found and marks are given to allow for an understanding of population size and potential recaptures.

By repeating annual surveys, the data from BBR can bolster statewide surveys and give insights to population trends of this endangered species.

By Jacob Harvey

