



Center for Grassland Studies

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Photo: C. Chandler

Grassland Systems | PGA Golf Management | Beef Systems Initiative

March 2022

New Course: Research Experiences in Grasslands by

Dan Uden, Assistant Professor, School of Natural Resources / Agronomy and Horticulture Department / Center for Resilience in Agricultural Working Landscapes, University of Nebraska-Lincoln, Lincoln, NE



Dan Uden

Worldwide, grasslands provide us with numerous essential goods and services — livestock forage, wildlife habitat, recreation, and much more. At the same time, the world's grasslands are under increasing pressure on multiple fronts. Keeping grassland landscapes healthy and resilient, and in many cases, restoring their health and resilience, will require, among other things, sustained commitment to the science of understanding them and the challenges they face. Effective grassland science, and science in general, requires proficiency in both hard skills (e.g., data analysis) and soft skills (e.g., time management).

Research Experiences in Grasslands is a brand-new undergraduate-level course currently under development at the Center for Grassland Studies. This course will equip future generations of students to engage with and incorporate grassland research in their careers, whether that means consulting with and understanding current and prior research or leading their own. The housing of this course within the Center for Grassland Studies will make it visible and accessible to students across campus

with interests not only in grasslands, but science in general, while simultaneously leveraging the University of Nebraska-Lincoln's wealth of faculty and staff expertise in grasslands research, education, extension, and outreach. Within the Grassland Systems major, the course will complement the existing internship program offered through the Grazing Livestock Systems Option by providing students in the Grassland Ecology and Management Option with a similar professional, research-based experience. In a tiered design, students will ideally be able to enroll for one, two, or three credits, with accompanying levels of involvement and commitment ranging from engagement with research fundamentals to development of a professional presentation or peer-reviewed paper. Regardless of enrollment level, students will complete a series of modules that interweave hard and soft skills for maximized research impact. The course's team of instructors from the Department of Agronomy and Horticulture, School of Natural Resources, Center for Grassland Studies, and Center for Resilience in Agricultural Working Landscapes will connect students to cutting-edge grassland-focused research opportunities in Nebraska and beyond, according to their individual goals and interests. **(Continued on Page 4)**

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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.

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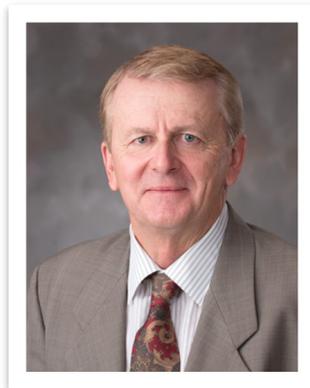
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Director's Column

by Jerry Volesky, Interim Director, Center for
Grassland Studies, Lincoln, NE / Range and Forage Specialist, Nebraska Extension / Interim
Associate Director, WREC, North Platte, NE



Since assuming the role as interim director in January, it has been enlightening to learn more about the diverse activities and operations of the Center for Grassland Studies (CGS). The CGS has worked hard to increase its value as a source of information in grassland ecology and management for our audience of practitioners, advisors, scientists, educators, students, and enthusiasts.

The CGS, along with the Center for Resilience for Agricultural Working Landscapes (CRAWL), is continuing its active role with the Nebraska Integrated

Beef Systems (NIBS) group. This has included follow up discussions from the 2021 fall workshop and meetings with the NIBS Faculty Advisory Committee.

The CGS is also taking the lead with CRAWL to implement a collaborative adaptive management project at the University of Nebraska-Lincoln's Barta Brothers Ranch. Stakeholders have been integrally involved in the process and management treatments have been selected. The project is set to begin later this spring.

Planning is underway for several summer educational programs and events. The first is the Nebraska Ranch Practicum, June 6—9. This a multi-disciplinary, hands-on educational program designed to give participants the skills and education needed to succeed in today's ranching industry. Go to Page 5 for more information.

The second is the Nebraska Range Short Course, June 20—23, is designed to provide people with a variety of backgrounds to increase their knowledge and capacity in the field of range management. See Page 5 for more information on this event.

The last is the 22nd Annual Nebraska Grazing Conference, August 9—10. 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.

During my career in rangeland research and extension, one important topic that has periodically come up is drought. The resulting questions are what are the effects of drought on our grasslands and how do we best manage through a drought? The relatively dry summer and fall of 2021 and winter 2022 across much of the state of Nebraska has prompted concern of drought this spring. The US Drought Monitor for early-March shows nearly all of Nebraska at either the moderate or severe drought category. While we always hope for the perfect amount of rain for the growing season, being proactive with a drought plan that is customized to fit the specific needs of your operation can reduce the impact of potential drought.

If you would prefer to receive an electronic copy of this newsletter instead of a print copy, please let us know by emailing mmckendree14@unl.edu. Thank you.

Educational Trunk to Focus on Grasslands

by Cheryl Dunn, Research Manager / Herbarium Curator, Agronomy and Horticulture, University of Nebraska-Lincoln, Lincoln, NE



Cheryl Dunn

The Center for Grassland Studies (CGS) is funding the development of educational trunks that will promote Nebraska grasslands within communities and schools across Nebraska. This endeavor was initiated by **Walt Schacht**, former interim director for the CGS, to increase community engagement and promote knowledge and enjoyment of grasslands.

The first trunk, scheduled for completion at the end of this summer, will focus on why grasslands are important and why people should care about them. Geared toward high school students, the trunk will explore root and soil development and how carbon is sequestered in our grasslands. Students will develop critical thinking skills while allowing for discovery, imagination, and curiosity. The material will include real-world data for students to manipulate along with root and soil monoliths.

Angie Petersen, an instructor at North Platte High School, has been hired to assist with the development of the trunks. Angie holds a Master's in Education and an adjunct professorship at Mid-Plains Community College, which sets this endeavor up for a high degree of success. She is uniquely positioned to engage young people while satisfying the Nebraska Agriculture and Science Standards so teachers can easily add these lesson plans to their curriculum.

Educational trunks are not a new idea. The Nebraska Game and Parks Commission currently has nine popular trunks that address topics from mammals to insects to aquatic ecology. To see a complete topic list, go to <http://outdoornebraska.gov/wildlifeeducationtrunks/>. Each trunk provides resources in the form of hands-on materials and lesson plans that engage a broad audience to learn more deeply about the subject matter. Teachers, scout leaders, and others may check out the trunks to enrich learning.

The Center for Grassland Studies is grateful for the guidance received from **Lindsay Rogers**, administrator, Fish and Wildlife Education Division, Nebraska Game and Parks Commission, in the development of the project and is excited to partner with them in promoting its trunks alongside theirs.

Form a Team and Grab Your Clubs

by Scott Holly, PGA, PGA Golf Management Internship Coordinator, University of Nebraska-Lincoln, Lincoln, NE

The PGA Golf Management Program at the University of Nebraska-Lincoln is gearing up for its annual four-person Spring Scramble on April 25 at Wilderness Ridge Country Club, Lincoln, NE.

Those persons interested in having a great day of golf and laughs are encouraged to form teams and register at www.golfgenius.com/pages/8217072423124647835.

Questions? Please contact staff at unlpgascramble@gmail.com

We look forward to seeing you at the event!

SPRING SCRAMBLE
APRIL 25TH, 2022

HOSTED BY:
PGA Golf Management
WILDERNESS RIDGE

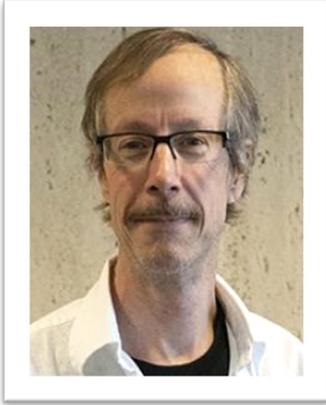
\$400 PER TEAM

SCAN TO SIGN UP!

UNLPGASCRAMBLE@GMAIL.COM

Collaborative Adaptive Management for the Barta Brothers Ranch

by Craig Allen, Director, Center for Resilience in Agricultural Working Landscapes, University of Nebraska-Lincoln, Lincoln, NE



Craig Allen

The Sandhills cover 25% of Nebraska. This region is unique and economically important as one of the Earth's largest remaining intact grasslands. However, Sandhills grasslands are threatened by numerous stressors and are considered by many to be “fragile”. Despite careful management approaches, Nebraska grasslands and other grasslands in the north-central Great Plains are declining in quantity and quality. Acres are lost to development, conversion to cropland, and woody encroachment; quality and productivity are degraded by invasive species; and practices that reduce soil health, effective precipitation, and grassland diversity.

Managers and producers implement a variety of approaches to prevent, reverse, or mitigate the effects of these stresses. However, it is often unclear which management approach is most appropriate at a given time and what the economic and/or environmental outcomes of different approaches will be. Many management strategies often reduce variability and diversity (e.g., managing for a single ecosystem service such as forage production). Over time this may reduce grassland diversity — and resilience. Although grassland managers are free to experiment with alternative management approaches, ***doing so on their own properties can be economically and/or environmentally risky.***

Conducting landowner-designed management experiments in a Collaborative Adaptive Management (CAM) framework at Barta Brothers Ranch (BBR) provides stakeholders with opportunities for addressing key questions related to alternative management approaches in a manner that minimizes risk. We explicitly aim to engage ranchers in association with other grassland managers and advisors (e.g., state and federal agencies, NGOs), while enhancing learning within the ranching community. Bringing together stakeholders provides opportunities to build relationships and learn in a way that could not be accomplished by individual stakeholders or researchers.

The mission of BBR is to serve as a ‘model ranch’ and innovation center that integrates range management, prairie forestry, wildlife management, and conservation, with a focus on Sandhills communities and their education. This holistic approach to management and education considers a diversity of ecosystem services — making BBR an ideal location for CAM implementation. In a collaborative we are developing a framework focused on identifying management objectives and assessing results that allows high-risk management experiments on safe-to-fail public (University) lands, keeping adjacent ranches as controls or locations for less ‘risky’ experiments. Experiments will focus on implementation of prescribed fire in a patchwork manner as well as grazing intensity. Ecosystem services and disservices will be monitored through variables such as aboveground plant composition and production, bird abundance and composition, soil properties including soil carbon, and beef cattle performance, among others. Economic analyses will provide an additional, more traditional, assessment of tradeoffs as well.

Research Experiences in Grasslands (Continued from Page 1)

The idea of *Research Experiences in Grasslands* initially emerged from conversations between **Cheryl Dunn**, research manager/herbarium curator, Agronomy and Horticulture Department, University of Nebraska-Lincoln, and **Walt Schacht**, former interim director of the Center for Grassland Studies. In Summer 2021, I joined Cheryl in officially initiating development of the course, and around the same time, the Center for Grassland Studies generously committed financial support for accelerating that development. In January 2022, **Katharine Hogan** — Ph.D. candidate in UNL’s School of Natural Resources — was hired for a six-month term as a graduate research assistant with the tasks of course design and content development. Katharine brings a rich background in grassland research to this position, with emphasis in grassland restoration, and Cheryl and I continue to be impressed by her progress. We look forward to offering the course by Fall 2023.

Nebraska Range Short Course: June 20 — 23

The Nebraska Range Short Course is designed to provide people who have backgrounds in range management, natural resources, or agriculture an opportunity to increase their knowledge and capacity in the field of range management. The course consists of a series of classroom and field sessions focusing on principles of range management for efficient, sustainable use of rangeland for multiple purposes.

Plant identification, rangeland soils, range inventory and monitoring methods, prescribed burning, rangeland restoration, ecosystem services, wildlife management are some of the topics covered in the course.



Credit is available through the University of Nebraska-Lincoln or Chadron State College. Sixteen continuing education credits are available for the Society for Range Management Certified Professional in Rangeland Management program.

The application deadline is May 15 and limited to the first 25 registrants. The course fee includes educational materials, transportation associated with field trips, and breaks (breakfast and dinner are not provided). Food and lodging can be arranged with Chadron State College.

To learn more, go to <https://agronomy.unl.edu/nebraskarangeshortcourse> or contact **Jerry Volesky** at (308) 696-6710 or jerry.volesky@unl.edu

Registration Opens for 2022 Nebraska Ranch Practicum

by Troy Walz, Nebraska Extension Educator, University of Nebraska, Broken Bow, NE



Photo credit: Troy Walz

Ranchers interested in learning about the latest cutting-edge research in range livestock production from the University of Nebraska–Lincoln are encouraged to register for the 2022 Nebraska Ranch Practicum offered by Nebraska Extension.

The practicum will be held during eight sessions over the course of three seasons in order to cover the production cycle of livestock and forage resources. Participants will have the opportunity to learn about a variety of topics, including the effective use of decision support tools to evaluate management and marketing alternatives, plant identification, range condition and grazing strategies, wildlife management, evaluation of cow body condition scores, and beef cattle production systems.

The practicum will be held June 6 and 7, July 7, September 7 and 8, and November 3, 2022; and January 10 and 11, 2023. Classroom activities will open and close the practicum in North Platte with the remainder of the classes conducted at the University of Nebraska's Gudmundsen Sandhills Laboratory, a working ranch with education and research facilities, near Whitman.

The registration fee is \$675. The fee for a spouse is an additional \$350. Registration covers educational materials, noon meals, and breaks. Participants are responsible for travel and lodging expenses. The practicum can count for college or continuing education credit. To register, submit a completed application and registration fee by May 3. Applications will not be accepted after that date. Enrollment is limited to 35 participants. Applicants will be notified of their status no later than May 20. Refunds will be issued if space is not available.

To learn more or register, visit <https://nebraskaranchpracticum.unl.edu/> or contact **Troy Walz** at 308-872-6831 or roy.walz@unl.edu.

Nebraska Sandhills Rates as World's Most Intact Prairie

by Scott Schrage, Science Writer/Editor, University Communication, University of Nebraska-Lincoln, Lincoln, NE

To speak with the University of Nebraska–Lincoln's **Dirac Twidwell** is to hear the sentiment emerge as a sort of mantra. The reasons preceding the statement, and behind the sentiment, are legion. Protecting signature species from extinction. Maintaining the quality of air and aquifers. Mitigating wildfires and floods. Preserving cultures and livelihoods that echo across generations.



Dirac Twidwell, professor of agronomy and horticulture. Photo credit: G. Nathan

It's for those reasons that the associate professor of agronomy and horticulture has spent years researching and combating the decline of grasslands, especially the one just a few hundred miles to his northwest: the Nebraska Sandhills. That distance, as relatively short as it is, represents the gulf between what Nebraska is and what it was even a few hundred years ago.

What it was, what the Sandhills remain, is what an ecologist would call a temperate grassland: a mostly treeless, grass- and wildflower-covered region that grounds the surrounding ecology and culture. Or, as Twidwell would describe it, one of the last "true prairies." Researchers have known for a while that many grasslands, whether temperate or tropical or desert, are shrinking in size or outright disappearing from the planet. But few had tried to quantify the full extent of that disappearance, or the extent to which certain grasslands have resisted it.

"There has not been a complete focus on grassland systems or rangeland systems," said **Rheinhardt Scholtz**, a colleague of Twidwell's and postdoctoral associate of Nebraska. "Grasslands get lumped together in a soup bowl with other vegetation types, and most of the focus goes to the 'charismatic' biomes — like tropical rainforests, for instance. "Grasslands are, in fact, the least protected and most under threat. We reiterate that all the time — but the situation continues to get worse over time."

In a new study appearing in the journal *Conservation Science and Practice*, the researchers found that, of all the temperate grasslands in all the countries in all the world, the Nebraska Sandhills are the most intact. In fact, the duo's study revealed that the Sandhills are among just seven large-scale grasslands of any type that remain mostly intact. Another resides in the Wyoming Basin, with two others in Asia and one each in Africa, South America and Australia. But even among that select company, the Sandhills stand apart in two regards. For one, they reside next to the third-most converted grassland region in the world — one that includes central and eastern Nebraska, which has been extensively cultivated for agricultural production over the past 150 years. Despite that, Twidwell said, the Sandhills are also the only major intact grassland currently without a formal conservation strategy.

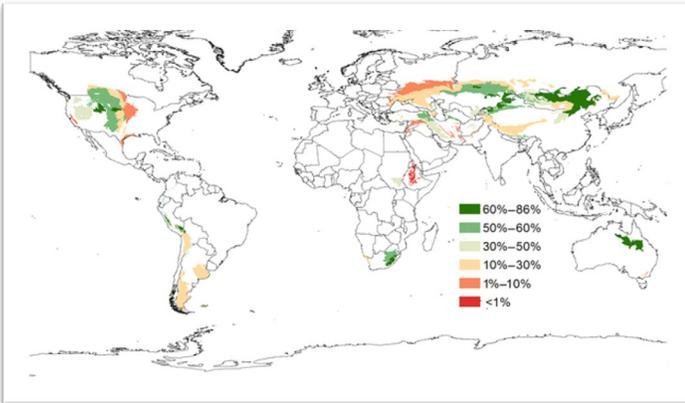
Grasslands play host to animal species and migrations found nowhere else on Earth. The eastern edge of the Sandhills serves as the annual pit stop for the aptly named sandhill crane, roughly 500,000 of which arrive between late winter and early spring to rest and refuel en masse before continuing their northerly migration. The Wyoming Basin houses the largest population of pronghorn, which boasts both the greatest speed and longest land migration of any mammal in North America.

The decline of grasslands is endangering livelihoods and cultural legacies, too. Raising livestock remains the economic and cultural backbone of the Sandhills and other grassland regions whose soils cannot easily sustain agriculture. The nomadic culture that arose around herding sheep and cattle in the Mongolian-Manchurian grasslands, for instance, dates back several thousand years. In South America's Central Andean wet puna, which sits more than 2 miles above sea level, grazing and agriculture still incorporate certain practices developed by the Incas.

To better understand the status of landscapes so tied to the past, Twidwell and Scholtz turned to the very pinnacle of modern-day technology: satellites operated by NASA and the European Space Agency. The former provided images of Earth's surface from 2001 and 2019. The latter offered land-cover imagery only from 2019, but at a higher spatial resolution, with each pixel representing tracts of land just 1/16 of a mile tall and wide. Combined, those resources presented a reasonably detailed then-and-now perspective on how grasslands have changed across the first two decades of the 21st century. **(Continued on Page 7)**

Sandhills Prairie (Continued from Page 6)

They did so, in part, by allowing the researchers to calculate two metrics that tend to say a lot about the resilience and long-term prospects of a grassland region. One is intactness, which Scholtz explained by pulling up a three-by-three grid of pixels resembling the connected squares of a chessboard. To evaluate intactness, the researchers directed a program to pick a pixel, then analyze it and the eight pixels that bordered it. If any of those pixels were not predominated by grassland, the nine-pixel area was not considered intact.



D. Twidwell and R. Scholtz, Conservation Science and Practice

A map illustrating the intactness of global grasslands, according to satellite data from the European Space Agency.

and enjoyed by native wildlife. That encroachment threatens the livelihoods of ranchers and the survival of native species while introducing no real ecological, environmental or economic value of its own. Because more than 90% of the region is privately owned, Twidwell and various partners, including the nonprofit Sandhills Task Force, have appealed to those landowners for help in mitigating the spread of eastern redcedar.

The early returns on those efforts also speak to the importance of the latest analysis, Twidwell said. Many prior studies have presumed that private ownership, especially the presence of domesticated livestock such as cattle or sheep, automatically puts a grassland region at greater risk and lowers its conservation value. The high intactness of Sandhills vegetation, and the extent to which landowners understand that sustainable ranching depends on avoiding the overgrazing of native grasses, challenge that presumption.

“They’re all losing ground to woody plants,” Twidwell said. “We are going to lose those regions if we don’t halt that expansion. “The evidence shows that we are not doing a good enough job conserving North America’s grasslands. We have to re-evaluate our conservation mindset if we are actually going to prove that we can conserve this biome within a private-lands ideology.”

“The pace of collapse is far outpacing our strategy, our management,” he said. “Nobody has successfully proposed a plan to halt the collapse of this biome — which means that, at best, we will have some large, intact regions left, but at worst, we may have only some islands remaining, just a semblance of the Sandhills and other grassland regions. And that’s the story of grasslands throughout the world.

“The question becomes: Do we recognize why big, intact grasslands are valuable, what they provide, the culture that thrives with it? And are we going to finally start doing something to conserve their legacy? The Nebraska Sandhills represent one of the best chances in the world to do that.”

To read the full story, go to <https://news.unl.edu/newsrooms/today/article/nebraska-sandhills-rated-as-world-s-most-intact-prairie/>.

By running that analysis on every pixel in a grassland region, the duo was able to calculate the percentage of the given region that remained intact. Of the 70 grassland regions analyzed, 47 are less intact than they were two decades ago.

Scholtz and Twidwell also identified the largest area for which every grass-covered pixel was connected to at least one other such pixel. Dividing that area by the overall size of a grassland then gave the researchers what’s known as the largest-patch index. That index essentially measures how much of a grassland consists of an unbroken core as opposed to isolated patches. By that metric, 95.66% of the Sandhills is connected, with just 4.34% separated from that core.

The gravest immediate threat to that resilience in the Sandhills is the encroachment of woody plants, especially the eastern redcedar tree, which is displacing grasslands grazed by livestock



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Nebraska Youth Range Camp

June 6 — 9

Nebraska College of Technical Agriculture
Curtis, NE

Youth ages 14 to 18 will experience hands-on activities related to rangeland management, conservation, ecology, animal science, and wildlife during the 58th Annual Nebraska Youth Range Camp. University, college, and agency professionals facilitate field activities, lectures, leadership/team-building

exercises, and field trips to local working ranches to illustrate management activities and goals.

Through the generous donation of sponsors, approximately 50 youth from across the state receive a discounted rate to attend the event which promotes education, leadership skill development, and interaction with other students with similar interests. Individuals and organizations are encouraged to become a sponsor of the Nebraska Youth Range Camp to support student participation. **Sponsors responding prior to May 1 will have their brand appear on event t-shirts.**

Online applications are available at nesrm.org and due by May 20. A \$75 registration fee is due by May 27. Youth are encouraged to contact their FFA advisor or 4-H Club leader for possible scholarships, as well as local Natural Resources Districts office managers regarding sponsorships.

For more information, contact **Blair Hartman** at blairhartman.ne@gmail.com.