

Economics of Scaling Up Brush Management

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ABSTRACT – Brush management treatments underpin grassland conservation programs and represent one of the most expensive conservation practices in US rangelands. Despite decades of past brush management expenditures, the Great Plains grassland biome of North America continues to lose ground to woody plant encroachment. Given the lack of progress in this effort despite tremendous financial investment, we ask; what is the economic cost of scaling-up brush management strategies? In this paper, we introduce a logic exercise to answer this question. We scale-up the costs of mechanically removing Eastern redcedar (*Juniperus virginiana* L.), which has been the prevailing strategy used for control of this encroaching woody species, to other control methods (prescribed fire, hand removal, and mulching) that target earlier stages of the woody encroachment process. Our results show the economic cost of mechanical brush management quickly exceeds the capabilities of conservation programs as the extent of area to be treated increases. Scaling-up mechanical removal would cost between \$30–\$200 million over a 200,000-hectare area with medium to large-sized woody plants, 15 to 50 times more than other control strategies that target earlier stages of the encroachment process over an equivalent land area. A key implication is that more proactive strategies and less expensive treatments need to be prioritized over high-cost brush management techniques if woody encroachment controls are to be applied at scales needed to conserve the remaining Great Plains rangelands.

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Forest management and partnerships in the Pine Ridge of Nebraska

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SUMMARY – Ponderosa Pine management in the Pine Ridge of Nebraska has developed more in the last 10 years than ever before. There have been many partnerships that have been built to provide multiple funding sources to develop landscape scale projects across the Pine Ridge. From Mountain Pine Beetle to intensive contractor thinning one thing has stayed the same, conservation of the Ponderosa Pine forest for the next generation.

Teacher Report: Legacy in Environmental Education Discovery (LEED)

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ABSTRACT – Annually the Fish and Wildlife Education Division at the Nebraska Game and Parks Commission hosts the LEED (Legacy in Environmental Education Discovery) educator workshop. A new Biologically Unique Landscape is chosen each year and area educators are invited to learn about the natural resources in these areas from local natural resource providers. There is no better way to know how this experience and the resources provided, affect an educator's classroom, than hearing from educators who have attended LEED. This session will feature past LEED participants and hear how they have implemented lessons learned and the NNLP into their classroom or program.

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Overcoming a rigidity trap and retooling our natural resources framework to address rapid environmental change on the Great Plains

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ABSTRACT – In the face of rapid environmental change in Nebraska and the rest of the Great Plains, we need flexibility in our natural resources management structure to address constantly evolving needs and challenges. Yet we are still managing our ecosystems to comply with laws and policies set up in an era that predates modern ecology. In the late 19th and early 20th century, most scientists and policymakers believed landscapes could not transition to alternative states, but instead always tried to return to one particular state. For example, scientists thought a widely forested area that was burned or heavily logged would still return to a forested state over the course of time. For Nebraska and the Great Plains, this idea implied that grasslands would return to grasslands, which meant that any trees on the landscape would have to be specially planted and nurtured by humans. However, modern science shows that entire biomes can transition to a different state, as the ongoing woody plant invasion across the Great Plains demonstrates. Much of our natural resources management framework is nevertheless driven by outdated assumptions about the natural environment, creating a “rigidity trap.” How can we retool our foundational natural resources framework for 21st century needs? Other areas of legal scholarship may provide some suggestions. One fundamental property law principle called “the dead hand” exists to ensure that property is not constricted by the desires of those who have long since passed away and is instead free to be bought, sold, and used as changing circumstances dictate. We propose developing a spiritually similar “dead hand” principle for natural resources law where reflection and evaluation can lead to greater flexibility and more effective natural resources management for evolving needs and challenges.

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Nebraska Mussel Program: Propagation, Reintroduction, and Augmentation

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SUMMARY – Freshwater mussels (Unionoida) are one of the most imperiled group of animals in North America as nearly three quarters of the family are threatened, endangered, or extinct. Historical records show 30 mussel species have been catalogued in Nebraska waters. Of the 30 species, 8 were never found in high numbers, and 13 are doing well in the state. This left 9 species; selected by Steve Schainost of Nebraska Game and Parks Commission, as candidates for further evaluation in Nebraska’s mussel management plans. With the information provided by Steve as well as other Malacologists, a small group of Nebraska hatchery staff put together a freshwater mussel plan for propagation and restoration. The efforts of this group will hopefully change the trajectory of the threatened mussels of Nebraska.

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Declines of Black-billed Magpie (*Pica hudsonia*) and Black-capped Chickadee (*Poecile atricapillus*) in the north-central United States following the invasion of West Nile virus²

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ABSTRACT – West Nile virus (WNV) is an introduced pathogen, transmitted by mosquitos, that spread across North America following its arrival there in 1999. Birds host the virus, but consequences of the disease to bird species have been variable. A small number of avian species are especially susceptible to WNV, experience high mortality rates when infected, and have shown regional declines apparently because of the disease. Other species have seemingly been unaffected. Transmission of WNV is associated with climate, with higher incidence of transmission in dry areas with warm winters. The north-central United States is an area that exhibits clines in temperature and precipitation, and in this area changes in species abundance due to WNV have not been closely examined. We used Christmas Bird Count (CBC) data to investigate changes in winter abundance of selected species before and after the arrival of WNV in the Great Plains. After arrival of WNV, average estimated abundances of Black-billed Magpie (*Pica hudsonia*) were significantly lower than projected abundances across much of the Great Plains. Black-capped Chickadee (*Poecile atricapillus*) abundances reached their lowest counts in portions of the Great Plains immediately after the arrival of WNV and experienced overall negative annual declines from 1988 to 2017. Two other species that were examined did not experience changes in abundance across the study area. Abundances of Black-billed Magpies and Black-capped Chickadees have declined over the past 30 years in the Great Plains, and WNV has likely played a major role in recent declines of magpies throughout the study area.

² from: Brenner, S.J., and J.G. Jorgensen. 2020. [Declines of Black-billed Magpie \(*Pica hudsonia*\) and Black-capped Chickadee \(*Poecile atricapillus*\) in the north-central United States following the invasion of West Nile Virus](#). *Western North American Naturalist* 80: 204–214.

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Beekeeping Management with Alternative Hive Structures

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ABSTRACT – Beekeepers are facing increased challenges, from honey bee population loss to management practice misinformation. As the diverse audience of hobbyist beekeepers grows, innovations are essential, particularly as the reasons for keeping bees have also diversified. Beekeepers today are not just interested in honey production but also providing pollination services, producing value-added products, and offering educational opportunities to new beekeepers. My research examines how beekeeping management differs with alternative hive structures or the hive boxes that are used to house each honey bee colony. Data on various functional measures, such as honey production, brood rearing, thermoregulation and overwintering success will help elucidate advantages and disadvantages of each alternative hive structure compared to the traditional Langstroth hive. Results from this research will provide scientifically vetted guidance and best management practices to promote pollinator-friendly landscapes and practices that support healthy bee communities.

Applied management of honey bees

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ABSTRACT – The Great Plains Master Beekeeping Program will provide training, education, outreach, and mentoring for beginning and advanced beekeepers that will improve colony survival and drive economic success. This program will focus on colony management, bee biology, pests, pathogens and other stressors, as well as land stewardship, business and marketing, and professional development. The program is also being used to develop novel tools for beekeepers to use in management of their hives for hygienic testing as well as selling honey for commercial markets. The overall goal of the program is to create beekeepers that can advocate for all bee species and have the training to be successful and powerful voices in the beekeeping community.

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Bringing Fire Back to the Forest in North-Central Nebraska

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ABSTRACT – Our work in the Middle Niobrara and Keya Paha Biologically Unique Landscapes over the last decade has emphasized prescribed fire as a stand-alone land management practice and a follow-up to cedar control. At first, the discussion focused on grasslands. Not many people were thinking about burning woodlands. However, a few landowners have boldly undertaken woodland burns for the first time in our area, providing an opportunity for the community to observe how both our forests and our grasslands benefit from woodland burns, as do the ranches that depend on healthy ecosystems. We will share how bringing fire back to our forests has accelerated and influenced prescribed fire culture in our BULs, sometimes in unexpected ways. We look forward to continuing our financial and technical support for landowners who expand prescribed fire use in the woodlands and prairies of north-central Nebraska.

Returning Disturbance Processes to Wildlife Management Areas: Designing Management Infrastructure

Kelly Corman*¹

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ABSTRACT – Disturbance processes like fire and grazing play a key role in maintaining diversity and resilience of Great Plains ecosystems. An excess of a particular management practice, even rest, can have negative consequences on habitat conditions for a variety of species. In this presentation we will examine several examples of modifying infrastructure on public lands to facilitate use of fire and grazing as management tools in prairie, eastern deciduous forest, and ponderosa pine forests of north-central Nebraska. Design considerations may be useful for managers planning such practices on public or private lands.

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Fighting fire with fire in the Great Plains

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ABSTRACT – Large wildfires have surged in recent years in the Great Plains. We found woody vegetation was associated with the highest large wildfire risk. This was particularly apparent in areas that have experienced the greatest increases in large wildfire. Woody vegetation can create extreme wildfire behavior that is difficult to suppress and has been increasing in the Great Plains over the last century. We suggest a path forward for reducing large wildfire risk is re-integrating fire into grasslands systems as a management tool. Fire can halt the invasion of woody vegetation, and restore invaded grasslands. We have utilised biome-wide data sets to track vegetation response to recent fires across a range of scales. Our results echo a century of scientific research highlighting the resilience of Great Plains grasslands and the sensitivity of some woody species to fire. Prescribed fires have been successful at halting woody encroachment in highly invaded areas, and our research utilising fire simulation models highlights the decreased risks of prescribed fire compared to wildfires burning in woody vegetation. Fighting fire with fire by embracing fire as a part of our grassland landscapes is an actionable step that we can take to combat increasing large wildfires in the Great Plains.

Summary of 2020 Nebraska Game & Parks Butterfly Survey

Cody Dreier*¹

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SUMMARY – The regal fritillary (*Speyeria idalia*) and monarch butterfly (*Danaus plexippus*) have seen population declines in recent years to the extent that both are being considered for listing under the Endangered Species Act. This summer, the Nebraska Game and Parks Commission monitored these species in the eastern quarter of Nebraska with the help of citizen scientists. These surveys will be used to better understand these species' abundances and habitat needs in Nebraska. This presentation will cover the history of these species, summarize the results from the 2020 summer surveys, and look toward the future.

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Which APP is Ap(propriate)?

Pam Eby*¹

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SUMMARY – With so many Citizen Science Apps on phones which one is best for which species? Which is the easiest if you are talking to a younger crowd or an older crowd? Or what if your group is not tech savvy? Together we will look at some Citizen Science phone apps and discuss their pros and cons.

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Prairie Corridor on Haines Branch

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ABSTRACT – First conceptualized in the 1948 Comprehensive Plan for Lincoln and Lancaster County, the Prairie Corridor on Haines Branch will provide restoration of a continuous passage of tallgrass prairie and a trail extending from the Pioneers Park Nature Center to Spring Creek Prairie Audubon Center along the Haines Branch of Salt Creek. Lincoln and Lancaster County are located in the Tallgrass Prairie Ecoregion and contain the Natural Legacy Saline Wetland-Biologically Unique Landscape identified in the Nebraska Natural Legacy Project. The Prairie Corridor project is protecting and re-establishing tallgrass prairie, saline and freshwater wetlands, and riparian corridors, all of which are identified as core resource imperatives in the Comprehensive Plan.

The Lincoln Parks and Recreation Department, the Lincoln Parks Foundation, the Lower Platte South Natural Resources District (LPSNRD), and Spring Creek Prairie Audubon Center (SCPAC), together with about 30 other partners, have been working with willing landowners since 2013 to preserve this unique area. During the past seven years, about 1,020 additional acres have been conserved through purchase of land and easements, including more than 200 acres of virgin prairie. Restoration and enhancement work has been undertaken on several properties, with over 220 acres seeded to re-establish high diversity tall grass prairie. Research conducted by UNL's School of Natural Resources is in its fifth year and includes the study of prairie, pollinator and stream ecology to inform future conservation and management decisions within and around the Prairie Corridor.

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Rethinking grassland conservation strategies in an era of woody encroachment

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ABSTRACT – Woody plant encroachment is a process where grassy ecosystems transition to a woody dominated state. Management of woody plant encroachment represents the most expensive conservation practice implemented in US rangelands, but has been unable to stabilize or reverse trends of grassland loss and illustrates a need to rethink best management practices for grassland conservation. In this presentation, we outline the woody encroachment process to illustrate strengths and weakness of traditional brush management and identify new approaches for targeting early stages of woody encroachment, extending treatment lifespan, and reducing grassland maintenance costs. These new approaches are the product of science-management partnerships in Nebraska and illustrate creative solutions for scaling-up grassland conservation. We highlight these partnerships and show how these practices are being applied on private and public lands.

Nebraska Natural Legacy Digitization Project

Molly Haas Wavada*¹

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SUMMARY – The Nebraska Natural Legacy Project works to conserve Nebraska’s endangered or threatened flora, fauna and natural habitats. Important, but often overlooked, resources are historical and contemporary physical materials, like photographs, maps, and documents. The purpose of the Nebraska Natural Legacy Digitization Project is to locate and digitize these important materials so that they 1) provide a conservation resource for restoration purposes, 2) ensure the preservation of the physical materials, and 3) increase public awareness of the areas through online accessibility.

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Plants for Birds at Audubon Nebraska

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ABSTRACT – One of the greatest global threats to biodiversity is habitat loss due to urbanization. While residential yards constitute a major portion of American urban landscapes, they are characterized predominately by turf grass and non-native ornamentals, which often do not provide the same ecosystem benefits as landscapes with native plants. These landscapes are opportunities to support wildlife communities by planting native plants to offset the negative effects imposed by urbanization. Toward this goal, the National Audubon Society's Plants for Birds program aims to create bird-friendly communities while providing educational opportunities that showcase the benefits of native plants. Audubon Nebraska provides Plants for Birds programming to increase awareness about relationships between native plants and diverse bird and pollinator communities, and partners with native plant growers, community members, and local organizations to increase the habitat value in urban areas. In six months, we have installed over 600 native plants within Nebraska communities, presented to and collaborated with diverse audiences and interest groups, increased social media engagement, and generated proclamations at the local and state levels. This presentation will focus on an overview of the national Plants for Birds program, our successes in Nebraska, and our next steps.

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Conservation Ain't Gonna Work If No One Cares But Us

Chris Helzer*¹

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ABSTRACT – Hey everyone? It doesn't matter whether we manage land, study bugs, or administer habitat programs, our conservation work is meaningless unless we get people behind us. Statistics about carbon storage, water purification, or recreation dollars can be helpful, but they're not going to make nature enthusiasts out of people who live in cities and are afraid of boxelder bugs on their windowsill. We have all got to get better at sharing our own personal stories about why conservation matters to us. Each of us can share our stories in our own way; at social functions, through social media, at church, through online dating sites (maybe?), or however/wherever we each interact with others. We can do this – let's talk about how.

Pallid Sturgeon Reaching New Places in Nebraska: Recent Developments in Research and A Story About Community Involvement

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ABSTRACT – Nebraska faced many challenges during high water events in 2019 and into 2020. As the rivers and streams landscape changed, so did the fish. A unique opportunity presented itself to observe Pallid Sturgeon across the state at locations not previously seen since it was listed as an endangered species in 1990. With assistance by local anglers, who provided documented occurrences, we expanded our understanding on how this species adapts to change. A story timeline will be presented describe the efforts and events. Additionally, the presentation will include recent developments in research relating to conservation efforts within the Missouri River Basin.

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Back to By Products: Promises and opportunities for layering benefits of water-resource conservation to restore farmland wildlife in the Corn Belt

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SUMMARY – Farmland wildlife, including many grassland breeding birds, butterflies, mammals, and other species were once considered by-products of diversified agricultural production practices that included hay, pasture, small grains, and other crops. Today, fewer wildlife thrive in row cropped landscapes, but coupling wildlife habitat conservation with efforts to improve water and soil health there offers promise for restoring farmland wildlife to rural landscapes across the Midwest. This talk will explore these synergies and discuss the promise of using natural features and processes to improve water quality and wildlife habitat on the same acres and make farmland wildlife a by-product of production practices once again.

Interim evaluation of breeding bird response to oak woodland restoration at Indian Cave and Ponca state parks

Joel G. Jorgensen*¹, Stephen J. Brenner¹, and Gerry Steinauer¹

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SUMMARY – Oak woodlands in Nebraska and the Midwest have changed because of suppression of historical disturbance regimes. Oak woodland management (prescribed fire and tree thinning) has been implemented at Indian Cave and Ponca state parks since 2008. Breeding bird surveys were conducted at both parks in 2012–2014 and were repeated in 2019/2020 with the objective of monitoring bird response to management. We provide an overview of results regarding bird response and discuss the implications of ongoing management on the breeding bird community.

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Salt Creek tiger beetle rearing: Fishing with no bait

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SUMMARY – This talk gives a brief overview of Henry Doorly Zoo and Aquarium's efforts to help captive rear the Salt Creek Tiger Beetle, the surrogate species that shaped the protocols and the magic YouTube video that changed the course of history.

Milkweed and agriculture: Host plant selection and impacts for insecticide sensitivity for monarch caterpillars

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ABSTRACT – Monarchs have evolved mechanisms to cope with insecticidal cardenolides in milkweed. We are exploring how monarch exposure to milkweed cardenolides can affect their sensitivity to other insecticides commonly used in agriculture. Current evidence suggests higher cardenolide levels increase the expression and activity of important detoxification enzymes. Here, we will discuss the toxicity of a pyrethroid insecticide to monarchs developing on four different milkweed species spanning a range of cardenolide levels (*Asclepias tuberosa* < *Asclepias incarnata* < *Asclepias syriaca* < *Asclepias curassavica*).

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Historic perspective of the saline wetlands

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ABSTRACT – Eastern Saline wetlands are of historical significance as their presence spawned a short-lived salt mining industry in the 1860's that led to the establishment of the city of Lincoln. The wetlands occur within the floodplains of Salt Creek and its tributaries in Lancaster and southern Saunders counties. They receive their salinity from groundwater that passes through salts deposited by an ancient sea that once covered Nebraska. They are characterized by saline soils and salt-tolerant vegetation, including several endangered species. They are considered one of the most imperiled natural communities in Nebraska due to historic losses and ongoing threats, but in recent years, numerous partners have been working to ensure their conservation.

Nebraska Bumble Bee Atlas

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ABSTRACT – The Nebraska Bumble Bee Atlas has recently completed its second season of surveying. In this presentation we will explore the +2,000 bumble bee observations and +200 habitat surveys made by community scientists, how they have improved our understanding of bumble bees, and what the future of bumble bee conservation looks like in Nebraska. The Atlas is a collaboration between the University of Nebraska-Lincoln and the Xerces Society, supported by the Nebraska Environmental Trust.

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Restoring Oak Woodlands and Savannas in the Landscape

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SUMMARY – Southeast Nebraska’s oak woodlands support numerous at-risk species, but the fragments of this threatened ecosystem are being degraded by lack of fire, proliferation of cedars and other shade-tolerant trees, and invasion by non-native plants. When we began restoration efforts, little to no oak regeneration existed, throwing the future survival of oak ecosystems into doubt. Now we are starting to see some oak seedlings, more diverse plant communities dominated by native plants, and a proliferation of other interesting things. Join Krista and Chance for a virtual guided tour of our efforts to reinvigorate oak ecosystems over the past decade with the intent to promote oak into the future.

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Precision Conservation: Increase Farm Profitability While Conserving Soil, Water, and Wildlife

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ABSTRACT – Agriculture intensification in Nebraska has resulted in the simplification of agricultural systems (e.g., corn and soybean rotation compared to multi-crop diversity and/or integrated crop-livestock systems), increased field sizes, and removal of non-crop habitat to maximize production. Despite increased farm productivity, rural and urban residents are becoming increasingly affected by multiple emerging and continuing challenges including environmental concerns (e.g., climate variability, soil erosion, water pollution, etc.), economic uncertainties, and declines in rural community vitality. These challenges for increased food production, environmental protection, and economic uncertainties require innovative solutions to achieve resilient agricultural systems. To address these challenges, new local (or field) scale, precision technologies and strategic conservation planning frameworks have been developed to offer opportunities for agricultural producers to maximize whole-field profitability by strategically identifying marginal (or low yielding) acres for cropland diversification, while simultaneously reducing negative environmental impacts. These new precision technologies and strategic conservation planning frameworks also offer natural resource agencies and organizations innovative ways to prioritize enrollment of private lands in conservation programs (e.g., State Acres for Wildlife Enhancement, Conservation Program 33-Habitat Buffers for Upland Birds) with the goal of increasing available wildlife habitat. Implementing these innovative precision technologies and strategic conservation planning frameworks in Nebraska will require a collaborative effort among farmers, farmland owners, industry, and local/state/federal/NGO partners to achieve resilient agricultural systems in the 21st century.

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More than a Pretty Place: A Decade of Conservation at Lauritzen Gardens

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ABSTRACT – Lauritzen Gardens encompasses 100 acres of riverfront hills just minutes from downtown Omaha, and welcomes more than 250,000 visitors each year. Renowned for beautiful gardens and plant displays, people are often surprised to learn about our conservation efforts. Lauritzen Gardens is dedicated to the conservation of plants and the biological diversity they support and works on multiple fronts to accomplish this mission. Projects in Greater Nebraska include conducting rare plant surveys for the Nebraska Game and Parks Commission in the Kimball Grasslands and Sandsage Prairie Biological Unique Landscape regions, and establishing conservation seed banks for several Nebraska Tier 1 at-risk plant species. On-site in Omaha, we have been working to gain an understanding of the biological diversity supported by our 100-acre property, with the aim of practicing the best possible ecological stewardship. This involves ongoing surveys to document the wildlife that utilize Lauritzen Gardens. To date, 143 birds, 61 butterfly species, and over 50 species of bees have been observed. This presentation provides an overview of a decade of conservation work at Lauritzen Gardens.

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Screening landcover types on a shifting landscape that supports the endangered American burying beetle (*Nicrophorus americanus*)

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ABSTRACT – In a world undergoing drastic environmental change, there is a need to manage ecosystems for rare and endangered species. Grasslands of the Great Plains are facing threats from all directions, including woody encroachment from invasive eastern redcedar (*Juniperus virginiana*). In Nebraska, prescribed fire has become a common tool used to combat woody encroachment in the grasslands. The Loess Canyons region of Nebraska, which supports one of the few remaining populations of the endangered American Burying Beetle (*Nicrophorus americanus*), is no exception. Using remotely sensed land cover and land use data, we have screened the Loess Canyons for indicators of beetle habitat preferences at multiple spatial scales. We found that beetles have a strong preference for perennial forbs and grasses at broad spatial scales in this landscape. Beetles also respond weakly to management activities such as prescribed fire, and respond negatively to bare ground and cropland at finer spatial scales. Our results indicate that although prescribed fire does not have a strong direct impact on American Burying Beetles, it can create grassland habitat that the beetles strongly prefer. This suggests that management activities undertaken to stop the spread of invasive woody species in grasslands will have an overall positive impact on the endangered American Burying Beetle.

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The ABCs of Data Validation for Citizen Science

Louise Lynch-O'Brien*¹

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ABSTRACT – One of the perks of citizen science for a researcher is the increased spatial, temporal and geographic reach of data. One of the perks of being a citizen scientist is getting to contribute to research of interest regardless of one's background. This presentation will provide an introduction to data validation - the assessment of data for accuracy – as well as the learning opportunities it affords researchers and volunteers alike.

The Great Outdoors- Indoors

Monica Macoubrie*¹

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ABSTRACT – Educator workshops, classroom visits, large-scale events, conferences, exhibit halls- nothing out of the ordinary for the Nebraska Game and Parks Commission Fish & Wildlife Education Division, except this year, it has all been virtual. Like everyone else during this pandemic, environmental education has had to adapt and learn to make programs virtual instead of relying on the normality of face to face events. In this session come learn different ways that Game and Parks has brought education indoors for everyone to enjoy during these wild and crazy times.

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Saline wetlands: Opportunities and barriers

Tom Malmstrom*¹

¹*City of Lincoln Parks and Recreation;*
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ABSTRACT – In order to sustain the conservation of the saline wetlands, efforts must carry out Nebraska’s Eastern Saline Wetlands Conservation Plan (2018). The Plan continues to support the partnership approach to conservation and includes comprehensive strategies to sustain wetland functions and protect watersheds. Future efforts must include economic (funding), research, and management (land use, human activities) perspectives of the broader landscape and its interaction with the natural resource.

Pollinator Pathways: Habitat connectivity for pollinators and wildflowers on Nebraska roadsides

Mercy Manzanares*¹ and Jon Soper*¹

¹*Nebraska Department of Transportation;*
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ABSTRACT – Roadsides have the potential to be pollinator havens. Through restoration efforts and collaborative research with UNL, the NDOT is working to improve habitat connectivity for monarchs and other pollinators. Learn about our commitment to pollinators and native wildflowers as we are looking critically at our program to improve our efforts over the next 10 years. We will also play a fun game with prizes in an effort to make our digital presentation more interactive.

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Audubon Omaha: Engaging College Students in Community Conservation

Jessica McAdams*¹

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SUMMARY – The University of Nebraska at Omaha Audubon Student Conservation Chapter (UNO ASCC) began in the fall of 2019 as a way for the Audubon Society of Omaha (ASO) to get college-level students involved with conservation and the community. Now entering its second year, UNO ASCC continues to grow while looking for ways to involve students in professional and personal learning, student-led research projects, and volunteer opportunities. By looking at conservation through multiple perspectives while providing opportunities for students to grow, UNO ASCC demonstrates that it's not just for the birds.

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**Smile - You're on *canid* camera:
A new technique to age live swift foxes**

Sarah A. Nevison*¹, Randy D. Johnson², Will M. Inselman¹, and Jonathan A. Jenks³

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²*Wisconsin Department of Natural Resources*

³*Department of Natural Resource Management, South Dakota State University*

SUMMARY – Accurately estimating the age of individuals in a population is necessary for the understanding of population dynamics, social organization, and survival potential. This is particularly true of small, at-risk species like the swift fox (*Vulpes velox*), which requires active management in some regions of the Great Plains and is an endangered species in the state of Nebraska. Currently, no method exists to age live, wild swift foxes beyond the categorization of adult and juvenile, though swift foxes are known to live up to nine years in the wild. We have developed a non-invasive technique to accurately estimate the age of swift foxes using visual assessment of tooth wear, along with a photographic guide which biologists can use in the field. This new technique will allow field researchers across the Great Plains to better assess the population structure and persistence of wild populations of swift foxes, thus leading to improved management capabilities, including during reintroduction efforts. This presentation will cover the need, development, limitations, and utility of this new technique and the photographic guide.

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History of Bighorn Sheep in Nebraska

Todd Nordeen*¹

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SUMMARY – Rocky Mountain Bighorn Sheep once roamed throughout western Nebraska. Extirpated by the early 1900s, bighorn sheep remained absent from the state for nearly 100 years. Conservation efforts began in 1981 to restore this majestic species to its historic Nebraska range with a goal of having a viable, self-sustaining population. Disease and other factors have slowed and continue to challenge restoration efforts but bighorn sheep can now be found in many parts of their historic range.

Pollinator Habitat in Nebraska: The Xerces Society/NRCS partnership and beyond

Rae Powers*^{1,2}

¹*The Xerces Society for Invertebrate Conservation;*
email: raeann.powers@xerces.org

²*United States Department of Agriculture-Natural Resources Conservation Service*

SUMMARY – In partnership with NRCS, The Xerces Society has been working to improve pollinator habitat on private lands. Come hear about past and current conservation work of Xerces in Nebraska, including educational events, on the ground conservation, and our work with at-risk species. We will also cover future goals for invertebrate conservation in the state!

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Beyond The Banks Of Nebraska's Coolwater Streams

Brett Roberg*¹

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ABSTRACT – In Nebraska, coolwater streams account for less than 25 percent of all flowing water (4,564 mi.) and play an integral part in supporting various aquatic and terrestrial organisms, including native and at-risk species. Since adopting the Coolwater Stream Management Plan, the Nebraska Game and Parks and other project partners have implemented best management practices to the in-stream and riparian habitats to provide long-term benefits to landowners and coolwater dependent species. This presentation will highlight several of our stream habitat projects and provide preliminary results on the observed changes to the habitat and aquatic communities.

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Is the Nebraska Loess Canyons ecoregion one of the greatest conservation success stories in the Great Plains?

Caleb P. Roberts*¹, Dillon T. Fogarty¹, Mazbahul Ahamad¹, Conor Barnes¹, Victoria M. Donovan¹, Alison Ludwig¹, Rheinhardt Scholtz¹, Daniel R. Uden^{1,2}, Dirac Twidwell¹

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ABSTRACT – Globally, grasslands are one of the most endangered ecosystems, yet there are few examples of large-scale conservation successes in grasslands. The Great Plains of North America are an iconic example of this: despite decades of significant conservation expenditures, there is no evidence of successful conservation of grassland biodiversity, positive population trends in endangered grassland species, or restoration of grassland ecosystem services such as livestock forage. In contrast, the Nebraska Loess Canyons ecoregion represents one of the greatest conservation success stories in the Great Plains. As a result of large-scale coordination, regionwide restoration of fire, and harnessing emerging technologies and computational power, we have documented increases in endangered American Burying Beetle populations, stabilized a grassland bird diversity, reversed the regionwide decline in livestock forage production, and halted woody plant invasion. The success of the Loess Canyons has provided a blueprint that has been shared with conservationists in other states, helping to inspire new large-scale strategies, including the Cheatgrass Challenge in western U.S. rangelands and a new Great Plains Grasslands Initiative targeting the woody encroachment problem.

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Strategically Moving Forward: Nebraska Game and Parks' Education Strategic Plan

Lindsay Rogers*¹

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SUMMARY – Adopted in January 2020, the Nebraska Game and Parks Commission's Education Strategic Plan presents strategies to advance education and interpretation in a coordinated and purposeful way. This session will focus on what work of this plan has already been done – Nebraska Community Survey, NGPC Program Inventory, etc. – and how the Commission seeks to continue using education and interpretation to ensure relevancy.

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Integrating Agriculture into Rainwater Basin Wetland Management

Cortney Schaefer*¹ and Krystal Bialas*²

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²*United States Department of Agriculture-Natural Resources Conservation Service*

ABSTRACT – Shallow playa wetlands in the Rainwater Basin (RWB) of south-central Nebraska provide an excellent opportunity to merge wetland habitat management with agricultural practices. Almost 99 percent of the lands within the RWB are under private ownership, with land use dominated by row-crop agriculture. And yet nearly 10 million migrating waterfowl visit RWB wetlands each spring. The Rainwater Basin Joint Venture (RWBJV) is working with many state, federal, and other conservation partners, in addition to private easement owners, to restore and enhance RWB wetlands. Recent research has shown that cattle grazing, especially in combination with other management practices (haying, chemical treatments, tree removal, prescribed fire, etc.) is a valuable tool for sustaining healthy RWB wetlands. Local grazers have quickly embraced the additional forage for their cattle. Landowners are benefitting from an additional income on their easements. And the wetlands are benefitting from the disturbance that promotes moist soil dominated plant communities and seed production. RWBJV partners work with landowners to determine stocking rates and appropriate grazing periods, build grazing infrastructure (wells, livestock watering tanks, and fencing), provide cattle transport options, and connect easement owners with local cattle grazers. Pivot modification and variable rate irrigation (VRI) are also utilized through RWBJV programs to enhance the functionality of the entire wetland basin.

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The last remaining intact grasslands on Earth

Rheinhardt Scholtz*¹ and Dirac Twidwell¹

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ABSTRACT – Grasslands are the most imperiled ecosystem on the planet. We have lost >60% endemic diversity and safe operating space in an ecosystem that is the least protected globally. Basic ecosystem services such as water provision and regulatory services provided by grasslands are threatened. Amidst 21st century pressures of global change such as woodland expansion, afforestation and climate change, our study identified the last remaining large and intact grasslands on Earth. This was done by quantifying the degree of landscape intactness on all pure grassland areas i.e. true prairies and all grassland steppes on Earth. Only seven regions represent the last remaining large and intact (at least 75% area) grasslands on the planet. They occur in the temperate regions of North America (Wyoming steppe and Nebraska Sandhills grassland), Asia (Selenge steppe, Altai steppe, Ordos steppe and Mongolian-Manchurian grassland) and in tropical Africa (Serengeti grasslands). These culturally-rich, biodiverse areas form critical parts of migration pathways and many livelihoods depend on their persistence for survival. While these regions are not immune from current global threats, they are our last hope for grassland strongholds under anthropogenically-driven global change.

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Restoration of saline wetlands and highlights of Marsh Wren Wetland project

Dan Schulz*¹

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ABSTRACT – Management techniques for restoring Nebraska’s eastern saline wetlands are constantly being refined as new information is gained. Management activities for the next few years are being finalized using the Upper Little Salt Creek Saline Wetlands Plan in conjunction with the Saline Wetlands Conservation Partnership which was recently awarded a large grant from the Natural Resource Conservation Service to help restore hydrology along the entire Little Salt Creek Watershed. One of the greatest achievements has been the successful restoration of cropland to suitable habitat for Species of Greatest Conservation Need as well as threatened and endangered species. One such example is Marsh Wren Wetland just north of Lincoln in northern Lancaster County.

Core areas of habitat in the Verdigris-Bazile BUL

Kyle Schumacher*¹

¹*Northern Prairies Land Trust and Nebraska Game & Parks Commission;*
email: kyle.schumacher@nebraska.gov

SUMMARY – Conserving our natural legacy in the Verdigris-Bazile Biologically Unique Landscape has required collaboration with landowners and many partner organizations. The relationships we have formed have been instrumental in creating large blocks of wetlands, grasslands and woodlands to anchor future conservation efforts on. As we look for ways to expand these core areas, we also look back at the projects that have brought us this far.

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Wetland Management in South Central NE Rainwater Basin

Brad Seitz*¹ and Rick Souerdyke*¹

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SUMMARY – Management of a wetland is an ongoing and ever changing dynamic. We will be discussing our part in managing this wetland habitat ecosystem for migratory waterbirds. Discussion will include grazing, burning and aerial spraying of specific wetlands. These strategies have proven valuable in the enhancement of the targeted vegetation that benefits migratory waterfowl.

Insects of the saline wetlands

Steve Spomer*¹

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ABSTRACT – Using a variety of collecting techniques, the E Nebraska saline wetlands were surveyed for insects from 1991 through 2020. So far, 13 orders, 137 families, and at least 700 species have been identified. The two most diverse orders were Coleoptera (beetles), with 36 families and 237 species, and Diptera (flies), with 40 families and 137 species.

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Habitat Stewardship of Medicine Creek Wildlife Management Area

Chad Taylor*¹

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SUMMARY – This presentation will offer insight on dual conservation philosophies initiated 18 years ago on the Wildlife Management Areas (WMA) of southwest Nebraska. Medicine Creek WMA is an 8,000-acre complex of land and water in Frontier County and will serve as an example of how "native landscapes" are managed with the goal of maintaining, enhancing, and restoring natural ecosystem function and native biological diversity. Previously "converted landscapes" are managed with the goal of maximizing hunting opportunities while protecting, enhancing, and sustaining diverse flora and fauna resources.

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Surveys for Burrowing Owls (and Other At-risk Species) in the Keya Paha River Watershed of Nebraska and South Dakota

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ABSTRACT – The Keya Paha River watershed is a landscape of mixed-grass prairie and cropland in north-central Nebraska and south-central South Dakota that is recognized by both states as providing habitats for a variety of wildlife species of concern. One of these species is the burrowing owl (*Athene cunicularia*), which is listed as a Tier I at-risk species in the Nebraska Natural Legacy Project and a Species of Greatest Conservation Need in the South Dakota Wildlife Action Plan. Occurrence data for burrowing owls in the Keya Paha River watershed are lacking for both states, especially in recent years. In May-July 2020, biologists conducted surveys for burrowing owls throughout the watershed. Survey efforts consisted of standardized roadside call-playback routes through areas of potentially suitable habitat and surveys of known black-tailed prairie dog (*Cynomys ludovicianus*) colonies. Biologists also recorded observations of other at-risk species encountered during surveys or while traveling within the study area. The surveys greatly increased the number of breeding-season records of burrowing owls in the Keya Paha river watershed. Most burrowing owls were found within prairie dog colonies, which are declining in abundance in most of the study area counties. These recent occurrence records of burrowing owls and other at-risk species will be used by biologists to prioritize future habitat improvement projects in the region.

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Arrival of white-nose syndrome and subsequent decline of northern long-eared myotis (*Myotis septentrionalis*) in eastern Nebraska

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ABSTRACT – As part of efforts to track the spread of white-nose syndrome (WNS) across North America, we have sampled bats for the fungus, *Pseudogymnoascus destructans* (Pd), at several mines in Nebraska, as well as monitored bat populations at these sites. We also searched for other hibernacula of northern long-eared myotis (*Myotis septentrionalis*) in the state and monitored their populations at summering sites. All 4 mines surveyed in southeastern Nebraska were invaded by Pd between 2015 and 2017, and at one site in 2017, we documented mortality of 3 species (*Myotis lucifugus*, *M. septentrionalis*, and *Perimyotis subflavus*) from WNS. However, we did not detect Pd at a mine in central Nebraska during sampling from 2014 to 2019, nor did we find the fungus on bats in the Niobrara River Valley in 2019. During our search for additional hibernacula in Nebraska, we identified several areas in southern, northeastern, and north-central parts of the state where bats likely hibernate in rock crevices, including the discovery of a rock-crevice hibernaculum of *M. septentrionalis* in northeastern Nebraska. Individuals using the rock crevice also were positive for Pd, and populations of northern long-eared myotis in southeastern and northeastern Nebraska have declined sharply since arrival of WNS to the state. Due to the steep declines of *M. septentrionalis* in eastern Nebraska, it is important to protect known hibernacula, as well as continue to search for additional hibernacula, track the spread of WNS, and monitor populations of this threatened species in the state.

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The Successful Restoration of River Otters in Nebraska

Sam Wilson*¹

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SUMMARY – River otters are native to Nebraska but were extirpated during settlement. Restoration efforts by the Nebraska Game and Parks Commission and partners have allowed this species to reclaim most of their historic distribution. This presentation details more than three decades of work leading to this recovery – from the first reintroduction in 1986 to their proposed delisting in 2020.

Current Pollinator Conservation Research and Education through the University of Nebraska-Lincoln Bee Team

Judy Wu-Smart*¹

¹*Department of Entomology, University of Nebraska-Lincoln;
email: jwu-smart@unl.edu*

SUMMARY – The UNL Bee Lab currently has 2 faculty, 5 graduate students, 3 undergraduate students, and 2 full-time technicians who are dedicated to conserving managed and wild bees as well as other pollinators. As a team, we conduct research on stressors that contribute to bee decline, including exposure to pesticides, degraded landscapes that lead to malnutrition, and poor management of pests and pathogens. Students conduct a wide array of studies that inform land management guidelines, improve pollinator-friendly seed mixes, and help beekeepers monitor for and mitigate impacts of unintentional pesticide exposure on honey bees. Come learn about the importance of pollinators, why they are in decline, and discover some opportunities on how to get involved in pollinator conservation.

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Large Controlled Burns: An Opportunity for Cross-Boundary Cooperation and Landscape Scale Conservation

Ben Wheeler*¹

¹*Pheasants Forever, Inc. and Quail Forever, Ord, Nebraska;*
email: Ben.Wheeler@nebraska.gov

ABSTRACT – Controlled burning is becoming an increasingly common grassland management technique in Nebraska. As the demand for fire continues to grow on both private and public lands, a focus on increasing fire size may alleviate potential time and capacity bottlenecks, while also fostering healthy cross-boundary relationships and at-scale conservation for area-sensitive, grassland-obligate species.

Retiring prescribed fire: Letting the smoke finally dissipate on this common management practice

Ben Wheeler*¹

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SUMMARY – Prescribed fire has been one of the most rapidly growing grassland management practices in Nebraska. While adoption of this practice continues to rise, it may be prudent to scout ahead and identify when prescribed fire may no longer be necessary or even beneficial.

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Fish Community Changes Following Fall Drawdown in a Canal and its Tributary Stream

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²Nebraska Game and Parks Commission

ABSTRACT – The influence of water management on fish communities within irrigation canals and those of the tributary streams to which those canals connect has received minimal attention in Nebraska to date. Stream fish communities may change in response to natural temporal changes in precipitation, but the management of water in irrigation canals may cue fish to from canals or entering and exiting tributary streams to seek refuge. Alternatively, dewatering of canals may strand fish in standing pools. The objectives of this study were to: 1) compare fish community differences longitudinally in one irrigation canal following drawdown in the fall; and 2) compare fish community changes in a tributary stream of the same canal before and after fall drawdown. Our study area included the Kearney Canal (a diversion of the Platte River) and Turkey Creek, a second-order stream that flows into the canal. Backpack electrofishing was used to sample an upper, middle, and lower reach were sampled in the Kearney Canal in November 2018 and 2019 and three, 100-m reaches Turkey Creek in October (before drawdown) and November (after drawdown) 2018 and 2019. Overall, species richness and diversity was higher in the Kearney Canal in 2019 compared to 2018. However, diversity was highest in the lowest reach in 2018 but highest in the upper-most reach in 2019. Species richness increased between the pre-drawdown period and the post-drawdown period in Turkey Creek in 2018, but richness remained equal between both sampling periods in 2019. Diversity was more similar between years in the upper and lower reaches of Turkey Creek, but diversity was substantially higher in the middle reach in 2018 compared to 2019. Temporal differences between and within the Kearney Canal and Turkey Creek may be due to intra-annual changes in canal operation (i.e., pre- and post-shutdown) and flooding that occurred in 2019 but not 2018. In all, results from this study highlight the interconnected nature of canals and their stream tributaries that may need to be considered when managing water in irrigation canals.

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The threat to Nebraska deer from Chronic Wasting Disease

Robert M. Zink*¹

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ABSTRACT – Chronic wasting disease (CWD) has increased throughout much of the range of white-tailed deer mule deer and elk. It has caused declines in many populations and continues to spread. CWD was first found in Nebraska in 2000 in Kimball County of the Nebraska panhandle, and now encompasses 49 (of 93) counties. In 2017, samples obtained by Nebraska Game and Park Commission (NGPC) biologists from hunter-killed deer were found to include 11% CWD positive animals. Studies have shown that specific genes (genotypes) enable individual animals to be less susceptible to the effects of infection by prions and live longer post-infection. With help from the NGPC and UNL Veterinary Diagnostics Lab we surveyed about 350 white-tails and mule deer from throughout the state and documented the frequency of these resistant genotypes in various areas (see references). Deer carrying the resistant genotypes 96S and 95H are widespread in the state, which at first glance seems important. However, the genotypes are in low frequency, and we might consider, from the genotype standpoint, the entire Nebraska herd as equally susceptible. If CWD continues to increase in frequency and spread, it is important to use this genetic information to predict the fate of the herd. A model based on the frequency of resistance genes, life and reproductive expectancies of deer with these genotypes, is being developed to anticipate population trends.

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