



## GRANT FINAL ACTIVITY REPORT



Project Number: 16-140-3

Project Name: Nebraska Natural Legacy Plan: Terrestrial and Aquatic Implementation for Biodiversity Conservation

Project Leader: Melissa Panella

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The Nebraska Natural Legacy Project achieved many great successes and strides in conservation with the support of the Nebraska Environmental Trust (NET) over recent years of this grant: *Nebraska Natural Legacy Plan: Terrestrial and Aquatic Implementation for Biodiversity Conservation*. The Nebraska Game and Parks Commission (NGPC) was fortunate in being able to use NET funds to match federal funding from the USFWS Wildlife & Sport Fish Restoration State Wildlife Grant (SWG) program. The match made possible by NET funds allows the state of Nebraska to more fully utilize SWG and to stretch every dollar further for wildlife conservation initiatives in the state. USFWS Partner contributions also provided match to this NET grant. Conservation efforts are summarized in this final report, with the finer detailed descriptions available in the interim NET reports submitted during the lifetime of this grant.

NGPC staff members work in cooperation with partners and landowners to carry out the Nebraska Natural Legacy Project, often finding win-win solutions for wildlife and landowners. Our multi-faceted approach and the regional guidance from Coordinating Wildlife Biologists positioned across Nebraska were essential to meeting the stated objectives of the grant. All objectives were completed with support from NET funds and associated match. Final values also represent statewide habitat and technical assistance provided.

- Objective 1: Enhance and restore 100,000 ac. of habitat primarily on private lands and also conservation lands. Conservation actions will follow strategies identified in the Natural Legacy Project in BULs.
- Objective 2: Implement education and outreach directed towards biodiversity conservation, habitat enhancement and sustainable land and water management.
- Objective 3: Evaluation of the conservation actions.

## **ENHANCEMENT & RESTORATION OF WILDLIFE HABITAT**

### Nebraska Natural Legacy Project Demonstration Sites Improve over 3,000 Acres

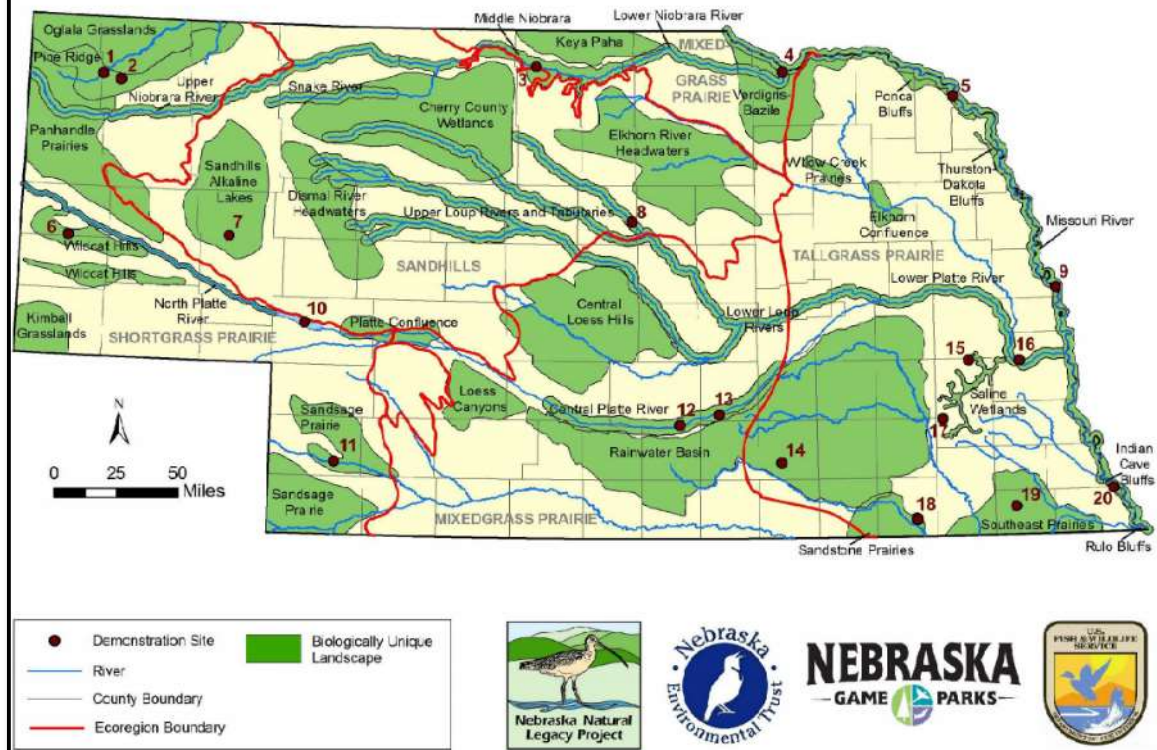
The Nebraska Natural Legacy Project identified 39 Biologically Unique Landscapes (BULs). These are areas with concentrations of Tier 1 and tier 2 at-risk species, priority natural communities, or intact native vegetation. The BULs were designed such that conservation within the landscape can provide the best opportunity to protect Nebraska's biodiversity. The Natural Legacy Project lists specific threats and stresses to the at-risk species within each BUL, and specific conservation actions to address those stresses. This project uses conservation (management) actions identified for each BUL to improve at-risk species habitat at the Natural Legacy Demonstration Sites.

Twenty Demonstration Sites were identified in the Natural Legacy Project. These are areas where innovative at-risk species management can be demonstrated for the public, landowners and conservationists. The 20 sites were selected because they contain high-quality or potential high-quality habitat for at-risk species, and they receive relatively high visitor use. We focused on several Demonstration Sites in order to support high quality plant communities that can be actively managed and receive high visitor use. They included Niobrara State Park (SP)/Niobrara Confluence Wildlife Management Area (WMA), Ponca SP, Schramm Park State Recreation Area (SRA), Indian Cave SP, Rock Creek Station State Historical Park (SHP)/Rock Creek Station SRA /Rock Glen WMA, Wildcat Hills SRA, and Audubon's Spring Creek Prairie. Natural Legacy Demonstration Sites are strategically positioned throughout Nebraska.

This effort has been a great success. Northern Prairies Land Trust (NPLT) staff were essential in helping to deliver conservation management in oak woodlands and prairies in the park areas (NGPC has worked closely with NPLT for over 15 years implementing private lands projects and managing unique habitats on NGPC lands). Management included invasive plant control, tree thinning, prescribed fire, and interseeding of native wildflowers. Several field tours and workshops on the management of prairies and oak woodlands for at-risk species were held at Ponca SP and Indian Cave SP. This grant is a continuation of that project, with the addition of Schramm Park SRA as a Demonstration Site, to implement critical habitat management to conserve at-risk species.

Nebraska's State Wildlife Action Plan (SWAP) entitled the "Nebraska Natural Legacy Project" (Natural Legacy Project) is a blueprint for conserving at-risk species and biodiversity in our state. The Natural Legacy Project divided the Species of Greatest Conservation Need (SGCN) into two categories. The Tier 1 species are those found in the state that are globally or nationally most at-risk of extinction. The Tier 2 species are those that did not meet the criteria for listing as a Tier 1 species, but that are listed by the Nebraska Natural Heritage Program as state critically imperiled, state imperiled or state vulnerable. This Demonstration Site project improved habitat for both Tier 1 and Tier 2 species.

## Nebraska Natural Legacy Project: Biologically Unique Landscapes and Demonstration Sites



Nebraska's Biologically Unique Landscapes (BULs) and Demonstration Sites. Sites identified for habitat improvements include: **#4** Niobrara SP and Niobrara Confluence WMA, **#5** Ponca SP, **#6** Wildcat Hills SRA, **#17** Spring Creek Prairie, **#18** Rock Glen WMA, Rock Creek Station SHP, and Rock Creek Station SRA, and **#20** Indian Cave SP.

We exceeded 3,200 ac. of enhanced habitat for Natural Legacy at-risk species within Demonstration Sites by enhancing, restoring, and establishing native prairies, wetlands, wet meadows, riparian areas, and woodlands. Below are summaries of the main projects within the Natural Legacy Demonstration Sites.

Site	Prescribed Burning	Prairie Seeding Restoration	Tree Thinning or Removal	Hack and Squirt Thinning	Invasive Plant Spraying	Total Acres*
Ponca	249	97	--	Not calculated	Not calculated	346
Rock Creek	1,117	--	63	30	140	1,350
Niobrara	287	--	>325	--	Not calculated	>612
Wildcat Hills	--	<1	--	--	--	<1
Spring Creek Prairie	126	--	191.5	--	Not calculated	317.5
Indian Cave	589	--	--	--	NA	589
<b>TOTAL ACRES*</b>	<b>2,368</b>	<b>&gt;97</b>	<b>&gt;579.5</b>	<b>&gt;30</b>	<b>&gt;140</b>	<b>&gt;3,215.5</b>

Acres of habitat enhancement at six Natural Legacy Demonstration Sites. \*Some acres include multiple habitat enhancements occurring on the same parcel of land. The numbers provided are not total unique acres on the landscape, but rather, unique by habitat enhancement.



The oak draw thinning project at the Rock Creek Natural Legacy Demonstration Site has greened up beautifully. Loads of wildflowers, both prairie and savanna species, are responding to the increased sunlight.



A prescribed burn on the 18-ac. oak savanna woodland at Ponca in 2015.



Prairie seeding restoration on the 18-ac. oak savanna woodland at Ponca in 2015.

## Digital Media Archiving

An additional educational facet of the Natural Legacy Demonstration Site work was accomplished with a Digital Media Assistant for digital archiving of Natural Legacy Demonstration Sites within Rock Creek Station SHP and Rock Glen WMA (Sandstone Prairies BUL), and Indian Cave SP (Indian Cave Bluffs BUL). The Digital Media Assistant searched NEBRASKAland Magazine Archives for historical photos and articles that focus on the two BULs and Natural Legacy Demonstration Sites. Hundreds of slides and photographic prints were located and scanned in 2019 and 2020. The assistant also created a "Search Terms" list to search for relevant Natural Legacy Demonstration Site photos in the NEBRASKAland online photo library. Metadata have also been recorded for all of the photos in the NEBRASKAland online photo library. Once digital archiving is complete, the materials will be uploaded to the online NEBRASKAland photo library for public accessibility and research.



Example of NEBRASKAland Magazine Archive photos cataloged by the Digital Media Assistant for Rock Creek and Indian Cave.



Example of a slide which shows Indian Cave on four different dates, ranging from the 1970s to 2019.

## **Middle Niobrara, Keya Paha, Lower Niobrara, Elkhorn River Headwaters, and some of Cherry County Wetlands BULs**

Our habitat improvement projects in these BULs include prescribed fire, mechanical tree removal, and grazing plans and infrastructure. We have been focusing on building local capacity and interest in prescribed fire as a highly effective management tool that restores function in woodland and grassland ecosystems. As we work with landowners, we plan burns that include neighboring properties and involve as many friends and neighbors on the burn as possible so that the landowner will be able to confidently burn again in the future. Mechanical tree removal projects are designed to facilitate long-term maintenance, primarily through prescribed fire. Grazing plans and infrastructure are also designed to work well with fire rotations, without compromising on ranch income. We engaged with 75 landowners to provide technical or financial assistance.

### Project Highlight in Middle Niobrara BUL:

We funded a project to remove about 650 ac. of mature eastern redcedar trees that were expanding into Sandhills prairie from a forested draw on a ranch in northern Rock County. In addition to the grassland restoration, we collaborated with the Nebraska Forest Service, which provided financial assistance to establish several fuel breaks through the draw and the slopes above the Niobrara River. The fuel breaks will facilitate future, on-going prescribed fire. We are currently working with the landowner to plan a 1,285-ac. prescribed fire that will include a neighboring Wildlife Management Area. The fire will kill remaining cedar seedlings in the grasslands, improve plant community diversity, and promote grass productivity for cattle production. We intentionally planned the fuel breaks and burn boundaries to support the use of fire on the landscape long-term.

### Project Highlight in Keya Paha BUL:

Prior to this Natural Legacy grant, one of our first habitat improvement projects in the Keya Paha BUL was to assist two neighboring landowners to clear eastern redcedar encroachment from a complex of oak woodlands and mixedgrass prairies. As expected, eastern redcedar seedlings began to appear over the next few years, and the landowners began discussing with us how to use fire in a landscape where controlling cedar regrowth would otherwise be exceedingly difficult.

We provided financial and technical assistance to plan and implement prescribed fire and support a shift from a season-long grazing routine to a rotational system that can accumulate adequate fuel for a fall burn after an early grazing window each year. The landowners were pleased with the plant community response to the grazing changes and are planning to use similar grazing patterns even in years when they are not planning to burn.

In early November 2020, we completed a successful 379-ac. burn on the properties, with the help of a crew of neighbors, friends, and local Volunteer Fire Department members. The landowners and their associates are now trained and well-positioned to effectively manage a high diversity complex of woodlands and prairies with fire. This successful conversion to a burn-graze rotation centers on fall burns and is a holistic approach that optimizes cattle production, woodland health, and grassland health all at once.

A. Natural Legacy NET Funds & Federal Match:

1. Middle Niobrara BUL (MNBUL):

1,502 ac. grassland burn

2,924 ac. tree removal

1,922 ac. grazing infrastructure

**TOTAL: 6,348 ac.**

2. Keya Paha BUL (KPBUL):

379 ac. complex burn

295 ac. grassland burn

**TOTAL: 674 ac.**

3. Lower Niobrara BUL (LNBUL): 0 SWG

4. Elkhorn River Headwaters BUL (ERHBUL): 0 SWG

5. Cherry County Wetlands BUL (CCWBUL):

**1,409 ac. tree removal**

B. PR Grouse:

1,233 ac. of grassland burns in MNBUL

1,752 ac. of grassland tree removal in MNBUL

164 ac. of grassland burns in ERHBUL

265 ac. of prairie seeding ERHBUL

TOTALS BY BUL

**MNBUL: 2,985 ac.**

**ERHBUL: 429 ac.**

C. ADDITIONAL TECHNICAL ASSISTANCE (no financial inputs)

6,867 ac. of private land and 219 ac. of public land





Two Regal Fritillary butterflies nectaring on swamp milkweed during a butterfly survey in the Middle Niobrara BUL. *Photo taken 5 July 2018. Photo Credit: Kelly Corman.*



Bumble bee pollinating false gromwell (21 June 2020) during a Bumble Bee Atlas survey in the Middle Niobrara BUL.



We worked with landowners to burn a diverse woodland and grassland mosaic in the Keya Paha BUL. The fire killed numerous eastern redcedar seedlings that had been re-invading the project area after restoration work completed in 2014 and 2015. *Photos taken 2 November 2020.* Before and after photos provided below.

Before prescribed fire: 7 October 2020; green (live) cedar sapling are visible in the middle and the hillside on the horizon.



Four days after prescribed fire: 6 November 2020; orange (dead) cedar saplings visible in the middle



of the photo. We are looking forward to green-up in spring 2021.



Liatris and goldenrod bloom where we cleared mature cedar from Sandhills prairie in the Middle Niobrara BUL. We are now in the process of planning a prescribed fire on the project area.



Ranchers work together to tie-off a prescribed fire as the sun sets over mixed-grass prairie and wet meadow in the Keya Paha BUL. *Photo taken 20 November 2020.*



An oak woodland greens up in the Middle Niobrara BUL in early spring after a fall prescribed fire that killed numerous cedar trees (now orange) that had been invading the understory. *Photo taken 12 May 2017.*

### Sandstone Prairies Biologically Unique Landscape

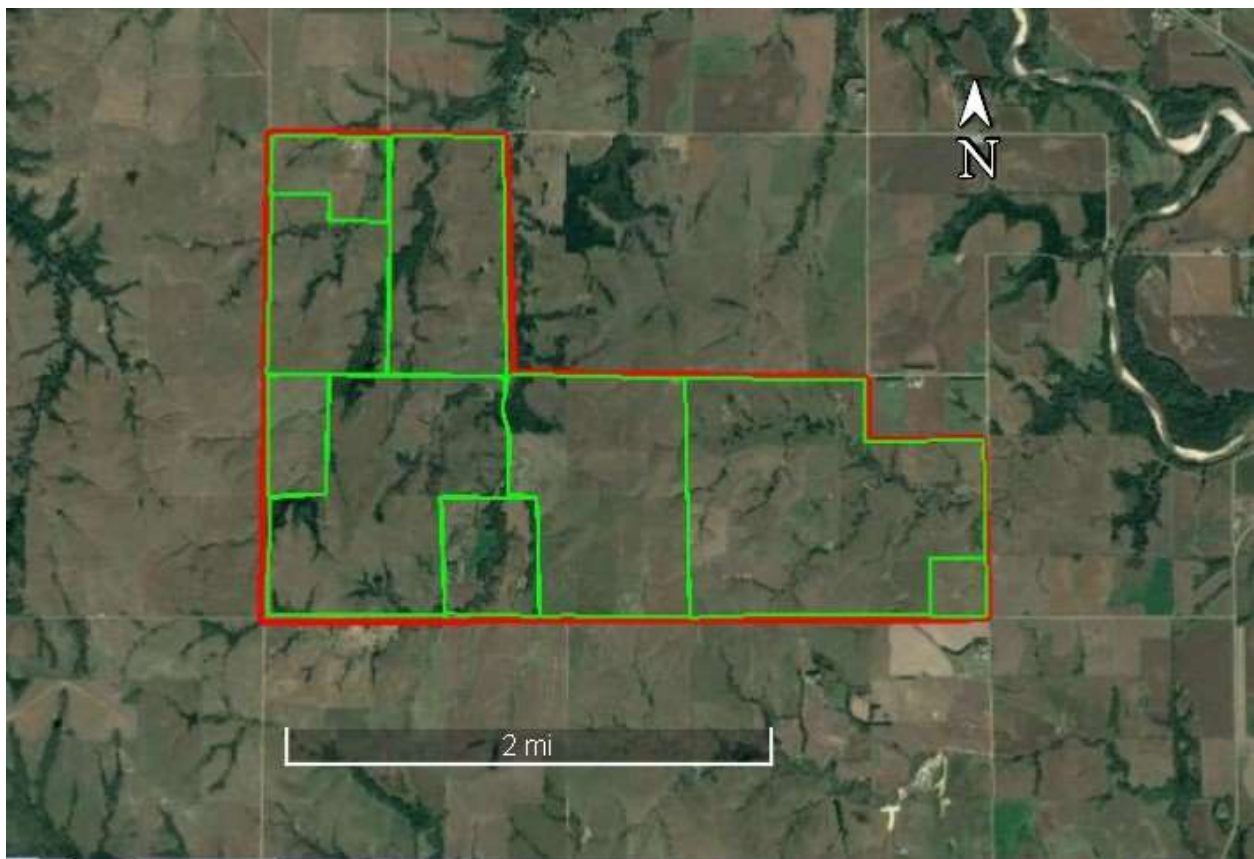
When we began our program in the Sandstone Prairies BUL years ago, the work was primarily focused on mechanical clearing of invasive trees from grasslands. Individual projects gradually coalesced into several large grassland habitat complexes throughout the BUL.

Mechanical tree clearing is an effective restoration technique, but it is too expensive to be sustainable as a form of ongoing management. Fortunately, the success of tree clearing projects over time has allowed us to shift the focus of our work towards much more sustainable practices, prescribed fire in particular. Over the duration of this grant, tree clearing accounted for less than 25% of the number, and less than 15% of acres, of habitat improvement projects we completed with private landowners. Concurrently, we have seen a dramatic increase in the number and acres of prescribed fire-only projects in the BUL.

Efforts to increase the use of prescribed fire always encounter an obvious challenge: there are only so many days where weather conditions are suitable. Given limited opportunities, how can fire be implemented on an extensive enough scale to meet our habitat goals? We have taken a two-pronged approach to solve this question. Prescribed fire is traditionally thought of

as a spring activity. However, it is possible to burn a prairie almost any time of year. Fall and winter burns actually seem more effective at controlling invasive trees than spring burns. We are having a great deal of success encouraging landowners to complete prescribed fires under “non-traditional” conditions, especially during the fall and winter, thus greatly expanding the opportunities to get fires done. When planning for prescribed fires, we also encourage landowners to not just figure out how to burn their own prairies, or parts of prairies, but to incorporate neighboring properties as well. Prescribed fires involving several landowners that cover a few thousand acres are becoming increasingly common, especially in the Sandstone Prairies BUL.

These types of fires have the additional benefits of being safer and easier to carry out than burns of individual prairies. The combination of an expanded burn window and the development of cooperative burning provides good reason to hope that our work will have a lasting impact on the landscape and the at-risk wildlife species that depend on it.



Map of a 2,500-ac. prescribed fire completed in the Sandstone Prairies BUL in February 2019 which involved nine different landowners.

Red line: Burn unit boundary

Green lines: Property boundaries



Large population of Birdsfoot Violet (*Viola pedata*) that appeared in a prairie in the Sandstone Prairies BUL immediately following a prescribed fire. Birdsfoot Violet is an uncommon species of violet in Nebraska that is a larval food source for at-risk Regal Fritillary (*Speyeria idalia*) butterflies.



Prescribed fire moves across a 3,000-acre burn unit in the Sandstone Prairies BUL.

### **Central Loess Hills BUL**

The Coordinating Wildlife Biologist Ben Wheeler has completed several large-scale projects to improve wildlife habitat in the Central Loess Hills BUL. He coordinated these projects while using a variety of conservation management strategies. Habitat projects within the Central Loess Hills typically incorporate forest stand improvement, mechanical tree removal, prescribed fire, and grazing plans. The CWB primarily uses four funding mechanisms to support conservation projects: 1) the Nebraska Game and Parks Commission through the Nebraska Natural Legacy Project, PR Grouse Program, and WILD Nebraska, 2) the Loup TREX grant administered through the Rainwater Basin Joint Venture to fund both the Loup TREX event and the Large Fire Incentive Program, and 3) the Farm Bill through the EQIP program. The Loup TREX Large Fire Incentive was active in 2019 and 2020 and provided a financial incentive for landowners to complete prescribed fires that were at least 500 ac. in size. In each year, funding was available for up to 2,500 ac. and all funding was used in those years. The Farm Bill has provided valuable financial assistance as part of the Wildlife Incentives Program. This program has been used in both 2019 and 2020, and we are excited to continue putting this valuable program to good work in the Central Loess Hills.



Central Loess Hills BUL

A. Nebraska Game and Parks Commission:

Mechanical Tree Removal	2,215 ac.
Prescribed Grazing	5,142 ac.
Prescribed Fire	5,638 ac.
<b>Total</b>	<b>12,995 ac.</b>

B. Loup TREX Large Fire Incentive

<b>Total</b>	<b>5,000 ac.</b>
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C. Farm Bill/EQIP:

Brush Management	103 ac.
Forest Stand Improvement	318 ac.
Prescribed Fire	1,579 ac.
<b>Total</b>	<b>2,000 ac.</b>

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**TOTALS**

**19,995 ac.**

**Loess Canyons BUL**

Nearly every habitat project in the Loess Canyons BUL involves some combination of mechanical cedar removal, firebreak preparation, grazing deferment, and prescribed fire. Since the beginning of 2016, the Coordinating Wildlife Biologist Andy Moore has assisted private landowners by writing plans to **restore and conserve 42,052 ac. of loess mixed grass prairie**. This includes the initiation and signing of 83 Legacy agreements. In the same time frame, Natural Legacy projects have **removed over 20,700 ac. of cedar trees**, and **restored and enhanced habitat on over 76,927 ac. of loess mixed grass prairie**. These landowners that are committed to cedar management also commit to skillful grazing management, and agree to prudent and judicious use of herbicide and insecticide on these native rangelands. Additionally, the biologist and these projects help to facilitate prescribed burns carried out by the Loess Canyons Rangeland Alliance and Central Platte Rangeland Alliance, as well as several contractors. In 2020 alone, over 31,000 ac. were burned in the Loess Canyons. **From 2016 to 2020, well over 70,000 ac. of prescribed fire were completed in the Loess Canyons**. Evidence from UNL shows that the Loess Canyons BUL may be the only cedar infested landscape in the country where cedar is being managed faster than it is encroaching on the landscape. The Nebraska Natural Legacy Project is an important piece of that equation.

Habitat restoration success in the Loess Canyons is fully dependent on the effective working relationships between many partners and stakeholders. The stakeholders who provide monetary and in-kind efforts to restoration in the Loess Canyons include private landowners, Natural Resources Conservation Service, Nebraska Environmental Trust, Nebraska Game and Parks, U.S. Fish and Wildlife Service, Pheasants Forever, Nebraska Forest Service, Twin Platte

Natural Resources District, Central Platte NRD, Loess Canyon Rangeland Alliance, Central Platte Rangeland Alliance, Rocky Mountain Elk Foundation.



Volunteers gather in the Loess Canyons Biologically Unique Landscape for a briefing at an LCRA burn. Prescribed fire is a valuable land management technique that can be beneficial to landowners and improve wildlife habitat.



Volunteers assist local burn associations with prescribed fire in the Loess Canyons BUL.



Younger generations learn the value of prescribed fire in managing the landscape.

### **Pine Ridge BUL**

Several projects were completed in the Pine Ridge BUL, with others partially completed. Project work took place in Sheridan, Dawes, and Sioux counties. There were gaps in the stationing of a Coordinating Wildlife Biologist in the BUL, so gains were not as high as we had originally anticipated in this landscape.

Many of the habitat improvements in the Pine Ridge focused on improving habitat for at-risk bat species. Ninety-seven acres of ponderosa pine around Saddle Rock/Steamboat Butte west of Crawford, NE were thinned. Pine-thinning helps to improve the overall health of the

forest and reduce fuels to help prevent high intensity wildfire that could otherwise threaten habitat for bats and other wildlife. Thinning the pine also creates more openings in the canopy which will help promote deciduous tree and shrub growth and enhances edge habitat. Thinning helps strengthen individual trees by removing competition to make them more resistant to stressors such as drought or disease. Pile burning takes place as weather conditions allow.

A similar pine thinning project at Fort Robinson State Park cleared 80 ac. of dense tree growth. The thinning is important to avoid risk of severe wildfires that could degrade habitat for bats and other species of wildlife. We also worked with staff members of Fort Robinson SP in order to establish two bat houses on the park grounds. Each of these bat houses can accommodate approximately 300 individual bats. These roost boxes will provide additional areas to shelter bats and for them to raise their pups.

Work was completed on an eastern redcedar removal project in Dawes County. The cedar trees on this project were predominantly small scattered trees that had begun encroaching into the deciduous woodland along a creek running through the property and into the open grassland on the property. The particular landowners on this project are very good advocates for conservation and will help educate others on the need to control eastern redcedar.

We worked on a property in an area now known to have northern long-eared bats (*Myotis septentrionalis*). Here, we cleared and thinned 100 ac. to enhance both the grasslands and deciduous woodlands. Two-hundred and eighteen acres of invasive juniper clearing were completed in Sheridan County. We are looking to expand working with landowners with a newly hired CWB.

## **ECOLOGICAL EDUCATION & OUTREACH**

**Ecological education and outreach efforts of the Nebraska Natural Legacy Project succeeded in reaching out to several thousand people to spread awareness of conservation initiatives and engage people to take actions, however big or small, to benefit wildlife.**

### Annual Nebraska Natural Legacy Conference

People are most likely to embrace conservation of the wildlife and habitats that they recognize and appreciate. The NGPC has been annually hosting a Nebraska Natural Legacy Conference to bring together conservationists, students, landowners and others who have a keen interest in Nebraska's wildlife, especially at-risk species. The conference is an opportunity for individuals to learn about management, research, monitoring and other issues to wildlife and their habitats in the state. The event is held every fall in a different location in order to feature landscapes, native habitats, and conservation projects and to reach new communities. During the course of this grant, NGPC held Nebraska Natural Legacy Conferences in the cities of Broken Bow, Nebraska City, Ainsworth, and Gering, as well as an online virtual event. Participation at each event was approximately 150 people each with the exception of the virtual event.

As communities, we were faced with making drastic changes in 2020 because of the COVID-19 pandemic — from teaching kids at our kitchen tables, to working on the front lines or working from home, to only seeing family through digital screens on important holidays. Changes for the Nebraska Natural Legacy Project included the need to plan and host our largest annual event amidst the uncertainties. This pandemic also showed us how we can adapt and still contribute to moving forward.

In October 2020, the Nebraska Natural Legacy Conference went completely online via Zoom for the 10<sup>th</sup> Annual Conference: A Decade of Connections on the Landscape. The virtual format allowed for over 400 people to attend the conference from all corners of Nebraska and neighboring states, some of whom otherwise would have been unable to attend because of travel and funding restrictions. This more than doubled the average attendance of our past in-person conferences. We also had presenters located in other states and even other countries, with the virtual format allowing them to share their conservation projects and ideas with us in Nebraska. We filled our presentation transitions by fielding jokes from the audience and sharing additional information on the topic at hand. We found a way to maintain comradery by giving people an option to join in an evening documentary about Aldo Leopold, followed by an engaging discussion of the film. Even with all of the uncertainty of 2020, we perhaps had the most successful conference in its 10-year history.

Multiple individuals and organizations were recognized for their valuable contributions to the Nebraska Natural Legacy Project. A new Natural Legacy Education Award went to Dennis Ferraro, Professor of Conservation Biology and Herpetologist at the University of Nebraska, for inspiring others through education to conserve at-risk amphibians and reptiles. We recognized the Nebraska Environmental Trust for more than a decade of support of the Nebraska Natural Legacy Project, ensuring conservation of at-risk species and landscapes for future generations. Our annual Conservation Award went to Lindsay Rogers at Nebraska Game and Parks Commission, for her dedication to bring recognition to biodiversity and the Nebraska Natural Legacy Project. The Best Student Presentation went to Alison Ludwig, graduate student at the University of Nebraska, for her presentation on endangered American burying beetles (ABB).

We made the most of the circumstances we faced in 2020, but many people have expressed their desire and hope that we are able to reconvene in-person for the next Natural Legacy Conference in 2021.



William Whitney of Prairie Plains Resource Institute, Inc. receives a Natural Legacy Conservation Award from Kristal Stoner.



Wildlife Biologists Mercy Manzanares and Melissa Panella observe firsthand how The Nature Conservancy uses strategic grazing by American Bison to maintain the grassland at Niobrara Valley Preserve. *Photo by Justin Haag, NEBRASKAland.*



Alison Ludwig, graduate student at UNL, 2020 Natural Legacy Best Student Presentation Award winner, with an endangered American burying beetle.

### Education at Nebraska Natural Legacy Demonstration Sites

We used the Nebraska Natural Legacy Demonstration Sites to increase public awareness, support, and participation to improve and conserve native habitats throughout the life of this grant. Multiple workshops and field tours occurred throughout the demonstration sites, educational signage was drafted and installed, and camera traps were installed and crowdsourcing was used for photo identification which aided in monitoring wildlife. Additionally, we used digital archiving in two of our sites to look back in time and better understand our BULs. Below are examples of the main educational projects at the Demonstration Sites.



## 1. Ponca Demonstration Site

In August 2016, we held a High Diversity Prairie Restoration and Management Workshop at the Ponca Demonstration Site. Nearly 100 people, including conservation practitioners, Master Naturalists, and landowners, participated in the event to learn new management techniques for prairie restoration and pollinators. Attendees watched multiple professional presentations and participated in discussion, then went on a guided tour of the Ponca Demonstration Site to gain a greater understanding of prairie management. Many of the program participants will have opportunities to apply what they learned on properties that they own or manage. Also in 2016, a boot brush station was installed, with a partnership from the Nebraska Invasive Species



Bill Whitney of Prairie Plains Resource Institute educates others about high diversity prairie restoration and management during a workshop held at Ponca SP in 2016.

program, which informs park visitors about avoiding the spread of invasive species. Park personnel have seen guests reading the signs and using the boot brushes that can remove seeds from invasive plants.

In July 2019, Ponca hosted a Pollinator Habitat Establishment and Management Workshop that attracted approximately 90 participants. Attendees of the workshop were educated on basic pollinator identification skills, techniques for successful pollinator planting, control of invasive plants, and current efforts underway for pollinators. This was followed by a field tour of a prairie restoration at Ponca's North Addition where the Coordinating Wildlife Biologist talked about prairie management. Also in 2019, three camera traps were placed in an effort to target plains spotted skunks (*Spilogale putorius interrupta*), a Tier I at-risk species. The project provided an opportunity for the public to be involved in monitoring efforts, by crowdsourcing

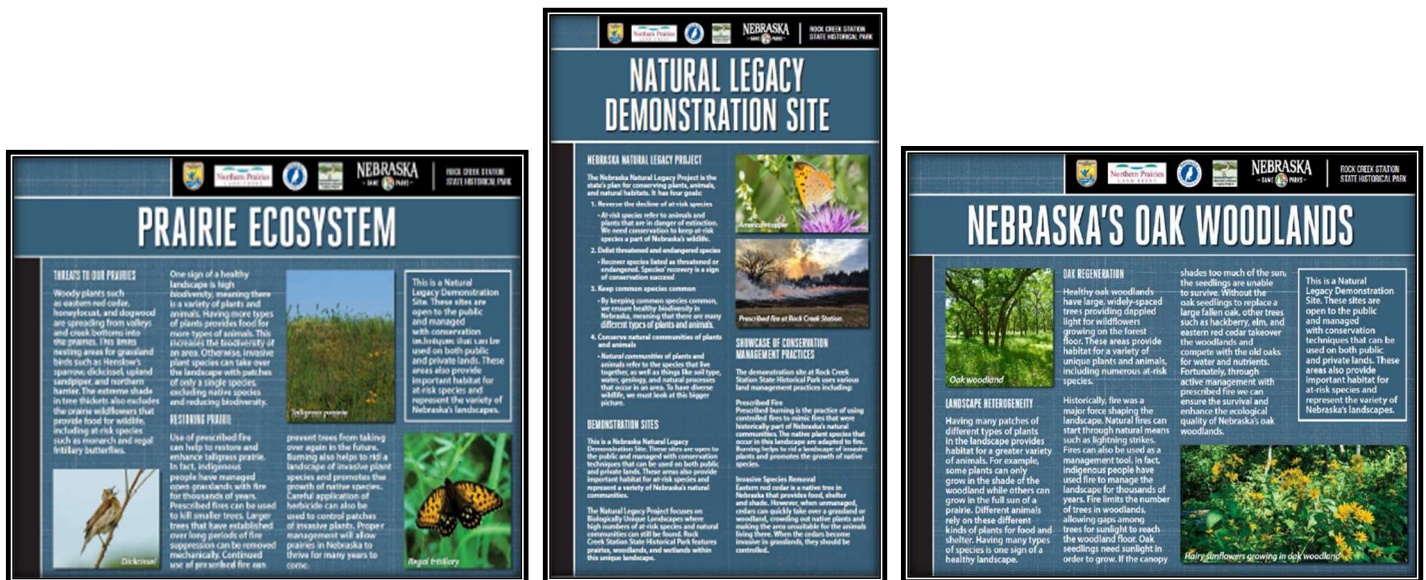


An educational oak woodland restoration sign installed at Ponca SP's Loess Loop in 2020. This is an excellent educational resource that park visitors can read while enjoying learning about the Demonstration Site.

image review on the website Zooniverse. Unfortunately, no spotted skunks were detected, but the website also shared project details with participants, giving Nebraska Game and Parks Commission a new avenue to share information about the Natural Legacy Project, BULs, and Demonstration Sites.

## 2. Rock Creek Demonstration Site

In 2020, educational signage was drafted to be installed at the Natural Legacy Demonstration Site at Rock Creek. The three signs include an overview and the purpose of the Natural Legacy Demonstration Sites, descriptions of prairie ecosystem ecology and management, and Nebraska's oak woodland ecology and management. More interpretive signage will be planned for the future.



Educational signage for the Rock Creek Natural Legacy Demonstration Site.

### **3. Niobrara Demonstration Site**

In 2019, three camera traps were placed at Niobrara SP to provide an opportunity for public involvement by crowdsourcing image review on the website Zooniverse. This was similar to the effort at Ponca SP, but these cameras were not baited for targeting spotted skunks. Educational signage has also been drafted explaining the demonstration site to the public. The signs include the purpose of the site, its ecology, and management techniques employed.

### **4. Wildcat Hills Demonstration Site**

In 2017, the Fish & Wildlife Biologist worked with the Wildcat Hills Education Specialist to develop content for a Nanonation exhibit and activities to be included in the new Wildcat Hills Nature Center. The Nature Center held its grand opening mid-summer 2017. A display about biological diversity and at-risk species, along with wildlife, birding, and pollinator-themed activities were incorporated into the interpretive design at this Natural Legacy Demonstration Site.

In July 2018, we held a Plants and Pollinators Informational Session and Site Visit at the Wildcat Hills. NGPC and the Xerces Society planned and organized the event for natural resource professionals to meet at the Nature Center and hear presentations about pollinator biology, and the opportunities and challenges associated with pollinator plantings, as well as go on a hike at the SRA to identify plants and look for pollinators.



Gerry Steinauer, State Botanist with NGPC, shows off native plants during the 2018 Plants and Pollinators Session at Wildcat Hills.

## 5. Indian Cave Demonstration Site

We lead a field trip at Indian Cave SP as part of the Nebraska Natural Legacy Conference in 2017. The conference was held in Nebraska City, NE in 2017 where the Coordinating Wildlife Biologist and the State Botanist with NGPC led tours of the many habitat enhancements and work being done on the ground. Numerous field tours, workshops, radio appearances, and newspaper articles have been written for Indian Cave and reported in other grants, as well as various educational signs that have been installed around the park.



Tour of the Indian Cave Natural Legacy Demonstration Site in 2017 as part of the Nebraska Natural Legacy Conference.

## Education & Outreach Initiatives in Nebraska's Biologically Unique Landscapes

### Pine Ridge BUL

Coordinating Wildlife Biologists led three educational programs including a bioblitz at Chadron State Park, presented information about bats and prairie-chickens at the Nebraska Natural Legacy Conference, published one educational article, and hosted a workshop about the Pine Ridge wildlife and plant communities at The Pine Ridge Biodiversity and Land Management Seminar at Chadron State College. Additionally, the biologist helped to create 12 handouts with fun bat facts and gave them out during the Trunk-or-Treat event in Chadron.



### Loess Canyons BUL

The Coordinating Wildlife Biologist has reached an average of about 581 people each year through outreach events that include prescribed fire workshops, school field trips and classroom visits, afterschool clubs, expos, partner meetings, conferences, public tours and one-on-one meetings with private landowners. Specific initiatives included the coordination or assisted coordination of 2–6 prescribed burn workshops annually, assistance for 2 large and effective landowner prescribed burn associations, coordinated public habitat tours annually from 2016–2019, and 2 presentations at the Nebraska Natural Legacy Conference to reach a total audience of 210 people.



Habitat tour attendees and KRVN radio gather to examine a rangeland where prescribed fire has been used in the Loess Canyons Biologically Unique Landscape.



NET Radio Producer Ariana Brocius gets sound bites from rancher Russ Sundstrom.

### Central Loess Hills BUL

Several education and outreach events occur regularly throughout the Central Loess Hills. Recently, the COVID-19 pandemic forced some of these events to either temporarily pause or modify for public health precautions, but education and outreach will continue to be an important facet of wildlife conservation within the Central Loess Hills. Primary education and outreach events are listed below:

1. Conservation Celebration – During this one-day event, between 150 and 300 fourth and fifth graders join us at an outdoor public access park to participate in on-site learning activities. Participants rotate through different conservation themed learning stations. These stations have ranged from entomology, soil conservation, aquatic life, birds, fire ecology, reptiles, and fossils. Station presenters over the years have joined us representing a wide variety of agencies and organizations, including: Central Community College, Lower Loup Natural Resources District, Natural Resources Conservation Service, Nebraska Game and Parks Commission, Nebraska State Museum, Raptor Recovery, Pheasants Forever, the University of Nebraska-Extension. The 2020 Conservation Celebration was postponed and we are excited about the possibility to bring it back in 2021.
2. Prescribed Fire Workshops – Every year, the CWB assists with prescribed fire workshops that provides grassland landowners and land managers with information to help them conduct safe and effective prescribed fires. These workshops range from basic workshops about prescribed fire to more advanced, topical workshops that have focused on themes such as fire weather, insurance and liability, firebreak management, burn plan writing, engine design, and fire leadership.
3. Ord School to Work – Three students from Ord High School have partnered with the local Coordinating Wildlife Biologist to conduct a small research project while participating in a job shadowing course. This opportunity not only provides the student with practical experience from the conservation field but also results in real information that can help guide conservation actions in the Central Loess Hills.
4. Professional Presentations – Several presentations have been provided to groups of other conservation professionals. These presentations offer an opportunity to highlight some of the conservation successes in the Central Loess Hills that can be replicated elsewhere for similar benefit. These conferences include: the Fire Learning Network Annual Meeting, International Fire Ecology and Management Congress, Nebraska Chapter of The Wildlife Society, Nebraska Natural Legacy Conference, Prairie Grouse Technical Council, and The Nature Conservancy’s Workshop on Ecological Burning.

5. Informal or Popular Presentations – The CWB regularly provides presentations upon request for school groups, local civic groups, and landowner associations both in the Central Loess Hills region and statewide. The Central Loess Hills Coordinating Wildlife Biologist has provided three presentations about central Nebraska wildlife for the Ord Public Library’s summer reading program. Additionally, the biologist also provided local teachers with materials, posters, Natural Legacy Project book, and Wild Curriculum, and created some new education and outreach materials for the Loess Canyons Rangeland Alliance to assist the group in reaching out to new landowners and potential members. The biologist also assisted with educational activities for Kids Klub students including hand planting pollinator habitat.



#### **Lower Loup Rivers BUL**

The Coordinating Wildlife Biologists presented about pollinators to a local elementary school and planted 150 milkweed plugs with the students.

#### **Southeast Prairies and Sandstone Prairies BULs**

The Biologist provided outdoor recreation perspective to 40 librarians in northeast Nebraska for their summer reading programs. Additionally six educator workshops were held that taught 120 early childhood educators about incorporating nature into their curriculum.

#### **Saline Wetlands BUL**

The Biologist helped Everett Elementary School with planning and logistics to establish a native plant pollinator patch while educating about the unique biodiversity of tallgrass prairies. Additionally, biologists conducted seven interpretive programs about invertebrates in both Spanish and English.

### **Verdigris-Bazile BUL**

The Coordinating Wildlife Biologists assisted and led over six educational programs that reached approximately 1,500 youth, families, and schools. The biologist also assisted with Missouri River Outdoor Expo which had over 750 students engaged in programs, 88 students attending the wilderness trainings, and tens of thousands of visitors passing through the event.

### **Middle Niobrara and Keya Paha BULS**

The Coordinating Wildlife Biologists assisted and led over 10 educational programs that reached approximately 1,600 youth, families, and schools. Additionally, they helped lead field trips during the Nebraska Natural Legacy Conference and also assisted with the Missouri River Outdoor Expo.

### **Middle Niobrara, Keya Paha, Lower Niobrara, Elkhorn River Headwaters, and some of Cherry County Wetlands BULs**

The Coordinating Wildlife Biologist has directly reached an average of about 350 people each year through outreach events that include prescribed fire workshops, school field trips and classroom visits, Nebraska Master Naturalist sessions, summer camps and afterschool clubs, public tours and wildlife viewing, Becoming an Outdoor Woman events, and bioblitzes. [Estimated total 2016–2020: >1,700 people]

Additionally:

- Provided assistance with the Monarch tagging station at the Missouri River Expo, an annual event that draws ~45,000 visitors to Ponca State Park over a single weekend
- Provided assistance with Niobrara State Park’s Outdoor Rendezvous, an annual event that draws ~1300 students each year.
- Gave 4 presentations at Nebraska Natural Legacy Conferences reaching a total audience of 210 people
- Wrote 3 articles published in regional newspapers
- Wrote 5 blog posts

### **Pollinator Programs**

In the fall of 2019, Pollinator Ecologist Cody Dreier had many outreach and education opportunities. He was able to connect with many families at the Missouri River Expo with monarch tagging. He gave a presentation at the Natural Legacy Conference about monarchs, milkweeds, and insect citizen science opportunities. Then, he presented to dozens of schools at





the Lauritzen Gardens Goldenrod Festival with more monarch tagging. Outreach opportunities were more limited in 2020, but he has been able to incorporate some outreach into trainings for the Surveys for Rare Butterflies of the Tallgrass Prairie of Eastern Nebraska.

### **Watchable Wildlife Programs**

Many educational resources were developed including a “Reptile-ology” and “Amphibian-ology” booklet that educates both children and adults about Nebraska’s unique reptiles and amphibians and how important these species are in the landscapes, as well as, three bioblitz education trunks that contain the basic supplies needed to host a bioblitz event, and are available for check out at several NGPC locations around the state. For the Nebraska Bird month celebration, materials and resources were created including bird journals, bird bracelets, prints of “Bird-ology: A Kid’s Booklet about Birds,” and bird-focused reading lists for 33 educational programs across the state. Additionally, new interpretive signs were developed and placed in wildlife-viewing blinds at five locations across the state. These signs provide visitors with tips for successful wildlife viewing, information on riparian areas, and a photo ID guide for common species to the area.

### **Presentations & Outreach**

Biologists presented information about wildlife, pollinators, and the Nebraska Natural Legacy Program at more than 11 different meetings and events across the state. Additionally, biologists lead more than 12 educational programs across the state, educating more than 1,420 youth and families about the unique biodiversity of Nebraska. Other programs included nature-themed summer reading programs and monarch classroom programs, which reached at least 2,500 students from kindergarten to ninth grade.

### **Workshops**

Additionally, Nebraska Natural Legacy biologists led four educational workshops, including the three Legacy in Environmental Education Discovery (LEED) Educator Workshops, which taught 58 educators about the unique features and management of the Rulo Bluffs BUL, Rainwater Basin BUL, and Oglala Grasslands BUL. A pollinator workshop at Ponca State Park attracted 90 participants that learned basic pollinator identification skills, techniques for successful pollinator planting, and current efforts underway for prairie management around the park.

Recent Nebraska Natural Legacy Project education initiatives were impacted greatly because of COVID-19. The LEED (Legacy in Environmental Education Design) workshop was planned for the last week in June 2020 in the Ponca Bluffs BUL at Ponca State Park could not proceed as initially planned. Additionally, several advanced workshops (Linking Literature and Science) had been planned for early summer 2020. That said, work has continued on several kids publications including Mammal-ology.

## EVALUATION OF CONSERVATION ACTIONS

**Biologists and researchers evaluated the conservation actions undertaken for at-risk species and their habitats by taking leadership roles in many varied projects across the state.**

### **Nebraska Natural Legacy Demonstration Site Monitoring**

Monitoring and habitat assessments highlighted successes and effectiveness of the habitat enhancements on Nebraska Natural Legacy Demonstration Sites. Below are summaries of monitoring efforts on >3,200 ac. enhanced in the demonstration sites.

#### **1. Ponca Demonstration Site**

In the restored oak savanna woodland, new sedge growth was found (likely *Carex sprengelii*) resulting from our seeding efforts. Additionally, native smooth Solomon's seal (*Polygonatum biflorum*) was located in this area but was not included in the seed mixture, so either it survived spraying, or seed from neighboring woodland was transported by wildlife. Wild turkeys, deer, and Cope's gray treefrogs have also been spotted in this restoration

Some restorations were weedy shortly after planting and will continue to be monitored in the future. Most of the prairie violet plugs planted in 2019 were affected by deer. A stem-mining weevil release area will also be monitored each September into the future to check for survivability and damage to Canada thistle plants. Photo point pictures were taken at multiple locations at Ponca restorations to document positive landscape changes and enhancement of wildlife habitat over time.

## 2. Rock Creek Demonstration Site

Prescribed burning and thinning has resulted in significant setback of unwanted shrubs and trees, controlling woody brush that was beginning to take over remnant prairie and enhancing the oak draw. We also saw native wildflower and prairie species thriving after prescribed fires. Fire helped to remove thatch from prairies and remove dense stands of cedars, which increased sunlight reaching the soil and allowed for seeding of native wildflowers. Fire also cracks the seed coats of some wildflower species to boost germination. In the large area burned in April 2019, fall wildflowers such as silky aster, aromatic aster, and downy gentian were detected. These fall flowering wildflowers provide important nectaring sources for insects when all other flowers are already done blooming for the year. Several at-risk species are responding well to our repeated prescribed fires and tree thinning, including slender mountain mint (*Pycnanthemum tenuifolium*) and violet bushclover (*Lespedeza violacea*).

The intensive spraying approach to control invasive plant species has resulted in removal of a high percentage of these species. Clumps of Caucasian bluestem are noticeably smaller and less dense after spraying, and very few, if any, new seeds are being produced.

Significant positive changes were noticeable after the first year of spraying for Caucasian bluestem, and continually improved through the years. Large patches that were sprayed gradually came up full of native species that were great habitat for Mourning Doves, Northern Bobwhite, Killdeer, and grassland birds. Wildflower density and diversity is so great in areas restored by the invasive plant control and prescribed fire that the areas have become excellent locations for collecting wildflower seeds for other restoration projects. Several species of native wildflowers took hold, providing critical habitat for many struggling species of pollinators. In particular, we observed side oats gramma, leadplant, violet woodsorrel, Canada milkvetch, hairy wild petunia, fringed puccoon, violets, common milkweeds, whorled milkweeds, tall thistles, and ironweeds. Monarch caterpillars were observed utilizing whorled milkweeds while adult monarchs drank nectar from tall thistles. Excellent growing conditions



The oak draw thinning project at the Rock Creek Natural Legacy Demonstration Site has greened up beautifully. Loads of wildflowers, both prairie and savanna species, are responding to the increased sunlight.

allowed whorled milkweeds to produce 6–10 seed pods each, which will help establish many new plants.

We also found many Tier 2 at-risk plant species, including spotted St. John’s wort (*Hypericum punctatum*), ebony spleenwort (*Alsplenium playneuron*), Maryland senna (*Senna marilandica*), and showy-wand goldenrod (*Solidago speciosa* var. *pallida*), many in numbers large enough to sustain healthy populations. Some animal at-risk species have included American Woodcock (a sighting which is at the far western edge of its migratory path), Greater Prairie-Chickens, multiple coveys of Northern Bobwhite, and a Black Rat Snake (another species at the far western edge of its range).

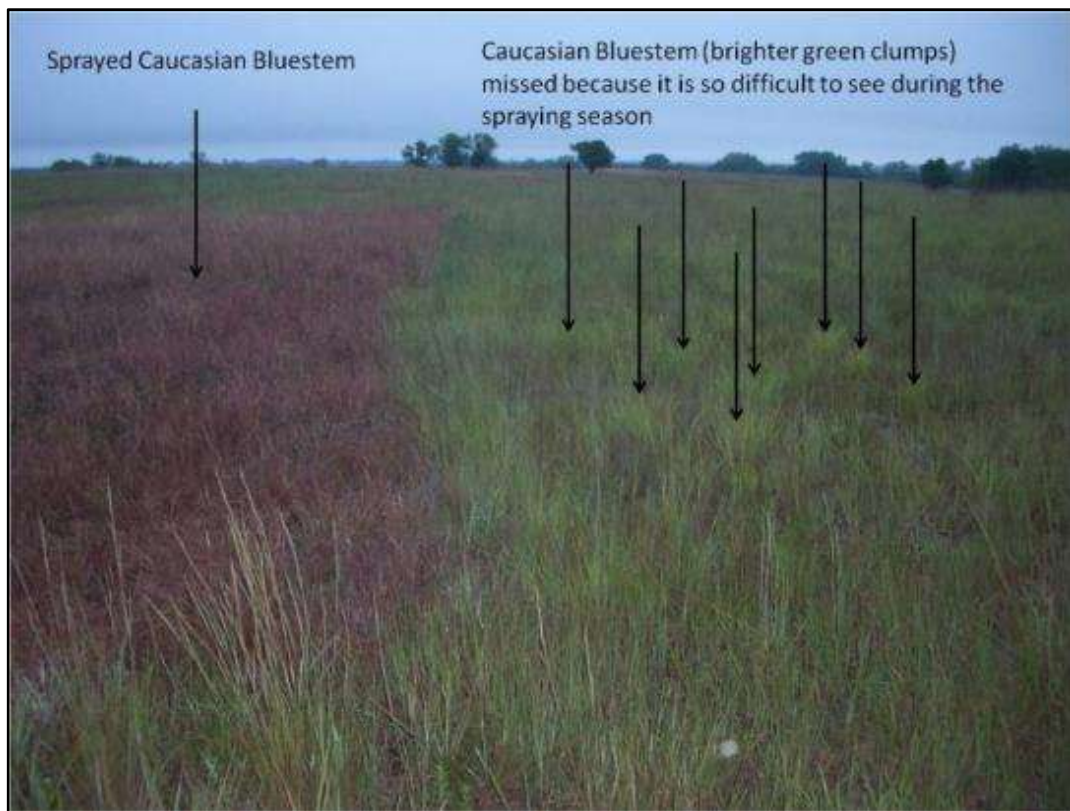


Photo showing results of Caucasian bluestem management via herbicide spraying at the Rock Creek Natural Legacy Demonstration Site in 2014.

### 3. Niobrara Demonstration Site

Aerial imagery is included below showing the drastic impact of tree thinning and prescribed burning at Niobrara. Images from the three camera traps will later be analyzed for visual effects of habitat improvements.



Aerial imagery of Niobrara SP in 2016 (above) and 2019 (below) showing the drastic impact of tree clearing and prescribed burning, with a particular example highlighted in the red oval.



#### **4. Wildcat Hills Demonstration Site**

The native pollinator plot around the new nature center is now established and growing well. Staff and visitors regularly report enjoying finding a diverse assemblage of insects and birds around the site.



A wide array of insect species have been found in the pollinator plot planted at the Wildcat Hills Natural Legacy Demonstration Site.

#### **5. Spring Creek Prairie Demonstration Site**

The areas cleared of vegetation are being monitored, and we are seeing promising initial results that the management was an effective control of invasive woody species. However, there is a seedbank of these woody species that exists in the soil and will need to be managed for years to come. In response to this seedbank, we intend on holding many more burns in the future.

#### **6. Indian Cave Demonstration Site**

Five time-lapse cameras were used to collect images at the Indian Cave Demonstration Site in order to evaluate response to habitat management practices. Videos can be created from the images to show the changes in tree density, sunlight to the forest floor, and plant diversity that have taken place over the course of many years. The long-term nature of the time-lapse cameras makes them valuable for showing gradual changes that take place over many years. Imperfect human memory, and also staff turnover can make it difficult to remember all the gradual changes.

### **Central Loess Hills BUL Monitoring & Research:**

Monitoring for lek activity of Greater Prairie-Chickens has been occurring on an annual basis since 2009. This monitoring effort continues through the breeding season for Greater Prairie-Chickens and involves over 600 listening locations along roadside routes. Multiple biologists from Pheasants Forever and the Nebraska Game and Parks Commission assist with this effort. Results from this monitoring are helpful in assessing the status of Greater Prairie-Chickens in the Central Loess Hills region and are used to identify conservation priority areas throughout the area.

We conducted annual grassland bird monitoring for several years by using the same roadside routes and listening locations as for monitoring of Greater Prairie-Chickens. These surveys provide information about grassland bird use of the Central Loess Hills ecoregion. When combined with the data from the monitoring of Greater Prairie-Chickens, this informs us about what grassland bird species benefit from projects that specifically target habitat for Greater Prairie-Chickens, and which grassland birds might need species-specific conservation attention.

When conditions allow, we have conducted winter aerial surveys for North American river otters throughout the Upper Loup Rivers system. A generous donation of time and fuel by a local pilot allows us to survey the channels of the river for river otter activity. These surveys are conducted in the winter when the channel is frozen over and belly slide marks can be observed from the air.

Incidental observations are recorded for nests of Bald Eagles and for sightings of Whooping Cranes. In addition, active area sand and gravel operations are searched for the presence of Least Terns and Piping Plovers. These birds often nest in the exposed sand these operations create.

### **Loess Canyons BUL Monitoring & Research:**

#### American Burying Beetle (ABB)

ABB and carrion beetle trapping surveys have been occurring annually in the Loess Canyons BUL since 2007. The same three routes and 24 traps are set for 5 trap nights in August. Several partners are involved in this endeavor, including University of Nebraska–Lincoln (UNL), USFWS, Pheasants Forever, high school and college students, Natural Resources Conservation Service, and private conservation entities. Individual ABB are measured and tagged for a mark-recapture analysis, and other carrion beetle diversity and abundance is estimated. UNL has been extensively involved in collecting and analyzing data in 2019 and 2020. Anecdotally, the ABB population is dynamic but appears healthy, sustainable, and seems to benefit from diverse mixed grass prairie interspersed with woody draws, which is the standard of a healthy Loess Canyons landscape.

### Prairie Grouse

The old prairie grouse (i.e., Greater Prairie-Chickens in the Loess Canyons) auto route transects are being phased out and replaced by a statewide grouse survey protocol. This is desirable because it depends less on audible sensing, and includes visual sensing as well. Three sections/surveys were completed by the biologist in 2020, and the plan is to monitor 2–3 sections annually going forward. Auto monitoring transects were completed sporadically from 2016 to 2019 and depend on volunteers with good hearing, as the coordinating biologist cannot pick up prairie chicken booming frequencies well. Greater Prairie-Chickens do occur intermittently in the Loess Canyons and are highly dependent on cedar removal and prescribed fire to restore and maintain lekking and nesting habitat. Prairie-Chickens have very little to no tolerance for cedar tree encroachment, and none of the birds were noted in the surveys done in 2020, which took place during heavy cedar tree cover.

### Project Monitoring

Individual private land habitat projects nearly always involve mechanical cedar tree removal, firebreak preparation, and prescribed fire. The before and after differences are often dramatic and impressive, but the main method of quantitatively analyzing habitat change and success on these projects is taking periodic photo points and vegetation surveys. Vegetation surveys include quantification of vegetation richness and evenness, height, and percentages of bare ground and residue. These surveys are corroborated with photo points. With over 170 current Natural Legacy projects in the Loess Canyons, monitoring is not feasible on every project annually, but it is completed on significant projects and on a periodic basis. Also, significant projects are evaluated with percent tree canopy cover analysis based off aerial images.

### Breeding Bird Survey

There are several breeding bird survey routes in the Loess Canyons. Efforts are made to complete at least some of these annually to document the bird species present. These are challenging to complete, and require a well-qualified ornithologist volunteer, or ornithologist resource professional to run the route. The data, however, are very valuable. Over 300 species of birds have been documented in the Loess Canyons.

### Herptiles:

Colleen Rothe-Groleau with NGPC spent time in 2018, 2019 and 2020 setting drift fences, pitfall traps, and plywood cover boards to assess herptile species richness and evenness in the Loess Canyons. Although data gaps still exist, these monitoring efforts help define the distribution and abundance of Tier 1, Tier 2, and federal species of concern in the Loess Canyons, and provide feedback data to assist with the adaptive management process.



## **Middle Niobrara, Keya Paha, Lower Niobrara, Elkhorn River Headwaters, and some of Cherry County Wetlands BULs**

We have been working with the Niobrara Valley Preserve to monitor plant community response to oak woodland thinning and prescribed fire. We have also initiated an annual survey for American burying beetles in the Middle Niobrara BUL that will allow us to monitor population fluctuations over time, inform our understanding of carrion beetle distributions, and in the future may potentially be useful for assessing how our habitat improvement projects can positively or negatively affect carrion beetles.

We have been conducting annual surveys for butterflies and floral resources on some of our prairie restorations, including 265 ac. of former crop ground seeded to mixedgrass prairie in the Elkhorn River Headwaters BUL. We are also tracking survival of experimental prairie violet plugs we hand-planted on that same restoration. Violets are a host plant for the at-risk regal fritillary but have limited dispersal ability and are not available in seed mixes.

In 2020, we conducted our first bumble bee surveys in the Middle Niobrara and Keya Paha BULs as part of the Xerces Society's Nebraska Bumblebee Atlas. In 2020, we conducted a burrowing owl survey that clarified the owl's status. We knew very little about Burrowing Owls within the Keya Paha BUL and had very few records of it, despite its status as a Tier 1 at-risk species in the BUL. Both NGPC and the South Dakota Game, Fish, and Parks will use the results to prioritize wildlife habitat improvement projects in the region. We continued our annual contributions to state-wide prairie grouse surveys and the USGS Breeding Bird Survey.

### **Pollinator Monitoring:**

Pollinator Ecologist Cody Dreier contributed data to the Nebraska Bumblebee Atlas in 2019 by surveying five sites. We also tagged 40 monarchs for Monarch Watch. He then worked on data entry and consolidating our pollinator records from 2016–2019 for the Surveys for Rare Butterflies of the Tallgrass Prairie of Eastern Nebraska into a single cohesive database. We also developed a new database to hold the 2019 distance sampling data.

In late 2019, we started to plan for the 2020 Surveys for Rare Butterflies of the Tallgrass Prairie of Eastern Nebraska. By the end of March, we started to realize the effects of COVID on our plans and switched our trainings to virtual as opposed to in-person trainings.

In early June, the ecologist led two separate 3-hr. training sessions for our Surveys for Rare Butterflies of the Tallgrass Prairie of Eastern Nebraska. The trainings had about 33 and 24 people respectively that made it to the end of each session. There were 195 surveys completed, and we excluded another 45 sites over the course of the summer with 33 total participants.

After the Surveys for Rare Butterflies of the Tallgrass Prairie ended in August, he participated in the Nebraska Bumblebee Atlas in 2020 and surveyed 10 sites. We also tagged and sampled 80 monarchs for Monarch Watch and Project Monarch Health.

In the fall of 2020, he worked on data entry for the Surveys for Rare Butterflies of the Tallgrass Prairie of Eastern Nebraska and developed RStudio code to analyze the results. Minor

revisions to the protocol are expected after analyses, but then we plan to move forward with an even more successful 2021 sampling season.

#### **At-risk Bat Monitoring in the Pine Ridge BUL:**

The CWB and NGPC Biologist met with Erin Considine, USFS Biologist, to discuss cooperative bat surveys, results, and plans for collaborating on acoustic monitoring for bats. Acoustic detectors were installed in locations with potential suitability for bats, near open water and cliffy areas. Acoustic detectors were set up at Fort Robinson State Park along the Red Cloud Buttes. The CWB worked on revising the spatial data for bat acoustic surveys in Nebraska in preparation for adding results/species data. Three project areas were surveyed with acoustic detectors for bats. Some additional locations at Fort Robinson SP were also surveyed. An exit count was conducted at one of the buildings at Fort Robinson SP known to host roosting bats in an attempt to get a better idea of the number of bats using the building.

The discovery of hibernating bats in a crevice in northeastern Nebraska and the need for continued sampling for White-nose Syndrome prompted us to start doing some winter acoustic surveys for bats to attempt to determine if we have any overwintering bats in the Pine Ridge BUL. The CWB also created maps of designated survey areas for Chadron State College students in Dr. Teresa Frink's Wildlife Techniques class who have begun assisting with acoustic bat surveys through fall and winter.

The CWB assisted with coordination of NABat surveys in the panhandle. A new driving route survey was added using NABat protocols in an area of interest north of Harrison, through Gilbert-Baker WMA.

#### **Watchable Wildlife Monitoring:**

The Watchable Wildlife Biologist developed and coordinated more than four citizen science projects across the state, trained 30 volunteers through five different workshops, helped develop Citizen Scientists of Nebraska, and helped provide scholarships to schools and assisted living centers to participate in a citizen science project. The Salamander Search citizen science workshop brought together 30 participants to learn how to locate and record observations of small-mouthed and tiger salamanders within the state. Additionally, the Watchable Wildlife Biologist helped to develop 25 Watchable Wildlife guides that are available online and describe the wildlife in different regions of Nebraska. The Watchable Wildlife Biologist also provided educational programs and assisted with organizing several events including many bioblitzes that were attended by more than 1,300 youth and families.

**Many of the wildlife conservation initiatives that the Nebraska Natural Legacy Project has undertaken for at-risk species would not have been as effective, or even possible without this important support from the Nebraska Environmental Trust.**