Mission Statement

The Mission of the Nebraska Natural Legacy Project is to implement a blueprint for conserving Nebraska’s flora, fauna and natural habitats through the proactive, voluntary conservation actions of partners, communities, and individuals.

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The Nebraska Natural Legacy Project (Legacy Project) has developed an effective structure of partnerships that implement voluntary, incentive-based conservation actions for the benefit of at-risk species and many common species. Ground-level habitat delivery is focused primarily in Biologically Unique Landscapes (BUL) and orchestrated by Coordinating Wildlife Biologists (CWB). These local Coordinating Wildlife Biologists rely on collaboration with landowners and partners to accomplish large-scale habitat improvements across fence lines. Communication, collaboration and education efforts target multiple audiences since habitat restorations are only possible when the conservation community is well-informed. Also, the conservation actions we do today are sustainable only when the next generation embraces wildlife and habitat as valuable resources. Actions are evaluated and species are tracked to ensure actions are efficient and effective.

The objectives for this grant were to implement conservation projects on private and public lands; conduct education and outreach; and evaluate conservation actions.

A special thanks to the Nebraska Environmental Trust Board members and staff that make implementation of the Natural Legacy Project possible.
Objective 1: Implement Legacy Project conservation actions on private lands and conservation lands. This grant will enhance and restore 100,000 acres of at-risk species habitat statewide.

The most common actions to enhance and restore habitat include invasive species removal, re-introducing natural disturbance such as prescribed fire and modifying existing management tools such as grazing. Prescribed fire is a controlled version of the historic disturbance that maintained the grasslands and is a valuable tool to control the encroachment of invasive or undesirable species. In some of Nebraska’s forests, tree densities have increased significantly. Tree thinning restores the understory community, retards the spread of the devastating diseases and destructive insects, and reduces wildfire risk. Conservation actions also include wetland restoration and riparian corridor improvements.

Accomplishments:
- 159,345 acres enhanced (97% private land)
- 1138 landowners engaged in projects
- Habitat improved for 89 at-risk species

Conservation actions are focused in Biologically Unique Landscapes (BULs). The BULs contain relatively intact habitat and higher numbers of at-risk species, so actions focused in these locations have a greater potential impact. Although conservation actions are designed for at-risk species, habitat restoration benefits the more common species as well.
Executive Summary

Historically, most fires consumed and prevented invasive tree encroachment over many thousands of acres. Contemporary prescribed fires are rarely larger than a couple hundred acres. However, across Nebraska there is a growing interest in safely implementing prescribed fire among local landowners. With an increasing cultural acceptance of prescribed fire, landowners are cooperating not only with resource professionals, but also with each other.
Objective 2: Implement Partnership Team Projects

Conservation of Nebraska’s biodiversity is a task larger than the resources of any one organization, community or individual. Therefore, successful development and implementation of the Natural Legacy Project is driven by collaborative partnerships. The Natural Legacy Partnership Team is integral to implementation of the Natural Legacy Project. This team developed criteria and selected projects that advanced Legacy Objectives.

Accomplishments:

Three innovative projects improved habitat at Demonstration Sites, restored wetlands for a multitude of at-risk and common species, and evaluated potential conservation actions to direct future restorations. These projects collectively enhanced over 1395 acres.

Before and after photos of a wetland restoration at The Nature Conservancy’s Demonstration Site.

Natural Legacy Partnership Team

Audubon Nebraska
Ducks Unlimited, Inc.
Farmers Union
Nebraska Alliance for Conservation and Environment Education
Nebraska Association of Resources Districts
Nebraska Cattlemen
Nebraska Corn Board
Nebraska Corn Growers Association
Nebraska Department of Agriculture
Nebraska Farm Bureau
Nebraska Forest Service
Nebraska Game and Parks Commission
Nebraska Land Trust
Nebraska Soybean Association
Nebraska Wildlife Federation
Nebraska Wildlife Society
Pheasants Forever, Inc.
Ponca Tribe of Nebraska
Rainwater Basin Joint Venture of Nebraska
Sandhills Task Force
The Nature Conservancy
USDA Natural Resources Conservation Service
US Fish and Wildlife Service
US Forest Service
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Objective 3: Implement education and outreach directed towards biodiversity conservation, habitat enhancement and sustainable land and water management.

At-risk species conservation is only successful when the conservation community is knowledgeable and engaged. The conservation community is broad, with many target audiences. It includes scientists and conservation practitioners who need the opportunity to communicate the most current scientific information and restoration techniques. It includes private landowners that are the primary stewards of Nebraska’s wildlife. It includes adults that are seeking opportunities to contribute. It includes the children, who will be faced with conservation challenges as our future decision makers.

Accomplishments:
154,000 students, landowners, practitioners, educators and individuals from the public were reached through Natural Legacy education and outreach programs.

Comparison of an eagle’s egg and a hummingbird egg.
Executive Summary

Objective 4: Evaluation of conservation actions

Accomplishments:
More than 11 projects have influenced how conservation action is delivered among partners. The information from this grant will continue to impact future actions.

Delivering efficient and effective conservation means that there is a constant need to further our understanding of at-risk species and habitat requirements, and to evaluate the effectiveness of our conservation actions. This research and inventory is changing conservation action delivery. Many of the projects initiated during this grant will continue over the next several years.

Surveys for the hawk moths that pollinate the Western Prairie Fringed Orchid (Red Circle) found three species known to pollinate this federally protected orchid.

Coordinating Wildlife Biologist preparing for dawn bird surveys.
Contributing Match

It is difficult to separate one partner from the collective group, but two partners pledged match to this Nebraska Environmental Trust Grant: the Natural Resources Conservation Service (NRCS) and the U.S Fish and Wildlife Service. The NRCS has integrated the Natural Legacy Project into Farm Bill programs through an Environmental Quality Incentives Program (EQIP) Special Initiative. Beyond the Special Initiative, the NRCS is a strong partner in providing quality habitat for at-risk species. The U.S. Fish and Wildlife Service is also a strong partner and works collaboratively on the ground, but also in planning and establishing goals at the BUL level.

Partner Contributions

U.S. Fish and Wildlife Service: Partners for Fish and Wildlife
Provided a total of $338,681 in match and involved 56 projects.

Natural Resources Conservation Service provided $831,304.57 affecting 19,138.10 acres, 9 water development projects and 99,475 linear feet of improvements.
Habitat Restoration
Objective 1: Enhance and restore 100,000 acres of habitat on private lands and conservation lands

Sandstone Prairies, Southeast Prairies, Indian Cave Bluffs and Rulo Bluffs Biologically Unique Landscapes

At-risk species and focal species that have benefited from conservation actions

<table>
<thead>
<tr>
<th>Species</th>
<th>Species</th>
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<tbody>
<tr>
<td>Greater Prairie Chicken</td>
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<td>Black-and-white Warbler</td>
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<td>Henslow's Sparrow</td>
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<td>Nodding Pogonia</td>
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<td>Wood Thrush</td>
<td>Eastern Chipmunk</td>
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<td>Kentucky Warbler</td>
<td>Eastern Gray Squirrel</td>
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<td>Regal Fritillary</td>
<td>Prairie Kingsnake</td>
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<td>Louisiana Waterthrush</td>
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<td>Bigroot Morning-glory</td>
<td>Button-snakeroot</td>
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<td>Clasping-leaf Milkweed</td>
<td>Cream Gentian</td>
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<td>Dwarf Larkspur</td>
<td>Green Dragon</td>
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<td>Hairy Gayfeather</td>
<td>Hoary Mountain-mint</td>
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<td>Haiti Mountain-mint</td>
<td>Pea</td>
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<td>Iowa Crab Apple</td>
<td>Iowa Crab Apple</td>
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<td>Limestone Wild Petunia</td>
<td>Limestone Wild Petunia</td>
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<tr>
<td>May Apple</td>
<td>Ohio Buckeye</td>
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<td>Pale Indian-plantain</td>
<td>Prairie Fawn Lily</td>
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<td>Purple Milkweed</td>
<td>Roundhead Prairieclover</td>
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<td>Showy Orchid</td>
<td>Spikenard</td>
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<td>Slender Fimbry</td>
<td>Thaspine Gayfeather</td>
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<tr>
<td>Wool Grass</td>
<td>Yellow Lady’s Slipper</td>
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</tbody>
</table>

31,256 Acres of Improved Habitat

- Sandstone Prairies Private Ground: 18,374 acres
- Southeast Prairies Private Ground: 8,027 acres
- Indian Cave BUL Public Ground: 3,300 acres
- Indian Cave BUL Private Ground: 1,251 acres
- Rulo Bluffs Private Ground: 304 acres

137 Additional Landowners were provided with habitat technical assistance

The ultimate goal in each of the four BULs (Sandstone Prairies, Southeast Prairies, Indian Cave Bluffs, and Rulo Bluffs) is to work collaboratively with landowners to manage native prairies and oak woodlands in ecologically, yet economically sustainable ways. As in many areas in Nebraska, common land management practices of the past have led to invasion of prairies by cedar trees and other woody species. In addition, fire suppression has resulted in loss of oak regeneration in the oak woodlands. Losing both prairies and oak woodlands continues to threaten declining species. In the southeast corner of Nebraska, biologists are working with landowners to understand how to manage prairies and woodlands sustainably, with the goal of providing habitat for at-risk species for the foreseeable future.

When the Natural Legacy Project was initiated over a decade ago, the most common type of habitat improvement project of this program involved mechanical removal of invasive trees. However, mechanical tree clearing is not a sustainable practice. It does nothing to address the underlying ecological reasons why trees invade prairies, and the cost is typically the equivalent of several years’ worth of income that can be generated from a given property. These mechanical tree clearing projects have laid the foundation with local landowners to create future land management plans that prevent these problems from happening again.

There are notable successes with this approach in the Sandstone Prairies BUL where relatively extensive areas of grassland remain and cattle ranching prevails. At several sites within the BUL, the Coordinating Wildlife Biologist (CWBP) Kent Pfeiffer and partners have been able to stitch together multiple tree clearing projects to create large blocks of contiguous grassland.

More importantly, landowners are beginning to see prescribed fire as a routine component of their approach to land management. Prescribed fire as a management tool is an affordable solution for long-term sustainability. Landowners often even work cooperatively to enable larger, yet safer, burn units. The adoption of prescribed fire has effects that ripple through all of their decisions regarding management. As just one example, pastures need at least some rest from grazing to develop the necessary residual cover to carry a fire. Until recently, rested areas were somewhat of a missing habitat component in southeast Nebraska prairies.

As biologists continue to support these concepts and practices in all four BULs, there is good reason to hope that the work will have a lasting impact on the landscapes and the at-risk species that are dependent on them.
Mechanical tree clearing is one of the primary tools we have used to improve grassland habitat quality on private lands. However, it is not a sustainable approach to management over the long term. So, while we continue to do tree clearing projects as necessary, we also increasingly emphasize more sustainable techniques such as prescribed fire and planned grazing.

Southeast Natural Legacy Partners
Spring Creek Prairie Audubon Center, The Nature Conservancy, Weston Family Foundation, Southeast Nebraska Grassland Association, USFWS Partners For Wildlife, Five Rivers Weed Management Area, NRCS, Prairie Plains Resource Institute, Moonshell Media LLC., Girl Scouts Spirit of Nebraska, Fontenelle Forest Association, Nebraska Environmental Trust.

One result of prescribed fire in oak woodlands and prairies is the reappearance of rare wildflowers such as Dwarf Larkspur, Turks Cap Lily (above) and Cream Gentian.
Oak woodlands that are not managed (left) allow a dense mid-story canopy, limited ground cover, erosion, and prevent sunlight from reaching the ground. This situation also prevents oak regeneration. With thinning and prescribed burning, the mid-story canopy is removed which promotes ground vegetation, reduces invasive species and promotes oak regeneration (right). The CWB has initiated an extensive prescribed fire program in the Indian Cave Bluffs and Rulo Bluffs BULs, on both private and public lands. At Indian Cave State Park alone, biologists have completed prescribed fires totaling over 7,000 acres. Many areas have been burned multiple times. The most recent fire at the park was a cooperative effort with adjacent landowners including 400 acres of park land and 900 acres of private land. This is an important step towards the larger, safer burn units necessary for sustainable management.
Verdigris-Bazile, Willow Prairies, Missouri River, and Ponca Bluffs Biologically Unique Landscapes

At-risk species and focal species that have benefited from conservation actions

<table>
<thead>
<tr>
<th>Greater Prairie Chicken</th>
<th>Regal Fritillary</th>
<th>Western Prairie Fringed</th>
<th>Ottoe Skipper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell’s Vireo</td>
<td>Plains Pocket Mouse</td>
<td>Orchid</td>
<td>Bald Eagle</td>
</tr>
<tr>
<td>Loggerhead Shrike</td>
<td>Small White-lady’s Slipper</td>
<td>Northern River Otter</td>
<td>Short-eared Owl</td>
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<tr>
<td>Wood Thrush</td>
<td></td>
<td>Iowa Skipper</td>
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</tbody>
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In Northeast Nebraska over the past three years, landscape-scale projects involving many techniques and multiple landowners have seen a significant rise. A notable accomplishment is the volume of acres that have been impacted, including projects using prescribed burns, mechanical tree removal, and forest stand improvement, reaching over 10,000 acres. These projects have extended beyond the boundaries of the Verdigris-Bazile and Lower Niobrara BULs, encompassing the Ponca Bluffs BUL and Willow Creek BUL.

A second major noteworthy accomplishment is the success of collaborative and cross-walking goals with partner agencies. USDA programs, including WRE, EQIP, and CRP, play a crucial role in improving habitat across the BULs. We also work closely with USDA to ensure that impacts to threatened, endangered, and other at-risk species are avoided. Biologists collaborate with the Ponca Tribe and Santee Sioux Tribe, which are both found within the boundaries of the Verdigris Bazile BUL and the Missouri River BUL. Both tribes own and actively manage their grassland, woodland, and wetland habitat found within their property borders.

In recent years, Coordinating Wildlife Biologist Rebekah Jessen has increased efforts to enhance larger habitat complexes. One such project complex is found in an area adjacent to the Bazile Creek. This was accomplished by bringing together the conservation efforts of a variety of agencies and a number of private landowners. This habitat block also includes multiple partners and financial resources including NRCS-WRE conservation easements along the Bazile Creek corridor, a NGPC Wildlife Management Area, USDA-EQIP agreements, NGPC Grouse Grant agreements, and Legacy agreements that have led to more than 1,153 acres of mechanical tree removal and 1,100 acres of prescribed burning. Future plans in this area also include a multi-landowner prescribed fire and additional tree removal on an adjoining property.

The future of the Legacy mission in the Northeast BULs continues to look bright. To ensure that the efforts of the Nebraska Natural Legacy Project persist for years to come, biologists will continue to forge new partnerships and maintain current positive relationships with agencies working in the BULs. By continuing to engage numerous partners, strategic larger habitat blocks will be enhanced. These collaborative efforts are integral to bringing attention to species and habitat conservation.

10,861 Acres of Improved Habitat

- Verdigris-Bazile BUL: 6678 acres private, 614 acres public
- Ponca Bluffs BUL: 885 acres private, 104 acres public
- Willow Creek Prairies BUL: 880 acres private
- Lower Niobrara BUL: 1700 acres private

Landowners engaged in projects: 45

Technical assistance provided to a total of 242 individuals collectively representing 37,800 acres.
Northeast Natural Legacy Partners


Landowners across Nebraska commonly turn to mechanical tree removal as a way to reclaim grassland habitat. This particular landowner in the Verdigris-Bazile BUL cleared invasive Eastern red cedar and locust trees to restore 163 acres of mixed grass prairie. We have also worked with 3 additional landowners within a 1 mile radius of this site to open a larger grassland complex. At-risk species found in abundance on and near this site include Greater Prairie Chickens and Regal Fritillary butterflies. Other species that have experienced benefits from invasive tree removal practices across the BUL include Bell’s Vireo, Iowa Skipper, Otoe Skipper and Plain’s Pocket Mouse.
The use of prescribed fire continues to be a popular method of maintaining open grassland acres. This prescribed burn that occurred in 2014 was successful in killing 95% of the cedars that infested this 120-acre prairie. On average, it is estimated that approximately 5,000-6,000 acres of native grassland habitat receive prescribed fire annually within the Verdigris-Bazile BUL. These burns are completed through efforts of the Nebraska Natural Legacy Project, USDA programs, local burn associations, Tribal entities, NGPC public land managers, and independently by landowners.
Between 2013 and 2016, the Loess Canyons Biologically Unique landscape has seen landowner engagement in wildlife conservation grow by leaps and bounds. The Canyons are mostly contiguous mixed-grass prairie with little cropland fragmentation. The major invasive species are native cedar trees, exotic bromes, and bluegrass. However, it is evident that landowners recognize these invasives as threats to their own operation as well as to wildlife, and that grazing deferments followed by prescribed fire can restore ecological integrity to this landscape.

A crippling drought hit in 2012 which briefly stopped prescribed fire for the 2013 burn season; however, it did not stop the proud stewards from planning tree removal, grazing deferments, firebreaks, and future burns. Over the next three years, the Coordinating Wildlife Biologist Andy Moore, created conservation plans for these practices on 56,826 acres of private land. When the rains came, the landowners and the burn associations were ready.

The Loess Canyons Rangeland Alliance is the longest established burn association in the area, and a prominent association in Nebraska. In the last three years, they have burned over 19,000 acres in the western Canyons, including nearly 10,000 acres in 2016 alone, all without major incident. Members have honed their skills and come together as a team, burning in a safe, efficient, and effective method. They have greatly increased safety of firebreaks and firebreak preparation. Multiple landowners are joining together to burn from county road to county road, making large, safe and efficient fires. Interior ignition is used with great timing to increase the effectiveness of fire to kill cedar trees. This association has the ability to do multiple burns at a time and has had 75 members show up on one burn day.

The Central Platte Rangeland Alliance is establishing its own track record. This winter both Pheasants Forever and the Prescribed Burn Task Force held workshops in Gothenburg to help train new members. They burned ~7,500 acres in spring 2016.

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**At-risk species and focus species that benefit from conservation actions**

<table>
<thead>
<tr>
<th>Bell's Vireo</th>
<th>Northern Bobwhite (Focus species)</th>
<th>Scissor-tailed flycatcher</th>
<th>Eastern Woodrat</th>
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<tbody>
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<td>Swainson’s Hawk</td>
<td>Barn Owl</td>
<td>Black billed Magpie</td>
<td>Elk (focus species)</td>
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<td>Ferruginous Hawk</td>
<td>Burrowing Owl</td>
<td>Sharp-shinned hawk</td>
<td>Speckled Kingsnake</td>
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<td>Golden Eagle</td>
<td>Short-eared Owl</td>
<td>Black-tailed Jackrabbit</td>
<td>Eastern Hognose Snake</td>
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<td>Prairie Falcon</td>
<td>Loggerhead Shrike</td>
<td>Plains Pocket Mouse</td>
<td>American Burying Beetle</td>
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<td>Merlin</td>
<td>Savannah Sparrow</td>
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<td>Regal Fritillary</td>
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<td>Northern Saw-whet Owl</td>
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<td>Plains Harvest Mouse</td>
<td>Whitney's Underwing</td>
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<td>Greater Prairie-chicken</td>
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<td>Hispid Cotton Rat</td>
<td>Married Underwing</td>
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</tbody>
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**32,853 Acres of Improved Habitat on Private Ground**

- 581 landowners engaged in Legacy Projects or provided technical assistance.

Technical assistance provided to private landowners collectively represents an additional 24,243 acres for a total of 56,826 acres.
The Upper Medicine Creek Prescribed Burn Association was started with leadership and coordination from the local biologist and a local landowner willing to serve as a burn boss. With funding and support from Pheasants Forever, they have completed their 2nd successful burn season, burning just over 1,000 acres. This will be a resource for landowners in and around the Canyons to implement prescribed fire.

The momentum and implementation is promising, but a sustainable level has not yet been reached. The Loess Canyons area is approximately 338,000 acres. It is estimated that the fire return interval to keep cedars from encroaching is 10 years. Therefore, for a BUL goal of sustainable grasslands, landowners will need to burn approximately 33,000 acres per year. This year, between associations and private contractors, nearly 20,000 acres were burned in the Canyons. The landowners here are engaging in prescribed fire at a rapid rate, and if support and coordination continues, a critical point may soon be reached where they can sustainably manage cedar encroachment. Now is the time to invest in training new burn bosses, establishing new burn associations started, and supporting current associations.

Scott Stout is the burn boss for the Loess Canyon Rangeland Alliance (LCRA). Darryl Schick is the president. Both men are effective land stewards and great leaders in the burn association and among regional ranchers. This group burned over 19,000 acres between 2013-2016, making a tremendous ecological impact on the Canyons. The Coordinating Wildlife Biologist is fortunate to work with these land stewards and provide assistance planning and implementing burns with LCRA landowners.
Tribute to Ron Bourne

Ron Bourne owned several sections of land in the Loess Canyons BUL. Since retiring from Great Plains Health as an anesthesiologist, he spent much of his time managing and improving his property for wildlife and sustainable cattle ranching. He battled invasive cedar trees with mechanical removal, deferred grazing, installed firebreaks, and prepared for a spring prescribed fire.

Not only was Ron an effective steward for his own land, but also for his neighbors. He supported the Nebraska Game and Parks Commission, NRCS and Pheasants Forever programs and explains the benefits to his neighbors. As a result of his influence and inspiration, seven of his neighbors agreed to put in firebreaks, defer grazing and join a spring prescribed fire. These neighbors also participated in several conservation programs and cut hundreds of acres of cedar trees. With Ron’s advocacy, over 2,000 acres of native mixed-grass prairie was restored, all in a time span of about three years. Several of these properties have gone from over 65% cedar canopy to less than 20% cedar canopy coverage with mechanical tree removal. Ron was also an active member of the landowner burn group- the Loess Canyons Rangeland Alliance, and recruited several other people to join as well.

The landscape under the stewardship of these landowners contains tremendous biological diversity. It is home to an endangered species- the American Burying Beetle. There are also dozens of bird species of concern that use this property, including Bobwhite Quail and Greater Prairie Chickens. This area has high density of Wild Turkeys very. Ron and his friends do a fine job of quality deer management for whitetail and mule deer and have elk using their property.

Ron is an inspiration because he accomplished all this work despite declining health, with some ailments that stem from the Vietnam War where he served his country in the armed forces. Even when Ron didn’t feel like it, he was out working, and picking up the phone to encourage and inform his neighbors. This project highlights that true landscape impact is accomplished when private land stewards and conservation partners work together for the good of our natural resources.

Ron passed away in December 2015. He never did get to see his first burn completed, but two were completed just a couple months after his death. At his funeral, Ron’s family collected a memorial, the results of which were a $10,000 donation to the Loess Canyons Rangeland Alliance. The conservation community owes their thanks to Ron and future generations of the Loess Canyons will benefit from the legacy of Ron’s passion and leadership.

Loess Canyons Partners

USFWS, NRCS, Pheasants Forever, NE Forest Service, Twin Platte NRD, Central Platte NRD, Loess Canyon Rangeland Alliance, Central Platte Rangeland Alliance, Upper Medicine Creek Prescribed Burn Association, UNL extension and research, Lincoln County and NPPD, Nebraska Land Trust and Nebraska Environmental Trust.

This project highlights that true landscape impact is accomplished when private land stewards and conservation partners work together for the good of our natural resources. Over 2000 acres were restored with a special thanks to Ron Bourne. Thanks to his leadership, more grassland restoration and landscape scale projects will be accomplished in the Loess Canyons.
Middle Niobrara, Keya Paha, Lower Niobrara and Elkhorn River Headwaters Biologically Unique Landscapes

At-risk species that have benefited from conservation action

<table>
<thead>
<tr>
<th>Greater Prairie-chicken</th>
<th>Regal Fritillary</th>
<th>Bailey’s Eastern Woodrat</th>
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<tr>
<td>Bell’s Vireo</td>
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<td>American Burying Beetle</td>
<td>Ottoe Skipper</td>
<td>Northern Long-eared Myotis</td>
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<td>Loggerhead Shrike</td>
<td>Long-billed curlew</td>
<td>Townsend’s Solitaire</td>
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<tr>
<td>Ferruginous Hawk</td>
<td>Burrowing owl</td>
<td>Olive-backed Pocket Mouse</td>
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Coordinating Wildlife Biologist Kelly Corman was hired in July 2013 and had the uphill task of building momentum and interest on habitat incentives for at-risk species while strategically focusing work in areas with the greatest potential benefit. Habitat projects have initially focused on mechanical cedar removal, but prescribed fire has been incorporated into more conservation projects. This is a significant accomplishment in a community that has been very nervous about using fire since the 2012 wildfire that burned nearly 74,000 acres in the Niobrara River Valley. Additionally, the Keya Paha Biologically Unique Landscape is a BUL that has only recently received funding for habitat conservation, so the first Natural Legacy habitat enhancement projects in this BUL marks significant success. About 1,001 acres have been enhanced by mechanical eastern red cedar removal in five projects. As comfort with prescribed fire increases and successes accumulate, it is anticipated that prescribed fire will continue to increase as a land management tool.

The CWB is working toward a strategic approach. A model of greater prairie-chicken presence and abundance has been established within the Keya Paha BUL, Middle Niobrara BUL, and surrounding habitat through extensive lek surveys. This information has been used to guide habitat projects to locations where it will have the greatest impact. These projects have primarily been projects to remove eastern red cedar trees.

Technical assistance and information has been sought by private landowners on invasive species, eastern red cedar management, grazing management, prescribed fire, and wildlife and ecological appreciation. Some conversations have resulted in landowners pursuing the suggested land management activities either on their own, or with other conservation partners such as NRCS and NFS, impacting an additional 960 acres to date. Our habitat work has impacted about 4,128 acres of the Middle Niobrara BUL, 166 acres of the Lower Niobrara BUL, and 428 acres of the Elkhorn River Headwaters BUL during the grant period. In addition, the Coordinating Wildlife Biologist has had involvement in 1,147 acres of habitat enhancement projects funded by NRCS, USFWS Partners for Fish & Wildlife, STF, and NFS partners.

Our work controlling eastern red cedar in prairies to maintain open grasslands has benefited Greater Prairie-chicken, Bell’s Vireo, American Burying Beetle, Loggerhead Shrike, Regal Fritillary, Iowa Skipper, Ottoe Skipper, and Long-billed Curlew. We have also worked with funding from partner agencies to restore crop fields to grasslands, reducing grassland habitat fragmentation. Our woodland habitat work has benefited Eastern Whip-Poor-Will and priority communities like dry upland bur oak woodlands. In addition to implementing mechanical cedar removal and prescribed fire in prairies and woodlands, we have installed 100 wildlife escape ramps in stock tanks to reduce needless mortality of birds, bats, and small mammals.

5,722 Acres of Improved Habitat

- Keya Paha BUL: 1,001 acres private
- Middle Niobrara BUL: 4,127 acres private
- Lower Niobrara BUL: 166 acres private
- Elkhorn River Headwaters BUL: 428 acres private

Technical Assistance was provided to 68 landowners representing an additional 4,871 acres.

A Keya Paha BUL project before work began November 26, 2013. The bottom photograph shows the same area after cutting and piling of cedar April 1, 2014. This project enhanced a diverse mix of prairie and oak woodland habitats.
Approximately 100 stock tanks will be retro-fitted with wildlife escape ramps to reduce wildlife mortalities. In 2006, the Bird Conservancy of the Rockies reported Ferruginous Hawks, Red-tailed Hawk, Red Crossbills, Lark Bunting, Townsend’s Solitaire, Sharp-tailed Grouse, Burrowing Owls and other species drowned in western Nebraska stock tanks. They also reported that each tank had an average drowning rate of 1.06 birds/tank without escape ramps and 0.16 birds/tank with escape ramps. This simple yet effective conservation action has potential to benefit many at-risk and common birds and mammals.

Photo taken at the Niobrara Valley Preserve.

A Ferruginous Hawk alights on a nest with nearly fledged young.

A contractor uses a mulching attachment on a skid-steer to remove eastern red cedar from Sandhills prairie in Keya Paha County, Middle Niobrara BUL. This work will improve habitat for prairie grouse and other grassland dependent wildlife species. Picture taken October 30th, 2015.

North Central Partners

Landowners, USFWS-Partners for Fish and Wildlife, Sandhills Task Force (STF), NRCS, Nebraska Forest Service (NFS), Pheasants Forever, Niobrara Valley Outdoor Education Partnership, Niobrara Council, The Nature Conservancy, Rock County Public Schools & FFA chapter, National Park Service – Niobrara National Scenic River, Middle Niobrara NRD, Nebraska Environmental Trust.
Loess Hills and Loup River Biologically Unique Landscapes

At-risk species that have benefited from conservation action

<table>
<thead>
<tr>
<th>Species</th>
<th>Habitat</th>
</tr>
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<tbody>
<tr>
<td>Bell’s vireo</td>
<td>Loggerhead Shrike</td>
</tr>
<tr>
<td>Greater Prairie Chicken</td>
<td>Whooping Crane</td>
</tr>
<tr>
<td>Regal Fritillary</td>
<td>Northern River Otter</td>
</tr>
<tr>
<td>Blanding’s Turtle</td>
<td>Small White Lady’s Slipper</td>
</tr>
</tbody>
</table>

Participants in the Prescribed Fire Training Exchange:


The Central Loess Hills Biologically Unique Landscape occupy a large area in central Nebraska. The extent of native grasslands here has provided us with a great platform to deliver meaningful conservation projects that benefit many native grassland wildlife species. Some species, such as the Greater Prairie Chicken occupy and use large areas throughout the year. Conserving large areas for wildlife such as the Greater Prairie Chicken, concomitantly conserves habitat for other species of wildlife that have much smaller grassland area requirements. In the Central Loess Hills, the CWB Ben Wheeler, has focused on delivering large, landscape-scale conservation actions to match the life history requirements of wildlife such as the Greater Prairie Chicken, with the knowledge that these efforts will be conserving many other native plants and wildlife. Actions such as the Prescribed Fire Training Exchange Program and the development of Greater Prairie Chicken Conservation Areas are a direct reflection of this approach. By focusing on large areas, actions not only support a diversity of native grassland wildlife and augment the connections between metapopulations, but also encourage collaborative initiatives which involve multiple landowners who share a common vision of healthy grassland landscapes.

The above photos show an area along the Middle Loup River in Custer County before and after six mechanical tree removal projects were completed.

12,117 Acres of Improved Habitat

- 385 acres Loess Hills BUL, private and 50 acres Loup River BUL, private
- 11,682 acres through the Prescribed Fire Training Exchange

Technical Assistance provided to 110 landowners collectively representing 15,788 acres.
Central Nebraska Partners

During the planning stages of the 2015 Loup Training Exchange, a landowner overlooks eastern redcedar invasion that is undermining the profitability of his livestock operation and reducing quality habitat for grassland wildlife.

Enhanced and restored habitats on private and conservation lands.
At-risk species that have benefited from conservation action

<table>
<thead>
<tr>
<th>Bell’s Vireo</th>
<th>Burrowing Owl</th>
<th>Pearl Dace</th>
<th>Swift Fox</th>
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</thead>
<tbody>
<tr>
<td>Black-Billed Magpie</td>
<td>Golden Eagle</td>
<td>Prairie Falcon</td>
<td>Fringed Myotis</td>
</tr>
<tr>
<td>Plains Topminnow</td>
<td>Short-Eared Owl</td>
<td>Pygmy Nuthatch</td>
<td>White-Tailed Jackrabbit</td>
</tr>
<tr>
<td>Ferruginous Hawk</td>
<td>Cassin’s Kingbird</td>
<td>Black-Tailed Jackrabbit</td>
<td>Long-Legged Myotis</td>
</tr>
<tr>
<td>Brewer’s Blackbird</td>
<td>Swainson’s Hawk</td>
<td>Townsend’s Solitaire</td>
<td>Northern Long-Eared Myotis</td>
</tr>
<tr>
<td>Loggerhead Shrike</td>
<td>Regal Fritillary</td>
<td>Long-Tailed Weasel</td>
<td>Townsend’s Big-Eared Bat</td>
</tr>
<tr>
<td>Burrowing Owl</td>
<td>Blacknose Shiner</td>
<td>Violet-Green Swallow</td>
<td>Rocky Mountain Bighorn</td>
</tr>
<tr>
<td>Long-Billed Curlew</td>
<td>Finescale Dace</td>
<td>Northern River Otter</td>
<td>Sheep</td>
</tr>
<tr>
<td>Brown Creeper</td>
<td>Lewis’s Woodpecker</td>
<td>Tawny Crescent</td>
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</tbody>
</table>

Over the past three years the Pine Ridge, Oglala Grasslands, Panhandle Prairies, and Upper Niobrara River BULs have had three different Coordinating Wildlife Biologists with Erin Devine as the current CWB. Despite the personnel changes and periods of vacancy, Legacy projects were implemented.

Efforts in these BULs have continued to focus on removal of invasive non-native Russian Olive from woodland areas and streams, and removal of Rocky Mountain Juniper and Eastern Red Cedar encroachments on grasslands. Several projects have also been designed to modify ranching infrastructure that allows for better grazing management and improved health of grasslands.

Recently, in the Pine Ridge BUL, projects have been modified to benefit bats. In 2015, the Northern Long-eared Bat was listed as threatened due to the effects of white-nose syndrome, a deadly fungal disease impacting cave-dwelling bats. The threat of the disease and the listing has gained more attention for bats than in previous years.

The Legacy Plan includes several species of bat as Tier 1 and Tier 2 “at-risk” species which are also found in the Pine Ridge: Northern Long-eared Bat, Fringed Myotis, Long-legged Myotis, and Townsend’s Big-eared Bat.

Actions to benefit these “at-risk” species, and all bat species found in the Pine Ridge, include thinning near bat roosting habitats, opening up riparian corridors, and removing invasive species to allow a diverse herbaceous understory which provides important foraging habitat. When they don’t pose a safety hazard, dead trees are left standing for roosting as well.

5089 total acres impacted

- Pine Ridge BUL: 1005 acres private, 1 acres public
- Upper Niobrara River BUL: 3,695 acres private
- Oglala Grasslands: 186 acres public
- Panhandle Prairies: 188 acres private

Technical Assistance was provided on many sites that cumulatively represent an additional 1723 acres.

Large log jams were formed on Sowbelly Creek in Coffee Park in Harrison, NE after flooding events in the spring of 2015. NGPC worked with the Village of Harrison to remove the debris and restore the creek.
Contractors working on removing invasive Russian Olive trees along Sand Creek in Sioux County. This project was done in partnership with the USDA Forest Service on the Oglala National Grassland.

Enhanced and restored habitats on private and conservation lands.

A Hoary Bat captured during surveys conducted by researchers from University of Nebraska-Lincoln in the Pine Ridge BUL.

Long-billed Curlew in Sioux County.

Partners of the Panhandle and Sandhills

At-risk Mussel Restoration

The objective of this project is to use propagation techniques to restore native populations where they have been extirpated. Species propagation and reintroduction is a long-term process that began with developing the techniques and equipment for mussel propagation in the state hatchery system, followed by small-scale reintroduction and monitoring of the populations to see if they are viable. Initial propagation attempts from 2014 resulted in a valuable experience, but very few mussels. However, attempts in 2015 allowed us to refine and develop new techniques. As a result, we ended the year with over 14,000 juvenile Plain Pocketbook mussels in the hatchery system. After experiencing some minor mortality due to potential poor water quality, we still have in excess of 12,000 mussels.

In May of 2016 we collected glochidia from Plain Pocketbook brood females and from Fatmuckets to initiate an additional year class of the Pocketbooks and to start an initial year class Fatmuckets. Various techniques and strategies are being implemented this year to rear both species. Production goals for both species during the summer of 2016 are: ~8,000 >14mm for each species.

We also started the process of experimenting with different tagging and marking procedures to check for mark/tag retention over the summer prior to a fall 2016 stocking of the 2015 year class mussels. Approximately 590 mussel were marked with a white CA glue dot on one side of the mussel and with a green or yellow “bee tag” on the other side. These will be monitored throughout the growing season for tag retention. We also attached a PIT tag to one of the 2014 year class mussels using dental adhesive.

This project will continue and federal funds have been secured to substantially augment the existing facility and equipment for long-term at-risk mussel restoration in Nebraska.

Plain Pocketbook mussel is tagged and ready for release.

Plain Pocketbook is displaying a “lure” to attract a host fish. Once the fish attempts a bite, the Plain Pocketbook will eject its glochidia, or young mussels, onto the fish and they will attach to the gills for a few weeks before dropping off to the stream bed.

25
Several of Nebraska’s Biologically Unique Landscapes (BULs) have been the focus of detailed planning efforts to address the most pressing stresses on our at-risk species and natural communities. Biologists and managers from the Nebraska Game and Parks Commission have held planning sessions with local professionals working in the BUL who can actively influence on-the-ground efforts that impact wildlife habitat. The various planning teams recognized that with limited resources, it was important to have a basic understanding about where conservation efforts were most critical and what could realistically be accomplished. Multiple criteria, research, and expert opinion went into the decision-making process to select targets for conservation efforts, prioritize strategies based on threats, and identify knowledge gaps. This structured decision making process has taken place for Indian Cave Bluffs and Rulo Bluffs, the Pine Ridge, the Central Loess Hills BULs, and has been initiated for the Loess Canyons BUL.

In Indian Cave and Rulo Bluffs, the workgroup prioritized seven focal species and the oak deciduous forest and identified the urgent need to understand oak tree regeneration and the conservation actions that positively impact recruitment. Resources were then investigated to determine how selected species and the oak forest responded to management decisions. Additionally, during the BUL planning process, the workgroup selected timber rattlesnakes as a priority for conservation efforts in southeastern Nebraska. A project is now underway to: 1) Determine the status of timber rattlesnakes in Nebraska, 2) Describe their habitat within the southeastern part of the state, and 3) Use radio telemetry to track individuals to reveal their seasonal movement patterns and locate their den sites in the Indian Cave and Rulo Bluffs BULs.

In the Pine Ridge, four species and eight natural communities were selected as targets for conservation. Regeneration of ponderosa pine is a topic of concern for many landowners and natural resource professionals in western Nebraska. We brought together forestry experts from several states and practitioners local to the area to discuss actions that may be taken to promote ponderosa pine regeneration. The selection of key areas (based on driving factors for regeneration) to potentially replant ponderosa pine is a next step. Tawny Crescents were identified also as a priority in the Pine Ridge. A butterfly larval research project determined that host plants are widely available, so no additional conservation actions for this species are currently prioritized. Given the wildfire potential and multiple other factors that were socially driven, this planning effort engaged University of Nebraska-Lincoln PhD student Daniel Uden on a scenario planning effort for the Pine Ridge.

The Central Loess Hills BUL Planning team assembled in Broken Bow to select species to focus on for conservation efforts within the landscape. The first steps in the Central Loess Hills BUL Conservation Plan were finalized. The planning group discussed and set goals for Northern Bobwhites and Greater Prairie-Chickens, which were identified as conservation targets during the planning process largely because of the two species’ ability to serve as “umbrellas” for conservation. Research needs in the BUL were identified, as well as monitoring plans.

The Loess Canyons BUL planning team met for the first time in North Platte on May 17. The group discussed their expectations for going through the planning process, their goals, the geographic scope of efforts, preliminary conservation targets, and who else should be invited to participate in the discussions. The group decided to continue to focus within the existing BUL boundary for this particular conservation planning effort.
The 24-member Natural Legacy Partnership Team advances initiatives by engaging partners in Natural Legacy Project goals. This team reviewed many projects and selected three innovative conservation projects that provide public education opportunities and are critical to meeting conservation goals.

### Partnership Team Project 1:
**Prairie and Wetland Restoration in Natural Legacy Demonstration Sites**

This collaborative project’s objective was to enhance 925 acres of prairie and wetland habitat within the Central Platte River BUL on The Nature Conservancy’s (TNC) Platte River Preserve and the National Audubon Society’s Lillian Annette Rowe Bird Sanctuary (Rowe). Both of these locations are Legacy Demonstration Sites and proposed sharing resources and contractors for greater efficiency.

The project included high-diversity, local ecotype seeding as well as wetland and associated riparian habitat enhancement. The project also included fire and grazing management to suppress cool-season exotic grasses and encroaching woody vegetation which will increase both the plant diversity and habitat quality of those areas. Collectively, TNC and Rowe exceeded the original objective and conservation practices were applied on 1325 acres.

![Image](image.png)

**The Nature Conservancy and Audubon Society’s Lillian Annette Rowe Bird Sanctuary collectively enhanced over 1300 acres.**

Nelson Winkel (TNC) and Ned Groelz test out the new seed stripper in September 2014. The toothed design of the harvesting cylinder is aggressive enough to get seed from plants that typically hold their seedheads tightly enough to resist harvest by brush-style seed strippers.
TNC purchased a custom-made seed stripper and used it to harvest both grasses and forbs for this project. Its toothed design made it very effective for harvesting seed of big bluestem, indiangrass, and other major warm-season grasses. Additionally, it also did a great job gleaning seed from perennial sunflowers, wild bergamot, and other plants that have been difficult to obtain seed from with the more traditional brush-style seed stripper. The new stripper was particularly effective at helping harvest large amounts of those major forb species that will not only add plant diversity to degraded prairies but also enhance vegetation structure by providing taller broadleaved plants to what are mostly grass-dominated sites.

Using seed from the seed stripper, along with hand harvested seed, TNC overseeded roughly 238 acres of degraded remnant prairie during the term of this grant (109 acres in spring of 2015 and 129 acres in spring of 2016). Seeding took place after spring prescribed burns and the sites were subsequently grazed (patch-burn grazing) to help reduce competition from dominant grasses. While 238 acres were seeded, 18 acres seeded in 2015 were actually seeded again in 2016, so the total footprint of overseeding was 210 acres.

In addition to planting areas on land owned by The Nature Conservancy, seed was shared with Audubon’s Rowe Sanctuary. In total, Rowe Sanctuary seeded 94 acres of land with TNC-provided seed.

During the summer of 2015, a contractor completed wetland construction across approximately 65 acres of former crop field. This component was funded by the U.S. Fish and Wildlife Services Partners for Wildlife program, which provided match for this grant. Historic sloughs that had been farmed through for decades were re-excavated and enhanced with a tracked tractor pulling a scraper. Spoil from the wetlands was deposited on higher ground and arrayed so that it resembles the sand ridges found in nearby remnant floodplain prairie.
In addition, a high-diversity seed mix of over 140 plant species was used to plant approximately 65 acres of the former cropland in the spring of 2016. The site was prepared through a regimen of herbicide treatments and discing. Seed mixes for mesic, dry, and wetland habitats were used for the project. Over 30 volunteers helped plant seeds by hand in the wetlands and on adjacent spoil piles, and staff planted the remainder of the site with a pull-behind fertilizer spreader. This was the second half of a restoration project on a former center pivot that had been converted to a low-diversity grass planting in the mid 1990’s and is now being converted to high-diversity prairie/wetland habitat.

As part of this project, TNC was able to better facilitate grazing on approximately 270 acres of prairie by removing broken-down fence, removing trees that had grown up in that fenceline, and by building new fence. A dependable fence allows grazing as a management tool, including grazing with stocking rates high enough to get impacts desired for reducing grass dominance and facilitating overseeding success.

At both the Miller Tract and approximately 320 acres in the West Dahms pastures (just west of The Nature Conservancy’s Derr House), TNC implemented patch-burn grazing to create heterogeneous wildlife habitat, enhance plant diversity, and suppress both woody vegetation and cool-season exotic grasses. In 2014, TNC burned approximately 75 acres at the Miller tract and 33 acres in West Dahms as part of this grazing strategy. TNC then burned roughly 125 acres at Miller in 2015 and 162 acres in 2016 and burned approximately 32 acres at West Dahms in 2015 and 86 acres in 2016. That is a total of approximately 513 acres over three years (7 burn units).
Restoration work at National Audubon Society’s Lillian Annette Rowe Bird Sanctuary (Rowe) was focused on a new addition to Rowe property which provides core habitat. Nebraska Natural Legacy Project funding was used to increase habitat quality for at-risk species and enhance viability of natural communities within an expanded network of protected, contiguous wetland and wet meadow habitats. Wetland and riparian habitat enhancement through light dirtwork and disking took place on 45.5 acres of accretion ground adjacent to the Platte River and tied in to nearly a mile of previously restored wetland on the John J. Dinan Memorial Bird Conservation Area. Tree removal on 85.5 acres of wetland and grassland habitat immediately improved the quality and suitability of those areas for target species. Spring prescribed burning and high-intensity, short duration grazing on 247.5 acres helped to suppress cool-season exotic grasses and encroaching woody vegetation, and increase both the plant diversity and habitat quality of those areas. In two cases, prescribed burns also served to prepare degraded remnant prairie sites for high-diversity, local ecotype seeding. Temporary fencing and collaboration with grazing lessees allowed for intensive grazing in select locations to suppress Tall Wheatgrass and other invasive grasses. Diverse seed mixes harvested at The Nature Conservancy’s Platte River Prairies were hand-sown over 96 acres including the wetland restoration site and several remnant meadow locations.

Restoring wetland hydrology and connecting backwater habitat to the river provides unique habitat for many Tier 1 and Tier 2 species including Whooping Cranes which were observed using the wetland restoration area shortly after the dirtwork and disking took place. The effects of increased habitat quality of grasslands was also well documented with the intensive grassland breeding bird surveys conducted annually at Rowe Sanctuary. Results such as these increase Audubon’s ability to demonstrate successful management and restoration strategies to the public.

Seven of 11 Whooping Cranes in a group that first landed on the wetland restoration site before spending the night roosting on the adjacent Platte River channel. Photo credit: Patricia Bennett, courtesy of 2016 Rowe Sanctuary Photo Contest.

Rowe Sanctuary staff and twelve different trained volunteers helped conduct prescribed burns during the 3-year grant term.

On a remnant meadow site that was cleared of scattered, invasive Eastern red cedar and Russian olive trees, prescribed burned and overseeded with a high-diversity mix, the number of total bird detections during annual breeding bird surveys more than doubled. Dickcissels, a target species preferring the increased forb component in grasslands typical following a prescribed fire, increased from 16 to 30 for the same area following the treatments made possible by the grant.
Partnership Team Project 2: Restoration of Massie Waterfowl Production Area

Massie Waterfowl Production Area (WPA) is an 847-acre perpetually protected semi-permanent wetland in Clay County, owned by the U.S. Fish and Wildlife Service and managed by the Rainwater Basin Wetland Management District. Massie WPA, located in the Rainwater Basin BUL, is primarily managed for waterbirds and provides habitat for several at-risk species. Massie WPA contains 473.4 acres of hydric soils that have been negatively impacted by road ditches, several drains, and a large ring dike. These impacts altered the wetland’s ability to function properly, concentrating water in small areas and not allowing the water to spread out evenly across the hydric soil footprint. This alteration in hydrology led to issues with invasive species establishment and water ponding in concentrated areas, which allowed perennial plant species to establish overabundant populations. Concentrating water kept these wetland soils constantly saturated, in turn benefitting perennial plant production and invasive species, thereby reducing the availability of annual moist-soil food plants for migratory waterbirds. In addition to dikes and ditches, sediment plumes from eroded uplands formed in portions of the Scott and Fillmore soil footprints, creating a microclimate suitable to invasive species, primarily reed canary grass.

The activities involved in the restoration and enhancement of Massie WPA included removing fill from the ring dike and roads, and culturally-accelerated sediment, filling ditches and drains, installing wildlife-friendly fence, and restoring the property boundary. Approximately 5,600 linear feet of ring dike bisecting the Massie soil footprint was removed as a part of this project, as well as 1.5 miles of roads. The sediment plume, removed from 11 acres of Scott and Fillmore soils, resulted in 11,710 cubic yards of soil material removed from the wetland. The material generated from fill and sediment removal was used to fill the ditches surrounding the ring dike, ditches and several small pits that were within the wetland footprint, and ditches resulting from the creation of roads that bisected the wetland. The ditches were filled to an elevation that matched the existing hydric soils and contained 30% overfill to account for shrinking. Leftover material from the excavation removal were piled on upland areas and later removed by the Clay County Roads Department for use in other construction activities.

Approximately 300 cubic yards of excavated material was used to rebuild the property boundary to address erosion issues from an adjacent property. The material was placed on the property boundary and seeded to provide a buffer to the wetland. At this location, a boundary fence (1,054 linear feet) was installed, which will allow the Wetland Management District the opportunity to graze the project area again and regain portions of the property that were lost due to adjacent landowner encroachment.

The original intent was to enhance 100 acres of wetland, and in total this project restored 95 acres and enhanced approximately 310 acres of wetland soils. In addition, 487 acres of wetland and upland habitat can now be more effectively managed through prescribed grazing because of this project.
Partnership Team Project 3: Saline Wetland Evaluation

Nebraska’s eastern saline wetlands are unique ecosystems that provide critical habitat for wildlife and salt-tolerant plant communities. However, urban and agricultural development and related activities have degraded over 80% of saline wetlands in Nebraska. These saline wetlands provide unique habitat for salt-tolerant species including the state endangered saltwort (Salicornia rubra) and federally endangered Salt Creek tiger beetle (Cicindela nevadica lincolniana). Conservation groups have restored several eastern saline wetlands in Lancaster and Saunders counties using dikes and water control structures. However, the loss of soil salinity in these wetlands through freshwater runoff and groundwater seepage into degraded stream channels has hampered restoration efforts.

The Saline Wetland Conservation Partnership proposed a restoration technique to address this problem that would add saline groundwater to the surface. The intent is to mimic groundwater upwelling, but there was concern that historically the groundwater would have been naturally filtered through the alluvial layers and mixed with fresh water near the surface. Thus the saline groundwater rising to the surface in the wetlands would be different than the water being directly pumped out of the aquifer. Direct pumping would circumvent the filtering process, so unintended impacts to habitat were possible. The goal of the saline wetland evaluation project focused on determining if adding saline groundwater to the soil surface would create favorable conditions for saline plant species and other wetland ecosystem services. This required understanding how the plant community and soil and water biogeochemistry responded to the added saline groundwater.

This evaluation was accomplished in partnership with the University of Nebraska at Lincoln, the Saline Wetland Conservation Partnership and the City of Lincoln.

The evaluation was led by the School of Natural Resources at UNL and conducted at Arbor Lake, north of Lincoln, Nebraska near Frank Shoemaker Marsh. Three different salinity levels (based on well depth) were tested using two different groundwater application techniques (slow and flush). The soil, saline plant germination rates and the plant community response was evaluated.

Ultimately, this evaluation determined that saline groundwater addition has high potential to be a practical saline wetland restoration strategy. Specifically, the continuous saline groundwater addition increased porewater salinity in the restoration site. The addition of medium and high range of salinity groundwater (i.e. 18-20 and 26-30ppt in this study) induced the distinctive porewater salinity differences from those in freshwater and low salinity (2-3ppt) plots.

The slow groundwater application is the recommended method as it prolonged the connections between saline groundwater and soil, therefore, maximized the effects of saline groundwater addition on soil surface. Slow application of medium and high salinity groundwater generated salt crusts in the soil surface.

Medium and high salinity groundwater addition (18-30ppt in this study) increased CO2 fluxes (Fig. 15). This suggests that the alteration of soil salinity level by saline wetland restoration activities affects carbon cycling and storage.

The salinity gradients induced by the saline groundwater addition shifted the plant community structure from a terrestrial or freshwater wetland species dominate community to a saline species dominant community which is the desired response. Salinity regulated the germination rates of saline species, but all targeted saline plant species were able to germinate in lab conditions using the saline groundwater.

The results of this evaluation are already being incorporated in saline wetland restorations. The Marsh Wren property owned by the Lower South Platte NRD is currently undergoing a restoration. Several wells are incorporated into the restoration design and will be used to add saline groundwater to a portion of the area.
Objective 3: Implement education and outreach directed towards biodiversity conservation, habitat enhancement and sustainable land and water management

At-risk species conservation is only successful when the conservation community is knowledgeable and engaged. The conservation community is broad with many target audiences. It includes scientists and conservation practitioners that need the opportunity to communicate the most current scientific information and restoration techniques. It includes private landowners that are the primary stewards of Nebraska’s wildlife. It includes adults that are seeking opportunities to contribute. It includes the children, which will be faced with conservation challenges as our future decision makers.

Master Naturalist Adrian Olivera is embarking on a “Celebration of Nebraska’s Biodiversity.” This project will capture images and video of our rare and declining species and capture stunning landscapes in Nebraska’s Biologically Unique Landscapes. Adrian has given several presentations and will continue to share Nebraska’s Biodiversity and share Natural Legacy conservation messages.

154,000 people were reached through education and outreach activities.
Since 2011, the Nebraska Natural Legacy Conference has become an important statewide event for natural resource practitioners, researchers, students, conservation groups, and landowners with an average attendance of 148 people. It is important to take notice of the accomplishments made through the Natural Legacy Project’s many partnerships. Without an opportunity to regularly share successes, challenges and new solutions at a venue such as the Natural Legacy Conference, there is the risk of losing sight of the best available science, progress toward goals and continued opportunities for gaining ground in what is often an uphill battle to conserve at-risk species. The Natural Legacy Conference is made possible largely because of the continued support of the Nebraska Environmental Trust.

In fall 2013, the Natural Legacy Conference was held in Nebraska City at the Lied Lodge and Conference Center. Over 170 people participated in this event. A long list of presenters included Nebraska Game and Parks Commission Director Jim Douglas, Congressman Jeff Fortenberry, Arizona Game and Fish Department Director Larry Voyles, Conservation Photographer Michael Forsberg, and many others.

In 2014, the annual conference took place at the Gering Civic Center. One hundred and twenty-five people attended the event. Two field tours were planned as part of the 2014 conference. One took attendees to the Wildcat Hills where participants explored a couple of properties managed by Platte River Basin Environments and had an opportunity to learn more about the plants and wildlife in the BUL. The other tour took place in the North Platte River BUL where hikers were able to see multiple wetlands and go through a guided wetland identification and delineation.

Natural Legacy Conference 2015 was a special occasion, because it marked the 10th anniversary of the Nebraska Natural Legacy Project, State Wildlife Action Plan. The conference reached out to over 150 conferees at the Holiday Inn Convention Center in Kearney.

During Natural Legacy Conference 2015, Marilyn Tabor (right) of the Nebraska Environmental Trust accepts an award of recognition on behalf of the program’s Executive Director Mark Brohman for his continued involvement and support of the Nebraska Natural Legacy Project’s mission. Wildlife Diversity Program Manager Kristal Stoner (left) presents the award depicting a Long-billed Curlew, the Nebraska Natural Legacy Project’s logo symbol, in flight. Photo by Rick Schneider.
Advanced Workshops

These workshops target specific audiences with tailored messages. The in-person, hands-on approach has a higher impact. A total of 17 workshops were held that reached 282 individuals.

Power of Pollinators: This workshop, held at Fontenelle Forest, taught participants not only about pollination and Nebraska’s pollinators, but also trained them how to plan for proper pollinator habitat in urban settings. This workshop was geared to homeowners and had 18 participants.

Beyond Bats!: These workshops taught participants about the natural history of Nebraska’s bats, the role of bats in the ecosystem, and how to incorporate bats into their educational efforts. Participants received two bat curriculum guides and several bat-related resources. This workshop series had 45 participants. (Photo below)

Buzz into Action: Insect Education: This workshop was designed for educators of preK-4th grade students. Educators were taught all about insects and how to teach about them. Participants received the “Buzz into Action: Insect Educators Guide,” and other insect-related resources and had 45 participants.

Outdoor Classroom Educator Workshops: Often educators are excited about installing an outdoor classroom, but once completed, they are unsure about how to utilize this new resource. Using the guide created with the previous NETF grant – “Using Outdoor Classrooms to Meet Educational Standards” – 38 educators were trained on how to use their outdoor classroom to implement natural resources-based lesson into their daily lesson plans.

Place-based Education: Place-based education is a concept of teaching students using their local ecosystems, cultures and economies as a central theme. The goal with these workshops was to help afterschool providers understand Nebraska’s “places” from a natural history perspective and then incorporate this place-based approach into afterschool project-based learning. Educators were provided with a copy of the Nebraska Natural Legacy Project Wildlife Action Plan. This provided them with a scaffolding to build afterschool curriculum based on Nebraska’s ecosystems, species and natural history. Two workshops – Scottsbluff and Norfolk – were conducted, training 34 afterschool program coordinators.

Afterschool Program Education Workshops: Much work was done with this grant to expand biodiversity education efforts with afterschool programs. The role of afterschool programs is expanding in many Nebraska communities and afterschool programs are being asked to provide students with significantly more quality STEM education curriculum. These workshops taught 48 afterschool program providers how to use wildlife to learn about the ecosystem. Through a long-term investigation of the schoolyard species, students will not only gain understanding of science investigations and data collection, but also gain an appreciation for wildlife species.

LEED: Legacy in Environmental Education & Discovery: Legacy in Environmental Education & Discovery (LEED) workshops are designed to be two-day, intensive workshops which educate classroom teachers about Nebraska’s biologically unique landscapes. These workshops focus on engaging teachers in the field to learn hands-on about a landscape’s plants and animal species. Activities for each LEED workshop vary depending on the area’s unique features. For example, the Pine Ridge workshop looked more in-depth into the role of fire on the landscape; the Niobrara Valley workshop focused more on aquatic species including macroinvertebrates and small fishes; the Loess Canyons workshop investigated American Burying Beetles and other unique species. In 2014, the Niobrara Valley workshop had 18 participants, in 2015 the Pine Ridge also had 18 participants and in 2016, the Loess Canyons had 20 participants. (Photo below)
**NATURAL LEGACY DEMONSTRATION SITES**

Natural Legacy Demonstration Sites were established in 2011 during the revision of the Nebraska Natural Legacy Project. Often conservation techniques produce results that are not embraced among neighboring landowners as they do not appear to follow traditional producer oriented land management goals. Demonstration Sites were established to address this concern. At Demonstration Sites, conservation actions are implemented where individuals can witness the restoration process over time. They are intended to promote understanding and acceptance of conservation actions that positively impact at-risk species in Nebraska.

There are a total of 20 Natural Legacy Demonstration Sites across Nebraska, selected to represent examples of habitat conservation opportunities in the state. A handful of these sites were selected for phase one of concentrated conservation actions. Work planned for these sites and currently taking place include invasive species control, prescribed fire, selective spraying, seeding, planting, and other habitat restoration activities.

Rock Creek Station State Historical Park and Rock Glen Wildlife Management Area are part of the Sandstone Prairies Biologically Unique Landscape (BUL) in southeastern Nebraska. Approximately 760 acres at the sites have been positively impacted with habitat rehabilitation efforts for at-risk species. To improve oak woodlands, understory thinning via chemical injection occurred in 34 wooded acres. Fire breaks were constructed which provided 41 acres of oak-dominated areas the infrastructure necessary to conduct prescribed fires. This location has been a success since neighboring landowners expressed interest in being included in burns.

A plant identification and landscape tour was held at Rock Creek Station State Historical Park (SHP) and Rock Glen Wildlife Management Area (WMA). Tour participants were able to see improvement that had taken place at this Natural Legacy Demonstration Site. Wildlife Biologist Melissa Panella wrote an article about this educational excursion for the Lincoln Journal Star’s Outdoor section:


The purpose of these Demonstration Sites is to highlight, explain, support, and promote conservation actions that can positively impact at-risk species in Nebraska. There are a total of 20 Natural Legacy Demonstration Sites across Nebraska, selected to represent examples of habitat conservation opportunities in the state.

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

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**Nebraska Natural Legacy Project Demonstration Sites**

Birdfoot Violet (Viola pedata) and Groovestem Indian Plantain (Arnoglossum plantagineum) are growing in the prairie at Rock Creek Station State Historical Park and Rock Glen Wildlife Management Area because of effective habitat management.

Additionally, Five Rivers Weed Management Area held a field day at Rock Creek Station. This event was attended by approximately 25 private landowners and natural resource professionals and highlighted invasive species identification and control methods.

Niobrara State Park is facing significant invasion of eastern redcedars that reduce grassland and riparian habitat quality. In 2015, 236 acres of invasive trees were cleared which contributed to a total area of improved grassland habitat in Niobrara S. P. to more than 700 acres. Additional plans are underway to coordinate with the Nebraska Game and Parks Commission’s Parks Division to plant pollinator habitat. The Natural Legacy Biologist followed up with Horticulture Manager Mike Groenewold to choose a clearing not far from the guest cabins, so that the location will offer high visibility of the project to park visitors.

At Ponca State Park’s Demonstration Site, 347 acres have benefited from restoration activities. Prescribed burns took place in 2014, 2015 and 2016. Some burned areas are expected to produce prairie seed for use at other park locations, while several of these burned areas have plans for reseeding.

Restoration activities also included seeding of an 18-acre oak savanna with tallgrass prairie and woodland species. Bur oaks grown by NGPC horticulture staff are being used to expand the oak savanna. Additionally, a small greenhouse will produce native prairie plants to increase floral diversity of restorations at the North Addition. The greenhouse can also be used to grow more oak seedlings for future plantings. Photo points were added to restoration areas to monitor changes over time. The restorations have desired early results with new sedge growth in the oak savanna restoration and Solomon’s Seal (Polygonatum biflorum) was also found in this area which offers a beginning for seed collection for future restorations. A trail was created that runs through one of the prairie restorations and a stretch of oak woodland at Ponca S. P. This path now includes signs that showcase various plants of interest found along the trail.

The Natural Legacy Biologist and Game and Parks Fish and Wildlife Program Manager Scott Luedtke met with new staff at Audubon’s Spring Creek Prairie which is also a Demonstration Site. The group evaluated potential habitat actions for the sites grasslands, wetlands, oak savanna, and old field areas. The property will benefit largely from invasive control and prescribed fire with an option for reseeding.
MONARCH AND POLLINATOR CONSERVATION SUMMIT

A Monarch and Pollinator Conservation Summit was held in February 2016. Over the course of a day-and-a-half in February, at least 80 stakeholders met in downtown Lincoln to discuss goals, threats, and actions to impact conservation of pollinators. Their primary task was to develop a strategy for planting enough milkweed and native pollinator plants across the state to prevent endangerment of monarchs. Information that was gathered at this meeting is now serving as the foundation for Nebraska’s strategy to conserving monarchs and other at-risk pollinators. Legacy biologist Melissa Panella is leading the plan development.

Natural Legacy Project in Classrooms

Science of Wetlands for 5th Grade: All 5th-grade students in science at Eastridge Elementary in the Lincoln Public School District learned about the importance of wetlands, habitat conservation and adaptation of species.

At Farm Safety Day at the Lincoln County Extension office, the Loess Canyons CWB, Andy Moore, is teaching Brady Elementary students about different wild animals and how to prevent injury and disease when outdoors on farms and ranches.

Focused Media Events

Endangered Species Day 2015 reaches more than 145,000 People: In an effort to raise awareness about endangered species and Nebraska’s role in their conservation, a media “conversation” engaged more than 145,000 people. Using social media, information was posted and a conversation started. Over the course of 2 weeks, there were 15 posts shared on 5 social media outlets: Facebook (Nebraska Natural Legacy Project, Watchable Wildlife, and Nebraska Game and Parks Commission) and Twitter (Nebraska Natural Legacy Project and Nebraska Game and Parks Commission). These brief but informative posts reached approximately 83,000 people and generated nearly 1000 ‘likes’ and approximately 100 ‘shares.’ Additionally, the information was promoted using traditional media outlets through a feature article in the Lincoln Journal Star titled, Endangered Species Day: A Time to Recognize Nature’s Impact. This feature was printed in the Sunday Outdoors section which is distributed to more than 62,000 readers. journalstar.com/sports/local/outdoors/

The Swift Fox, whose conservation can coexist well with the ranching way of life, was one of several species featured for Endangered Species Day 2015.

Nebraska Migratory Bird Month: Started in 1993, International Migratory Bird Day is celebrated annually on the second Saturday of May. It is a chance for conservationists, natural resource agencies, families and individuals to celebrate and learn about birds and bird migration. Realizing that not all agencies and organizations would be able to host events on one specific Saturday, it was decided that Nebraska would have a month-long celebration. Agencies and organizations were invited to host a bird-related event - large or small - sometime in the month of May to help Nebraskans learn about and appreciate all birds. A website – nebraskabirdmonth.org was established to promote all events with event details. Events were searchable by date and location. Over 50 events took place in both May 2015 and again in May 2016. Resources created to help extend learning include: Nebraska Migratory Bird Month flyer, Common Birds of Nebraska pamphlet, Simple Things You Can Do to Help Birds pamphlet, and Birdology: A Kids Book about Birds featuring articles and games.
Products

Books Available for Check-out: Two Natural Legacy titles are available for check-out from the University of Nebraska –Lincoln (UNL) library system. The hard copies are housed on UNL’s east campus at C.Y. Thompson library.

TITLE: Nebraska Natural Legacy Project, 2nd ed. Call Number: QL84.22.N2 N43 2011 (at C.Y. Thompson Library)

TITLE: Nebraska’s At-Risk Wildlife. Call Number: QL84.22 N2 P36 2010 (at C.Y. Thompson Library)

Biodiversity Posters Re-Print: Created with the previous NETF grant, the “Nebraska Biodiversity” posters (a series of 7) we reprinted. These posters have proven to be extremely popular with educators.

Update Mammal & Bird Trunks: Demand for wildlife and biodiversity related educational materials have increased in the past several years. We completed an overhaul of the 9 Mammal and Bird Wildlife Education Trunks as well as created two new trunks to be located in Omaha and Chadron.

Mountain Lion Display: A new display focusing on mountain lions was developed for use at nature centers and children’s museums. This display included a DNA Analysis Game to educate the public on how Nebraska Game & Parks Commission uses DNA to determine mountain lion populations. Also developed was a Scat & Tracks Table focusing on identifying carnivore scat and tracks and a display on Nebraska’s Scat Dog Surveys. Finally, a large Trail Camera Sign was created which included a large TV to scroll trail camera images to help Nebraskans understand how trail camera images are now being used to determine mountain lion presence and give baseline data.

Species Conservation Assessments: The primary goal in development of at-risk species conservation assessments (SCA) is to compile biological and ecological information that may assist conservation practitioners in making decisions regarding the conservation of species of interest. Several SCAs have needed updates. Melissa Panella has written several of these assessments and included updates to represent new research and sources of additional information about Nebraska’s at-risk species. There are currently 12 SCAs available for online access at www.NebraskaNaturalLegacy.org

In northeast Nebraska, the Coordinating Wildlife Biologist Bekah Jessen (below) holds many landowner tours and supports existing outreach activities with Natural Legacy messaging. Over the last three years, the CWB has reached approximately 1900 youth and 600 adults.

Outdoor education events continue to be a great way to connect the younger generation to the unique resources found within BUL boundaries. One such event is the Niobrara Rendezvous, where 800-900 students from surrounding schools gather and are introduced to a variety of topics related to outdoor recreation, conservation, ecology, and local history.

In Spring 2016, a blind was the highlight of the “Prairie Chicken and Pasque Flower” tour that was held in the western boundary of the Ponca Bluffs BUL. Forty participants enjoyed blooming Pasque Flowers, learned how local conservation actions influenced the landscape they were experiencing and enjoyed an especially active Greater Prairie Chicken lek.
Signs such as this inform visitors at State Parks and other public areas of threats and management actions for wildlife and their habitats.

In southeast Nebraska, the CWB holds many landowner tours and management workshop. The Annual Tallgrass Prairie Management Seminar in Beatrice continues to attract large crowds. Over the last three years, the CWB has reached 322 youth and 510 adults.

The Loess Canyons CWB holds numerous landowner workshop regarding land management annually and reaches approximately 1000 individuals annually with three year total of 3450 individuals reached over the period of this grant.

In northcentral Nebraska, the coordinating wildlife biologist has collaborated extensively with partners on many educational events through the Niobrara Valley Outdoor Education Partnership. By collaborating, they have reached at least 1100 youth and adults with educational opportunities to increase local appreciation for wildlife conservation. Some of their programs include Springview Resource Day, Outdoor Field Experience at Fort Niobrara NWR, Nebraska Youth Range Camp, and Niobrara Council & NVOEP Fall After-school Nature Club in Valentine.
In Central Nebraska, the Loess Hills CWB has hosted and participated in 14 outreach workshops, trainings and events that focus on prescribed fire and topics such as, “Central Loess Hills Prescribed Fire Training Exchange Program.” Over the three years of this grant, he has reached 454 individuals on just prescribed fire programming. In addition, the CWB has hosted several pollinator workshops and presentations.

In the panhandle of Nebraska, there have been three CWBs over the course of this grant and each has contributed to education and outreach by participating and supporting local events such as the Panhandle Eco-Extravaganza of the Prairie (PEEP) and the Chadron Conservation Festival. Combined, they reached 993 individuals.

Wildlife Biologist, Shelley Steffl and CWB, Erin Divine preparing to play a game with local 3rd grade students at Chadron State Park. The game taught students about bird song, why birds sing, and what we can learn from their songs.
Evaluation
Objective 4: Evaluation of Conservation Actions

Effective conservation requires directing efforts to areas with concentrations of at-risk species and high-quality natural communities. Surveys are conducted in selected BULs to identify at-risk plant and animal populations and high-quality natural communities. Monitoring of selected conservation actions is conducted to determine their impacts on at-risk species and communities and determine project efficiency. Results have influenced changes in our strategies, methodology and project locations.

Bird Surveys

Birds can serve as a barometer of habitats and habitat condition. For example, the Henslow’s Sparrow selects tall, dense prairies with very few woody plants while Golden Eagles avoid human disturbance, and prefer open country with rock outcrops for nesting. Tracking the presence and absence and long-term trends of our birds can 1) direct conservation efforts to areas likely to have significant impact, 2) provide feedback regarding the success of restoration activities 3) highlight habitat transitions 4) provide early indications of environmental conditions that are detrimental to wildlife.

In Nebraska, The Coordinating Wildlife Biologists conduct breeding bird surveys, prairie grouse surveys, nightjar surveys, Burrowing Owl surveys and Golden Eagle surveys. The results of these surveys are used to direct conservation actions to areas with at-risk species and monitor populations to determine if existing restoration efforts are having the desired impact on the avian community.

Greater Prairie Chickens are a Tier 1 species, and also considered an indicator of expansive grasslands which provide habitat for a multitude of prairie species.
Small Mammal Surveys

Mike Schrad, a Master Naturalist volunteer, continues to lead a small mammal evaluation. He is working at Indian Cave State Park and in the Central Platte River BUL at The Nature Conservancy’s Platte River Prairie Preserve. He is determining the range and abundance of the Tier 1 Plains Pocket Mice, evaluating if Pine Voles are impacted by prescribed fires and investigating how habitat management is influencing the small mammal community.

Initial trapping at the Platte River Preserve is establishing a baseline of the small mammal community in a managed grassland, so changes as a result of management influence can be detected. In 2014, this study found an unusually large number of Northern Grasshopper Mice and a population of Plains Pocket Mice that included individuals that resembled both the eastern and western subspecies. In 2015, the results were very different; the Plains Pocket Mice were the most common small mammal in the study and no Northern Grasshopper Mice were captured. Given the variability between years it is too early to draw conclusions and more field seasons are needed, but this evaluation is anticipated to provide valuable insights for managing prairies in a way that benefits the small mammal community. Also, with the presence of Plains Pocket Mice (a Tier 1 Species), a long term study was initiated to determine how it responds over time to grassland management procedures which may include grazing, prescribed burning and haying procedures.

Surveys were conducted at Indian Cave State Park to determine if Pine Voles were impacted by management, but unfortunately this question remains unanswered as no pine voles were collected.
Implementing the North American Bat Monitoring Program in Nebraska

There is an urgent need to understand the bat community and habitat requirements of several declining bat species in Nebraska. Selected areas of Nebraska have been surveyed for bats, but there are large areas with very little information and there is currently no systematic long-term monitoring established. The North American Bat Monitoring Program (NABat) is a national protocol designed to streamline data collection and encourage collaboration across large ecoregions in order to allow for broad understanding of bat ecology, populations, and habitat usage. NABat uses a combination of stationary and mobile ultrasound acoustic detectors and stationary points at stratified locations nationally to establish species distribution and track changes over time. This project will use NABat to study Nebraska’s bats community, and determine the habitat characteristics that influence bat presence and absence across Nebraska. A secondary focus of the project will be to determine the ability of mobile transects to detect shifts in bat population trends.

In the second year of the project, citizen scientists will be recruited to collect data. Engaged citizen scientists are a powerful tool not only for collecting valuable information, but also increasing awareness of bat conservation. In addition to its use in monitoring and habitat analysis, this study will assess the effectiveness and sustainability of the NABat program in Nebraska. This will allow the Nebraska Game and Parks Commission to efficiently continue the monitoring framework once this initial study is complete. Since beginning field work on June 1, we have collected data in 5 of the 38 grid cells selected for studying species distribution around the state, and have been impressed by the high levels of activity in these locations. This project will continue with funding from State Wildlife Grants. This project is in cooperation with the Nebraska Cooperative Fish and Wildlife Research Unit at the University of Nebraska at Lincoln.

The northern long-eared bat - *Myotis septentrionalis* - was recently listed as threatened due to white-nose syndrome. Studies such as this will more clearly refine where this species is found in Nebraska and provide insights for biologists regarding potential habitat conservation activities.
Pine Ridge Bat Habitat Use

The Pine Ridge contains bat species of concern for both state and federal agencies in the region. In Nebraska, the fringed myotis, northern long eared bat, Townsend’s big-eared bat and long-legged myotis are Tier 1 and Tier 2 species of state concern. The US Forest Service also lists the Hoary Bat, Townsend’s Big-eared Bat, and Fringed Myotis as sensitive species. In adjacent Wyoming, the Eastern Red Bat and Pallid Bat are species of concern. The Pine Ridge hosts a unique assemblage of bat species, of which 50% are species of concern. Due to a lack of an in-depth survey and summary of findings, there is still much information yet to be learned about these mammals in the Pine Ridge.

Understanding roosting sites for bats is vital to managing these species. Roosts serve many functions for bats including protection from weather and predators; a place to bear and raise young, digest food, rest, groom, and copulate; and areas to hibernate during winter. Of all potential roost sites, maternity roosts could arguably be the most critical type of roost for yearly reproductive efforts of bats. The objective of this project is to locate maternity roosts of species of concern in the Pine Ridge Region of Nebraska.

Bats were captured using mist nets and selected individuals were fit with small radio-transmitters. Adhesives allow radio transmitters to drop off after 2-3 weeks. From late June to early August 2015, we accrued 81 mist net nights in the Pine Ridge region of northwestern Nebraska. In summer 2015, we captured a total of 479 total bats representing nine species. Fringed myotis nearly exclusively roosted in dead ponderosa pine trees and primarily were under exfoliating bark and the same roosting habitat was used by some long-legged myotis. Some long-legged myotis also used cliff faces near Fort Robinson. The single lactating Hoary Bat was tracked to a live green ash tree. Northern long-eared myotis roosted in live cottonwood trees. These results are preliminary and this project will continue for another field season.

Stream Surveys

In 2015, five streams were surveyed in Cherry, Brown, Rock, Holt, Loup, and Knox counties using a backpack electrofishing unit. These sites are currently being discussed and evaluated for potential habitat restoration projects. Survey results will be used to establish baseline information of species occurrence. The presence or absence of specific species in streams may influence how streams are prioritized for restoration, and different restoration methods. This information will also be used to track long-term fish community changes as a result of stream modifications or climate change.

Orchid Pollinator Surveys

The Western Prairie Fringed Orchid is only pollinated by certain hawk moths and as this threatened orchid declines, there is a concern that the necessary pollinators are also disappearing from the landscape. Conservation of orchid meadows in the Willow Creek Biologically Unique Landscape has been a collaborative effort between landowners, USFWS, NGPC, local weed management groups, and a number of other entities.

However, habitat restoration activity focused on wet meadow habitats will have limited success if the required pollinator is absent. Species restoration must take into account the entire life history requirements. In July 2013 and 2014, Biologists “captured” hawk moths in Western Prairie Fringed Orchid meadows across the Willow Creek Prairies BUL. The purpose of the project was to determine whether the hawk moth community in the area contained species that were known to serve as pollinators of the endangered flower.

This photo illustrates the survey apparatuses used which includes UV light traps in the background and a mercury vapor light in the foreground. A Western Prairie Fringed Orchid is also highlighted in the bottom left corner.

Three species were detected that can pollinate the Western Prairie Fringed Orchid. One of these species is the Spurge Hawk Moth, which is also used as a biocontrol for spurge.

Armed with the knowledge that the pollinators are present, wet meadow restoration will continue to focus on areas with potential to benefit the orchid.

Surveys for the hawk moths that pollinate the Western Prairie Fringed Orchid (Red Circle) found three species known to pollinate this federally protected orchid.
Small White Lady Slipper Orchid Surveys

A stretch of highway roadside in the Willow Creek BUL is home to one of Nebraska’s largest populations of Small White Lady’s Slipper Orchids. The NE Department of Roads is the lead agency that monitors and protects this threatened species, but other agencies including USFWS, NGPC, NPLT, and private contractors have a vested interest in this population. Management activities, including a prescribed burn to remove thatch, limited mowing, and herbicide exclusion have been implemented to ensure that these orchids persist. Surveys are conducted annually to ensure that conservation measures continue to protect this unique plant.

Stream Fluctuations

Many at-risk species depend on cool stream temperatures. With potential for reintroduction of aquatic species statewide, long-term temperature fluctuations and trends will be key for determining the feasibility of reintroductions at specific locations. Data loggers were placed in cold water streams across the Pine Ridge BUL in an effort to monitor temperature changes in the streams and rivers as well as to obtain baseline temperature data for the BUL.
American Burying Beetle

The American Burying Beetle is an endangered species found throughout the Loess Canyons Biologically Unique Landscape. Every year the Coordinating Wildlife Biologist, NGPC biologists and volunteers assist with the long-term monitoring of this beetle by setting and checking over 40 traps for 5 nights. The population appears to be very stable in the Loess Canyons. The traps catching the most beetles are located in the Gothenburg wildfire area and parts of the BUL with the least cedar encroachment, indicating that efforts to remove cedar trees from the landscape are having a positive effect on the American Burying Beetle.

Cedar Encroachment

In the Loess Canyons BUL, a geographic image analysis was used to quantify canopy coverage on potential project sites. In the north central part of the Loess Canyons, some properties are nearly 70% closed canopy, or covered with cedar trees. This evaluation also suggests that by changing management to include tree cutting, grazing deferment, and prescribed fire, the plant community can be restored to only 15-25% tree cover. However, field vegetation monitoring in the Loess Canyons has revealed that cedar regrowth is a long-term problem and that cedar trees can grow at about 1 foot per year after tree removal.

Select locations in the Loess Canyons are estimated to have nearly 70% tree cover.

2012 Wildfire Recovery

In the Middle Niobrara River BUL, the vegetative recovery from the 2012 Fairfield Creek Wildfire has been monitored for three years. In 2013, grass-dominated areas that burned resembled other grasslands in the area just one year after the fire. However, many areas that had dense canopies of cedar experienced crown fires. In 2013, in these areas hemp, marestail, and sunflowers were common. In 2014 these species were still present but other forbs, sedges, and shrubs were beginning to cover a larger proportion of the ground. In 2015, annual grasses, sedges, and shrubs became more conspicuous. Buffalo bur, mullein, and thistles also seem to be more common in 2015. The expansion of smooth sumac may be a concern as it appears to be expanding in areas previously dominated by cedars.

Trees are demonstrating varying levels of recovery. By 2015, many oak suckers were reaching sufficient heights to escape browsing. Green Ash, American Elm, and Basswood re-growth were also doing similarly well. Few cottonwood suckers have survived. The surviving cottonwood suckers are in areas excluded from grazing. As of 2015, young pine seedlings remained elusive, but there are surviving live ponderosa pines on ridges, near roads, and as isolated trees. These will provide seed, but there are also many areas that have no live pine.

Sandsage Prairie Clover

Dalea cylindriceps, or Sandsage Prairie-clover, is a perennial herb native to the western Great Plains. It is recognized as a species of conservation concern in all but two of the eight states in which it has been documented and is recognized as a Tier I At-risk Species in Nebraska. Sandsage Prairie-clover is associated with sandsage prairie throughout most of its range in the Great Plains. In Nebraska, the most extensive occurrences of this plant community are located in southwest part of the state in Chase, Dundy, and Perkins counties. A study was undertaken to locate and document extant occurrences of the rare Prairie-clover in these counties, but no occurrences were found in Nebraska’s sandsage prairie in 2014. The Sandsage Prairie Clover does persist in Nebraska; outside of the study area, two large and previously-unknown Nebraska occurrences of D. cylindriceps were located in Garden and Keith counties.
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