



©Luke Seitz



©Julia Robinson

Can You Dig It: What's good for the soil is good for the herd & the bird

DAWSON COUNTY CROPLAND RESEEDING TIP 2021

Taylor Scherr

BIRD CONSERVANCY OF THE ROCKIES PARTNER BIOLOGIST
BASED IN THE GLENDALE FIELD OFFICE

Contents

Problem Statement.....	2
Project Background.....	2
Goals and Objectives.....	5
Objectives.....	6
Proposed Alternatives and Actions.....	6
Partnerships.....	7
Implementation and Outreach.....	7
Budget.....	8
Progress Evaluation & Outcomes.....	9
References.....	9
Application Ranking Summary: 2021 Targeted Implementation Plan.....	11

Problem Statement

The primary focus of the 2021 Dawson County Targeted Implementation Plan (TIP) is Soil Quality Limitation—Organic Matter Depletion. In Dawson County, the Local Working Group identified soil health as one of the county’s top resource concerns, largely focused on organic matter depletion on dryland crop operations.

Soil health is the foundation of sustainable rangelands capable of supporting livestock and wildlife simultaneously, a critical endeavor given the rapid loss of grasslands across the nation. Research suggests that compared to annual cropland, perennial grasslands contain more organic matter, soil carbon, nitrogen, water aggregate, and microbial activity (Nation 1995, Culman et al. 2009). Perennial cover can improve soil quality, thus improving grazing lands and wildlife habitat through numerous methods. Such improvements include:

1. Creating year-round ground cover to reduce potential soil loss from erosion, increasing weed suppression, decreasing evaporation of soil moisture, and increasing wildlife habitat.
2. Minimizing soil and habitat disturbance, thereby improving soil organic matter, reducing risk of compaction and erosion, increasing carbon sequestration, and improving weed suppression.
3. Increasing overall plant diversity, thus improving sustainability of the ecosystem.
4. Stabilizing soils and overall system health with living roots to create pore space for water infiltration, increasing soil microbiology activity, and increasing nutrient cycling.
5. Encouraging the use of livestock grazing, improving organic matter, soil nutrients, stocking rate potential, vegetation heterogeneity, and weed suppression.

Within the proposed focus area, at least 21 producers have expressed interest in reseeding and development of infrastructure and livestock water to graze reseeded lands. The conversion of cropland back to perennial cover within this area would address this primary resource concern in the county, while also creating and improving at least 4,200 acres of grazing lands for livestock production and wildlife habitat through the reestablishment and connectivity of permanent vegetation.

Project Background

Optimal soil quality is necessary for the overall health of working lands, regardless of ecosystem type and land use. Compared to annual crop systems, perennial systems have greater amounts of organic matter and may contain less herbicide residue, and fewer weed seeds (Nation 1995). Additionally, research suggests that perennial grasslands contain more soil carbon, nitrogen, water retention capability, structure and microbial activity than neighboring, fertilized cropland that supported a rotation of wheat, sorghum, and soybeans (Culman et al. 2009). By restoring marginal croplands to perennial cover, there can be improvements to soil quality by restoring organic matter depletion, as well as a reduction in noxious and invasive weeds and an increase in wildlife habitat for species such as grassland birds.

With the rapid decline of grasslands across the nation, the Northern Great Plains remains a stronghold for this valuable ecosystem. In the Northern Great Plains, however, 51.3 million acres of grassland have been converted to agricultural cropland since the 1800s and there is a continued conversion rate of almost 1.2 million acres of grasslands per year (World Wildlife Fund 2018). Coinciding with this extreme loss of habitat, grassland birds have been identified as the fastest declining group of birds, with a 53% reduction in population—more than 720 million birds—since the 1970’s (Rosenberg et al. 2019). Most

intact grasslands remain under private ownership, making partnerships with agricultural producers ever more critical for conservation of grassland birds. This is particularly true in areas where conversion from cropland back to grass is both possible and profitable for producers, providing economic and ecological benefits.

Grassland birds historically existed alongside large herbivores when bison roamed freely across the Northern Great Plains. Heterogeneity in the landscape is critical for bird biodiversity due to this, and grazing is essential to create and maintain this heterogeneity (Figure 1). Agricultural practices that are developed with this in mind are highly beneficial to a number of species, whether developed through proper grazing practices or wildlife-friendly haying practices. Through the development of infrastructure and stock water where needed, and prescribed grazing or forage harvest to manage beneficial grazing or haying, it is possible to establish and maintain this heterogeneity on croplands re-established to perennial cover.

The Dawson County Long Range Plan (LRP) has identified seven grassland bird species of concern in the county (Sprague’s Pipit, Baird’s Sparrow, Bobolink, Chestnut-collared Longspur, Long-billed curlew, Burrowing Owl, Ferruginous Hawk) that would potentially benefit from the restoration of cropland to perennial cover, and the sustainability and system health generated when grazing and hay land are properly managed for soil health.

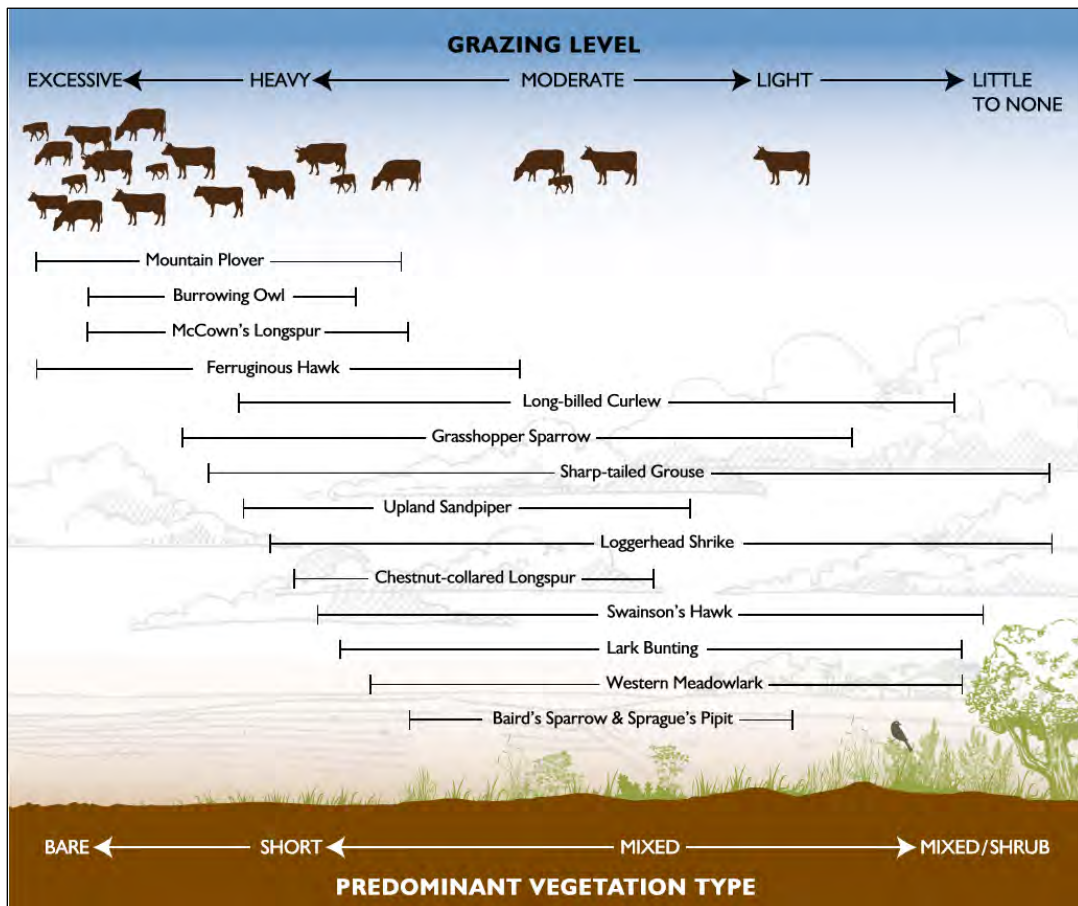


Figure 1. A representation of the importance of heterogeneity on the landscape for supporting multiple grassland bird species. Figure adapted from F. Knopf 1996.

The proposed project area for this TIP is a 189,667-acre area south of the divide in northern Dawson County (Figure 2), with approximately 100,000 acres of cropland. The project area was delineated using data of current cropland in the county (World Wildlife Fund PlowPrint data, Figure 3) and interest of local producers. Producer interest was gauged by a survey sent out in spring 2019 and data provided by producers in May 2020, resulting in at least 21 interested producers. Within Dawson County, 88.5% of lands are privately owned and 70% of these lands are intact grasslands (Northern Great Plains Joint Venture 2019). Targeting the restoration of the remaining croplands via use of World Wildlife Fund’s PlowPrint data will maximize improvements to organic matter depletion on dryland crop operations and maximize connectivity of habitat for wildlife by creating permanent vegetative cover.

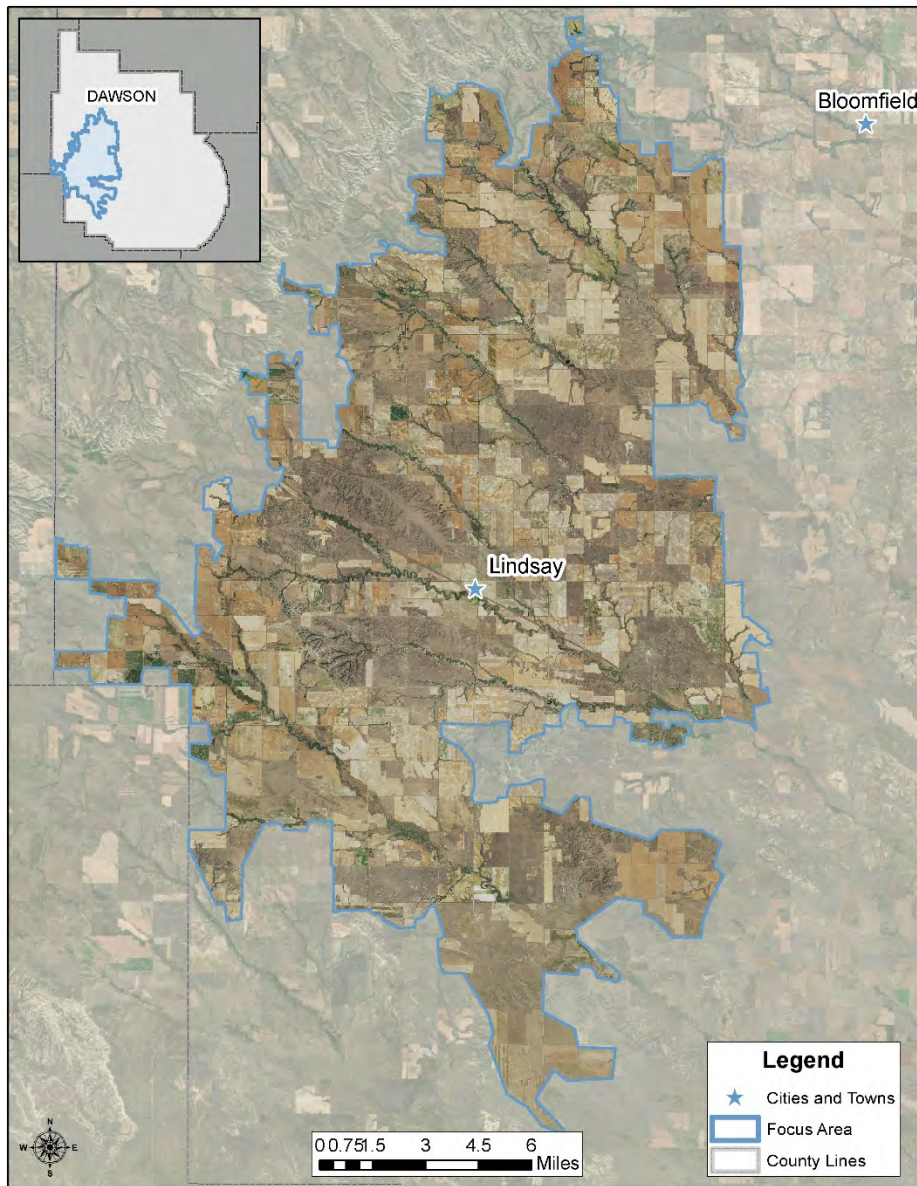


Figure 2. Map of the proposed TIP focus area and its location within Dawson County, Montana.

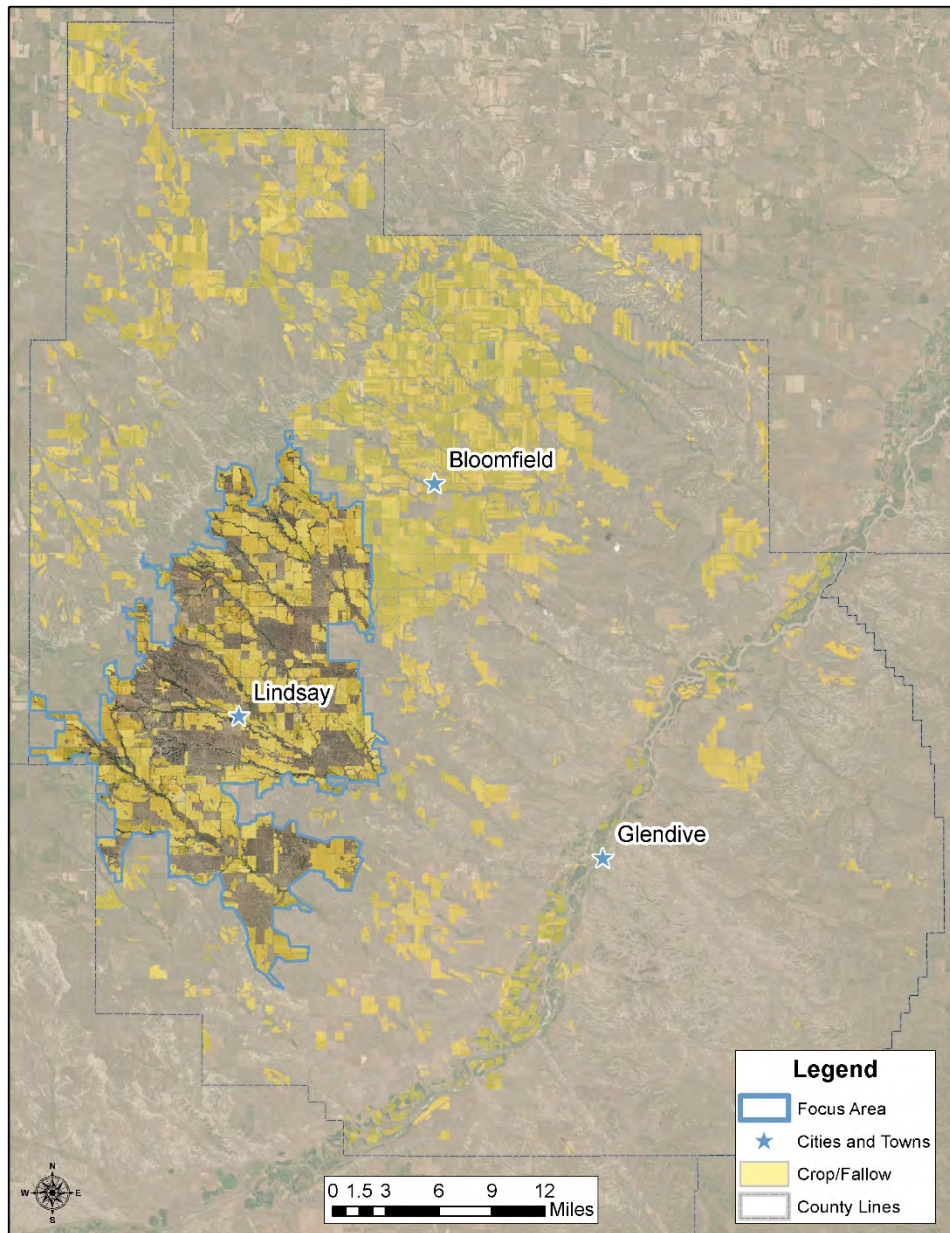


Figure 3. Map of the World Wildlife Fund’s PlowPrint data and the overlap with the proposed TIP focus area in Dawson County, Montana. PlowPrint data from WWF 2019.

Goals and Objectives

The primary goal of this project is to restore cropland back to perennial cover to increase soil quality, largely focused on organic matter, for the overall benefit of ecosystem health. Infrastructure will be developed where necessary to facilitate healthy management practices for haying or grazing, a critical component to maintain soil health integrity. This goal will be achieved by meeting or exceeding the following objectives:

Objectives

1. **At least 4,200 acres of cropland restored back to perennial cover**

With the current number of interested producers, and the estimated number of acres per producer, we aim to restore 4,200 acres of cropland back to perennial cover within the proposed focus area. This is a realistic goal for the duration of the TIP, as it would require 1,400 acres to be restored to perennial cover each year for the three-year sign-up period. There are enough applicants to meet this objective if all interested parties apply and enough funding to support these efforts given our budget estimate.

2. **Increased organic matter on cropland restored to perennial cover**

In the Northern Great Plains, organic matter content of soil is typically between 4% to 7% of overall soil mass (Hargrove and Luxmore 1988). In many instances, soil organic matter on cropland has fallen below 3% of overall soil mass (USDA-NRCS). This can result in negative effects to ecosystem services and decreased economic and environmental benefits such as increased erosion, decreased water infiltration, decreased carbon retention, and many others. Grasslands tend to support healthier soils when compared to annual cropland (Culman et al. 2009), including increased soil organic matter due to deep perennial roots, so the TIP will meet the goal of restoring soil organic matter to historic (4–7%) levels.

3. **Ideal vegetation heights for songbirds during the grassland songbird breeding season**

Recent research from the Bird Conservancy of the Rockies Science team found grassland songbirds in eastern Montana selected for vegetation heights of 10.6 inches, ranging from 9.4–12.2 inches, and a density of 7.1 inches, ranging from 5.9–7.9 inches, during the breeding season (Guido et al. *unpublished data*). We therefore intend to restore perennial cover to croplands to achieve this range during the breeding season (defined for this purpose as June 1 through June 30), maximizing the benefits of reseeding projects for songbirds. This will also provide cover for other wildlife and help reduce erosion, weeds and loss of soil moisture.

Proposed Alternatives and Actions

The proposed alternative is to restore croplands to perennial cover, while also developing infrastructure and livestock water to maximize the regeneration of soil quality and development of productive, healthy lands that can support livestock and wildlife simultaneously. NRCS will offer financial assistance for planting annual cropland to perennial cover through Range Planting, Forage and Biomass Planting, and/or Critical Area Planting. Critical Area Plantings may be used if necessary for situations such as ephemeral gullies, saline areas or other similar areas as defined by NRCS standards. Financial assistance for Cover Crops will be provided to assist in the restoration of cropland back to perennial cover.

Producers interested in the development of infrastructure and livestock water can also apply for financial assistance for fence, as well as components necessary to supply sufficient livestock water for a beneficial grazing rotation. Although cover crops and reseeding of cropland back to perennial cover largely aids in the restoration of soil organic matter, assistance in providing the means necessary for a rotational grazing system is essential for the continued improvement and maintenance of soil quality.

Continued economic benefits from reseeded croplands are critical for producers, meaning the lands will likely be grazed or hayed. Rotational grazing, when compared to continuous grazing, decreases soil compaction and increases carbon (Byrnes et al. 2018). Further, typical recommendations are that livestock should travel no farther than 2 miles to water on flat topography and 1 mile on rough terrain (Smith et al. 1986). With increased distance to water, soil becomes more compact and the overall health decreases. Croplands that are reseeded to perennial cover are likely not equipped with water or infrastructure necessary to prevent this compaction. Through providing practices to help develop the means to graze reseeded land to benefit soil health, the economic and environmental benefits of this TIP will be capitalized.

Environmental Quality Incentives Program Conservation Activities Include:

Code	Practice Name
550	Range Planting
512	Forage and Biomass Planting
342	Critical Area Planting
340	Cover Crop
382	Fence
642	Water Well
614	Watering Facility
516	Livestock Pipeline
533	Pumping Plant

Partnerships

This will be a highly collaborative effort led by the Bird Conservancy of the Rockies partner biologist in the Glendive Field Office, a position that is in partnership with NRCS and Montana Fish, Wildlife & Parks. Aside from technical assistance provided by this partnership, Bird Conservancy of the Rockies has grants available to assist with financial assistance on projects that may need additional cost share, as well as both financial assistance and technical assistance for workshops and outreach.

The Northern Great Plains Joint Venture (NGPJV) has requested to be part of the dialogue for this TIP and may provide financial and technical assistance if it becomes available in subsequent years. The NGPJV has previously had grants available that assisted with similar projects throughout the Northern Great Plains and has submitted a request for an extension of these funds into 2021 and on.

Additionally, World Wildlife Fund (WWF) has applied for multiple grants to restore cropland to grass for habitat for birds and, if received, would also be willing to potentially provide financial and technical assistance as needed and as available.

Implementation and Outreach

This Targeted Implementation Plan will span 2021 through 2025, with three years of sign-ups available to producers and contracts lasting five years each.

The Bird Conservancy of the Rockies partner biologist will organize outreach, education events and provide information to producers within the focus area, providing the majority of the technical assistance for this project with assistance from the Glendive Field Office. A list of 21 interested

producers was compiled via surveys and local contacts, and a survey of interest was sent out in June 2020 to these producers. This list would continue to be developed upon funding of the TIP via word of mouth, a press release, and a flier announcing the project sent to all producers within the focus area as determined by FSA records.

If any participating producers are interested, Bird Conservancy of the Rockies would like to consider highlighting projects and outcomes to educate others on the benefits of planting perennials. This outreach may be through their social media and a blog on their website and will also help to promote the TIP and show on-the-ground working lands enhancement.

Below is a proposed budget, broken down first by costs per producer and then costs per year. Several producers are interested in doing approximately 200-acre reseeding projects and intend to develop infrastructure and livestock water. Therefore, the below scenario assumes that all 21 currently interested producers intend to do this, while also planting for a Native Range Planting that requires standard preparation. The estimated amounts reflect the variation in proposed individual projects' size and scope.

Budget

Practice	Price	Unit	Average Extent	Cost per Unit
Range Planting: Native, Standard Prep	\$92.79	ac	200	\$18,558.00
Fence: Barbed/smooth wire	\$1.93	ft	15,840	\$30,571.20
Fence: Electric	\$1.38	ft	2,640	\$3,643.20
Pumping Plant: Photovoltaic pump	\$1,715.82	each	1	\$1,715.82
Pumping Plant: Well pump test	\$151.63	hr	20	\$3,032.60
Watering Facility: Permanent drinking w/ storage (1000 to 5000 gal)*	\$1.37	gal	1,500	\$2,055.00
Watering Facility: Storage tank*	\$0.59	gal	9,000	\$5,310.00
Livestock Pipeline: Buried PVC	\$1.33	ft	1,500	\$1,995.00
Water Well: Typical Well, 100 to 600 ft depth**	\$28.87	ln ft	199	\$5,745.13
Cost per Producer				\$72,625.95
# of Producers				21
Requested				\$1,525,144.95

*Based on an estimate of 200 head per pasture
 **Based on well depth in Dawson County from Ground Water Information Center data

EQIP Funds Annual Breakdown				
Fiscal Year	Contracts (no.)	Acres Treated (total)	Average Expected Cost per Contract	Total
2021	7	1,400	\$72,625.95	\$508,381.65
2022	7	1,400	\$72,625.95	\$508,381.65
2023	7	1,400	\$72,625.95	\$508,381.65
Totals	21	4,200		\$1,525,144.95

Progress Evaluation & Outcomes

Successful implementation of this TIP will be determined by the improvement of soil quality, largely determined by an increase of soil organic matter, resulting in improved grazing land and wildlife habitat. This would require the meeting or exceeding the TIP objectives through the use of the following monitoring methods:

1. Map of WWF's PlowPrint data before implementation with added acres restored after implementation of the TIP to demonstrate overall footprint of acres improved for outreach and education purposes.
2. Soil health tests will be run in the autumn prior to reseeding and each subsequent autumn for the duration of the contract to measure soil organic matter levels, as well as assess overall soil health of the ecosystem. Multiple indicators of soil health will be measured to demonstrate overall improvements made on newly reseeded land.
3. Photos will be taken before and after implementation to provide visual confirmation of improved vegetative heterogeneity and perennial cover and provide another method for outreach and education.
4. Point count bird surveys will be conducted multiple times during the contract period, including before implementation when possible, and after implementation and establishment of grass to document species presence and usage.

The Bird Conservancy of the Rockies partner biologist will also host an outreach event at the conclusion of implementation of this TIP to demonstrate the improvements and benefits made to restored lands in terms of both soil health and bird habitat.

References

- Byrnes R.C., Eastburn D.J., Tate K.W., Roche L.M. (2018). A Global Meta-Analysis of Grazing Impacts on Soil Health Indicators. *J Environ Qual.* 47(4):758-765.
- Culman, S.W., DuPont, S.T., Glover, J.D., Buckley, D.H., Fick, G.W., Ferris, H., Crews, T.E. (2009). Long-term Impacts of High-Input Annual Cropping and Unfertilized Perennial Grass Production on Soil Properties and Belowground Food Webs in Kansas, USA. *Agriculture, Ecosystems & Environment*, 137(1-2), 13-24.
- Dawson County Field Office (2019). Dawson County Long Range Plan.
- Hargrove, W.W. and Luxmore, R.J. (1988). Soil organic matter content across the United States, From: A New High-Resolution National Map of Vegetation Ecoregions Produced Empirically Using Multivariate Spatial Clustering, released to the USDA, public domain.
- Nation, A. (1995). *Quality Pasture*. Green Park Press of Mississippi Valley Publishing Corporation, Jackson, Mississippi. 285.
- Northern Great Plains Joint Venture (2019). Conservation Guidance Document.
- Rosenberg, K. V., Dokter, A. M., Blancher, P. J., Sauer, J. R., Smith, A. C., Smith, P. A., Stanton, J.C., Panjabi, A., Helft, L., Parr, M., & Marra, P. P. (2019). Decline of the North American Avifauna. *Science*, 366(6461), 120-124.

Smith, B., Leung, P., and Love, G. (1986). Intensive Grazing Management: Forage. Animals, Men, Profits. The Graziers Hui, Kamuela, Hawaii.

USDA-NRCS. Healthy Soils Are... Fact Sheets.

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/health/?cid=stelprdb1193043>

World Wildlife Fund (2019). PlowPrint Data Report. <https://www.worldwildlife.org/projects/plowprint-report>

Ranking Questions

Application Ranking Summary: 2021 Targeted Implementation Plan Dawson County Reseeding Cropland Program

Ranking Date:	Applicant:
Final Ranking Score:	Application Number:
Planner:	Phone:
Farm Location:	

Ranking Questions

Select one of the following: (connectivity is defined by the acres surrounding the land to be restored and the acres to be restored)			Points
1a	Will implementation of practices result in restoration or connectivity of <50 acres?	Yes 0 No 0	
1b	Will implementation of practices result in restoration or connectivity of between 50 and 100 acres?	Yes 0 No 0	
1c	Will implementation of practices result in restoration or connectivity of >100 acres?	Yes 0 No 0	
Select one of the following:			
Will the seed mix include...			
2a	...only introduced species?	Yes 0 No 0	
2b	...a mix of introduced and native species?	Yes 0 No 0	
2c	...only native species?	Yes 0 No 0	
Select one of the following:			
Will the seed mix include...			
3a	...less than 3 overall species?	Yes 0 No 0	

3b	...3 to 5 overall species?	Yes 0 No 0	
3c	...more than 5 overall species?	Yes 0 No 0	
Select one of the following:			
Will the seed mix include...			
4a	...≤ 1 forb species?	Yes 0 No 0	
4b	...2 forb species?	Yes 0 No 0	
4b	...3 or more forb species?	Yes 0 No 0	
Select one of the following:			
5a	Planned land use for restored acres is haying.	Yes 0 No 0	
5b	Planned land use for restored acres is grazing.	Yes 0 No 0	
5c	Planned land use for restored acres is other (hunting, wildlife, etc).	Yes 0 No 0	