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## Can You Dig It: What's good for the soil is good for the herd & the bird, Part 2

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DAWSON COUNTY CROPLAND RESEEDING TIP 2022

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## Problem Statement

The primary focus of the 2022 Dawson County Targeted Implementation Plan (TIP) is Soil Quality Limitation—Organic Matter Depletion. In Dawson County, the Local Working Group identified and listed soil health as one of the county’s top resource concerns, largely focused on organic matter depletion on dryland crop operations, in the Long Range Plan.

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 Target Area, at least 23 producers have expressed interest in reseeding cropland to perennial cover or the renovation of retired Conservation Reserve Program (CRP) land and the development of infrastructure and livestock water to graze reseeded and renovated lands. The conversion of cropland back to perennial cover and the renovation of CRP lands within this area would address this primary resource concern in the county by working with at least 26% of the producers in the area, while also creating and improving at least 6,900 acres of grazing lands for livestock production and wildlife habitat through the reestablishment, renovation and connectivity of permanent vegetation. This TIP would build off the 2021 Reseeding TIP established in the Lindsay area of Dawson County, which received 6 applications with just over 4,000 acres of cropland planned to be reseeded to perennial cover during its first sign-up period, and would establish a fund pool to the area adjacent to the 2021 TIP Target Area furthering connectivity.

## Project Background

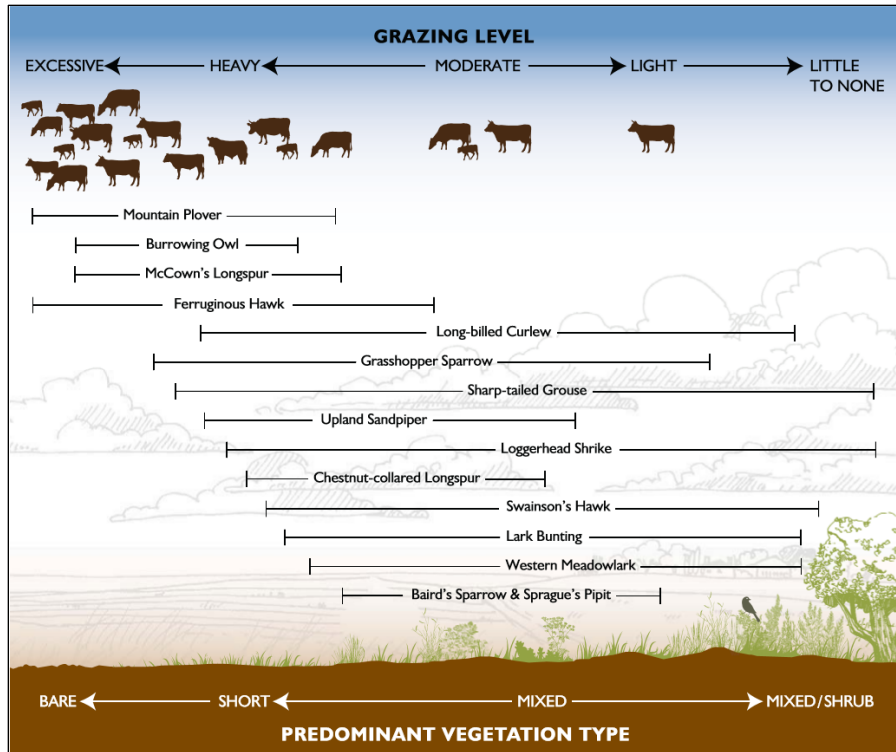
Optimal soil quality is necessary for the overall health of working lands, regardless of ecosystem type and land use. Compared to annual crop systems, perennial systems have greater amounts of organic matter and may contain less herbicide residue, and fewer weed seeds (Nation 1995). Additionally, research 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. Similarly, by renovating expiring CRP and developing the necessary infrastructure for use as working lands, comparable benefits may be achieved.

Soil stores significant amounts of carbon as soil organic matter, with nearly 3.5 times more carbon than that stored in all living plants (Lal 2004). The loss of soil organic matter in agricultural fields can lead to a potential 20–67% decline in the amount of carbon stored, which has potentially serious consequences for global climate change (Davidson et al. 1993). Additionally, there is emerging evidence that grasslands with higher biodiversity tend to have a higher capability of carbon storage than those with lower species richness (Chen et al. 2018). Restoring cropland to perennial cover and renovating CRP to increase biodiversity, therefore, will provide benefits by improving soil organic matter and may provide long term benefits for carbon storage to benefit the rapidly changing climate.

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, 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, the rejuvenation of CRP and the sustainability and system health generated when grazing and hay land are properly managed for soil health.

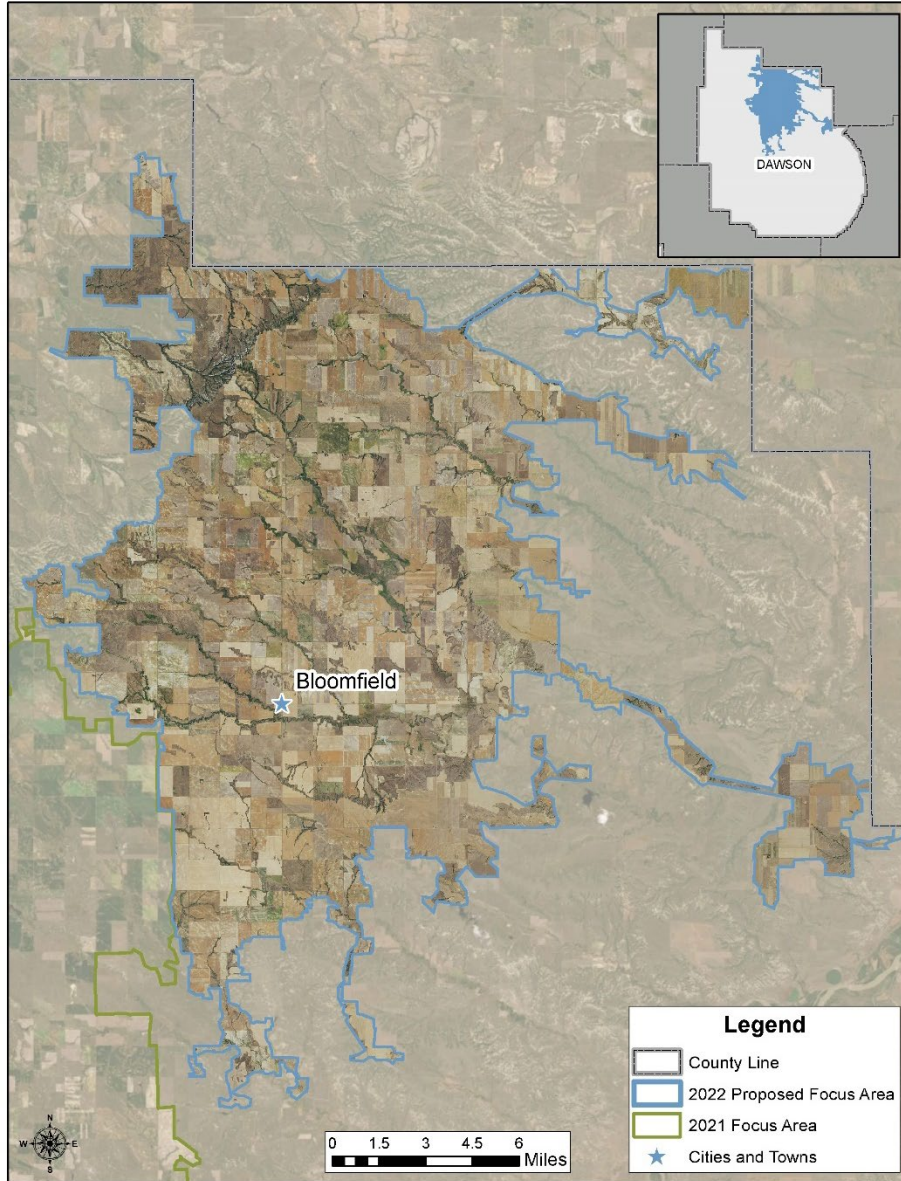


**Figure 1.** A representation of the importance of heterogeneity on the landscape for supporting multiple grassland bird species. Figure adapted from F. Knopf 1996.

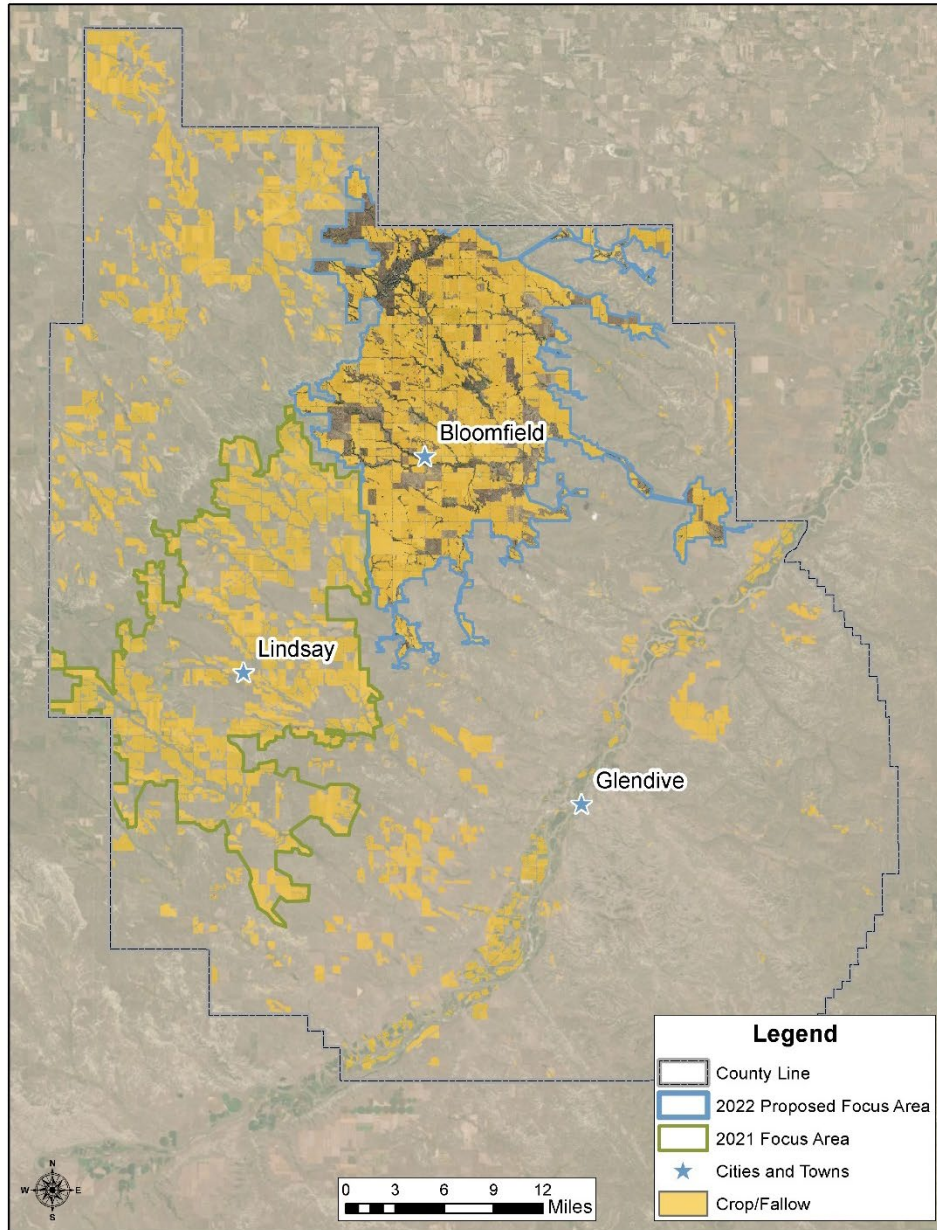
The proposed Target Area for this TIP is a 196,511-acre area south of the divide in northern Dawson County (Figure 2), consisting of approximately 130,000 acres of cropland. The area was delineated using data of current cropland in the county (World Wildlife Fund PlowPrint data, Figure 3) and interest of local producers. Producer interest was gauged by a survey sent out in winter 2020 to all 88 known landowners in the Target Area using the parcel data layer from FSA’s records. This resulted in at least 23 interested producers, and further outreach will continue.

In combination with the 2021 Dawson County Reseeding TIP, the proposed Target Area would result in funding pools for reseeding and infrastructure projects for the majority of dryland crop operations within Dawson County (Figure 3). In 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 Target 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 2022 TIP Target Area and implemented 2021 TIP Target 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. It will also provide support for developing infrastructure to facilitate healthy management practices for haying or grazing, a critical component to maintain soil health integrity, on expiring CRP lands or lands restored to perennial cover. This goal will be achieved by meeting or exceeding the following objectives:

## Objectives

**1. At least 6,900 acres of cropland restored back to perennial cover or CRP renovated to improve perennial cover**

With the current number of interested producers, and the estimated number of acres per producer based on enrollment in the 2021 Lindsay-area Reseeding TIP, we aim to restore or renovate 6,900 acres of cropland or CRP within the proposed Target Area. This is a realistic goal for the duration of the TIP based on survey interest and the number of acres interested producers implied they would want to enroll. Additionally, in the Lindsay area, we had just over 4,000 acres of cropland enrolled in the first year of sign-ups, demonstrating a great interest in reseeding cropland back to perennial cover within Dawson County. There are enough applicants to meet this objective if all interested parties apply and enough funding to support these efforts given our budget estimate. Although 6,900 acres seems a small portion of the overall crop area, reseeding efforts provide larger ecosystem and working lands benefits by creating contiguous landscapes. This can eradicate edge effects for wildlife, restore successional migratory and breeding habitat, and benefit producers who intend to incorporate the restored land into their grazing rotations. Outreach will continue with hopes of furthering the dollars spent, and such efforts were successful in seeing more acres than planned reseeded for the Lindsay-area TIP.

**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 and rejuvenate CRP, 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 and renovating CRP through Range Planting, Forage and Biomass Planting, and/or Critical Area Planting. Renovation of CRP will be advised on a case-by-case basis, but will include managing the existing stand—through grazing, mowing, herbicide, light harrowing, or light disking—to suppress the existing stand, as well as controlling for any invasive weeds. Once the fields are prepared, the field will be interseeded through the use of broadcast, no-till drill, hoe drill, or conventional drills. No-till drills will be recommended where possible to minimize soil disturbance and weed seed germination (CRP Interseeding Recommendations for Montana, Montana Plant Materials Center). 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 reseeded 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 would also be willing to potentially provide financial and technical assistance as needed and as available.

### Implementation and Outreach

This Targeted Implementation Plan will have three years of sign-ups, beginning in 2022.

The Bird Conservancy of the Rockies partner biologist will organize outreach, education events and provide information to producers within the Target Area, providing the majority of the technical assistance for this project with assistance from the Glendive Field Office. A list of 23 interested producers was compiled via surveys and local contacts. 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 Target 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. This TIP was developed as a continuation of the 2021 Reseeding TIP in the Lindsay area of Dawson County, where we had an average of 316 acres per application during the 2021 sign-up period with interest in infrastructure and water development in five of the six applications. Therefore, the below scenario is based off of averages from these applications, using the 2021 EQIP Cost List.

## Budget

Practice	Price	Unit	Average Extent	Cost per Unit
Forage & Biomass Planting: Introduced Perennial Grasses w/ Legume	\$61.78	ac	316	\$19,522.48
Critical Area Planting	\$210.00	ac	50	\$10,500.00
Fence: Barbed/smooth wire	\$2.00	ft	7,500	\$15,000.00
Pumping Plant: Photovoltaic pump	\$2,116.40	each	1	\$2,116.40
Pumping Plant: Well pump test	\$149.80	hr	20	\$2,996.00
Watering Facility: Permanent drinking w/ storage (1000 to 5000 gal)*	\$1.41	gal	1,500	\$2,115.00
Watering Facility: Storage tank*	\$0.58	gal	9,000	\$5,220.00
Livestock Pipeline: Buried PVC	\$1.33	ft	2,500	\$3,325.00
Water Well: Typical Well, 100 to 600 ft depth**	\$29.57	In ft	199	\$5,884.43
<b>Cost per Producer</b>				\$66,679.31
<b># of Producers</b>				23
<b>Requested</b>				\$1,533,624.13

EQIP Funds				
Fiscal Year	Contracts (no.)	Acres Treated (total)	Average Expected Cost per Contract	Total
2022	8	2,400	\$66,679.31	\$533,434.48
2023	8	2,400	\$66,679.31	\$533,434.48
2024	7	2,100	\$66,679.31	\$466,755.17
<b>Totals</b>	<b>23</b>	<b>6,900</b>		<b>\$1,533,624.13</b>

## 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 conducted 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 or renovated land.
3. Individual WEPS scenarios will be run on each contract to document modeled soil losses from erosion, shifts in organic matter, and average Soil Tillage Intensity Ratings (STIR) before and after conversion to perennial cover.
4. 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.

5. 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. Point counts will be conducted from May 15 through June 30 of each year to ensure breeding bird species diversity is represented.

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.

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## Ranking Questions

### Application Ranking Summary: 2022 Targeted Implementation Plan Dawson County Reseeding Cropland Program

#### Ranking Questions

1. Select one of the following: (connectivity is defined by the acres surrounding the land to be restored and the acres to be restored)
  - a. Will implementation of practices result in improvement or connectivity of <50 acres?
  - b. Will implementation of practices result in improvement or connectivity of between 50 and 100 acres?
  - c. Will implementation of practices result in improvement or connectivity of >100 acres?
2. Select one of the following: Will the seed mix include...
  - a. only introduced species?
  - b. a mix of introduced and native species?
  - c. only native species?
3. Select one of the following: Will the seed mix include...
  - a. less than 3 overall species?
  - b. 3 to 5 overall species?
  - c. more than 5 overall species?
4. Select one of the following: Will the seed mix include...
  - a. ≤ 1 forb species?
  - b. 2 forb species?
  - c. 3 or more forb species?
5. This application will be effective for wildlife habitat by using one of the following land use management techniques:
  - a. Not applicable
  - b. Haying
  - c. Grazing