2024

Sheridan County
Crop to Perennial Vegetation
Targeted Implementation Plan

USDA NRCS PLENTYWOOD FIELD OFFICE

Brooke Johns, NRCS, District Conservationist

Jacquie Evans, PPJV, Science Integration Specialist

TABLE OF CONTENTS

Montana NRCS photo

TIP SUMMARY

This Targeted Implementation Plan (TIP) will establish perennial grass mixes in unproductive or inefficient areas of annual cropping systems. It will restore 4,500 acres of marginally productive croplands back to grasslands and will improve the management of working lands for agricultural production while minimizing impacts to natural resources. The estimated project cost to NRCS for converting 4,500 acres of annual cropland to perennial grasses over three years (2024–2026) is $772,650.

Primary Resource Concern: *Energy Efficiency of Farming/Ranching Practices and Field Operations*

Geographic Focus

The 2024 Target Area covers 698,200 acres in the northeastern and central portions of Sheridan County (Fig. 1). Approximately 396,422 acres (57%) within the Target Area are annually cultivated crop fields that have the potential to be converted to perennial vegetation under the TIP. In 2022 and 2023, this TIP was implemented in the western and southern portions of Sheridan County, respectively, with 853 acres contracted so far in 2022 (Fig. 2 and 3). Together the three TIP areas cover the entire county.

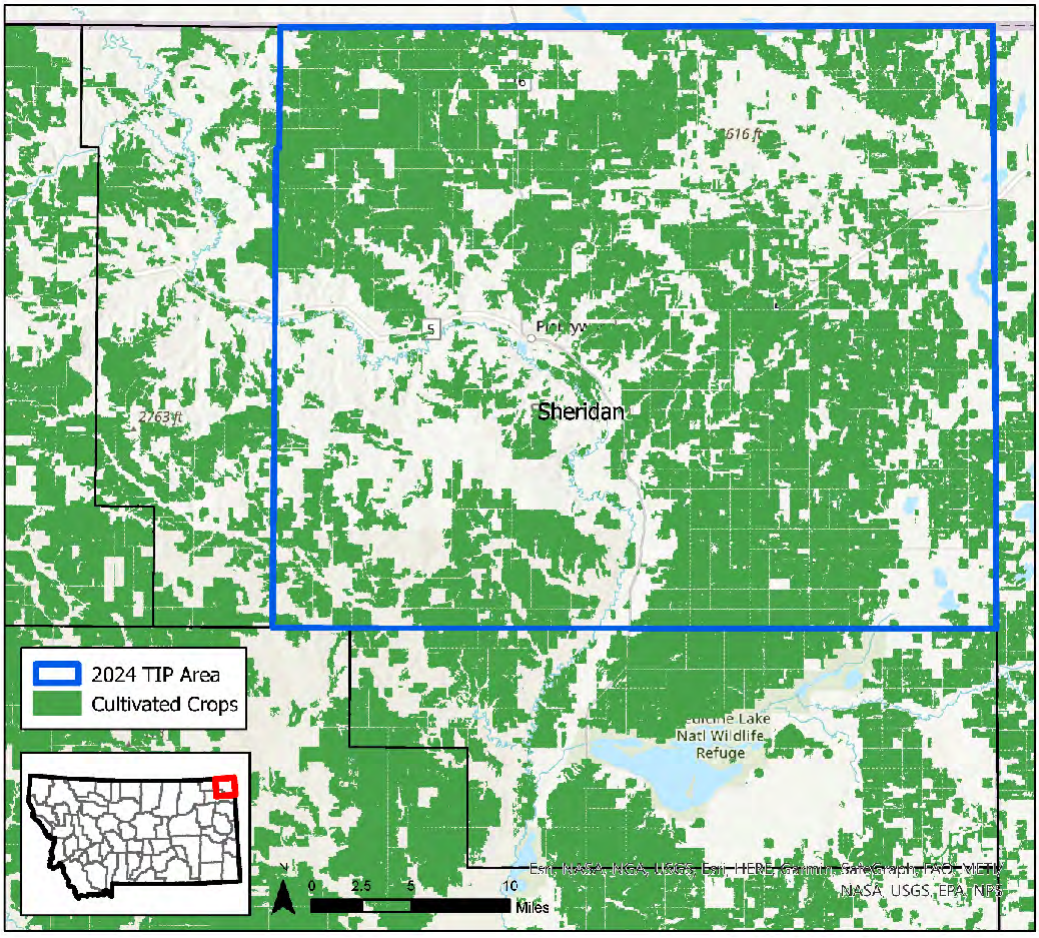

Figure 1. Sheridan County 2024 TIP Project Area

PROJECT OVERVIEW

Background Information

The size of farm equipment continues to increase as the industry attempts to maximize efficiency in crop production. Equipment has outgrown the ability to farm on every acre; some fields are now just too small and some areas in larger fields are too oddly shaped to farm economically (Fig. 4). These types of fields occur throughout Sheridan County. As equipment gets larger, efficiency drops on small and odd-shaped fields. Increased efficiency of farming operations will be attained when odd-shaped areas and subfields are planted to perennial cover, resulting in more regularly shaped crop fields that are compatible with the use of GPS guidance systems and contemporary farm equipment. There is a need, and much interest in converting small, odd-shaped, or marginal annual cropland to perennial cover in Sheridan County.

Resource Concerns

Problems with marginal or low-producing cropland and degraded wildlife habitat were identified at the Local Work Group meeting as priority resource concerns (Sheridan County Long Range Plan, page 37).

Resource concerns on small, odd-shaped, or marginal crop fields include:

- ***Energy efficiency of farming practices and field operations*** – small or oddly-shaped fields are subject to operational overlap, where equipment such as sprayers and seeders make multiple trips across the fields or subfields. Overlap is highly inefficient because of the extra fuel needed to go over the acreage again and the amount of seed and fertilizer put down. In marginal cropland, the amount of energy put into the cropland compared to the yield returned is too high to justify continually cropping.
- ***Plant productivity & health and pest pressure*** – thin stands of marginal crop areas are more susceptible to noxious weed invasion and damage from pests, diseases, soil borne pathogens and nematodes affecting the desired ecological functions and management objectives.
- ***Nutrients and pesticides transported to surface water*** – thin crop stands are susceptible to loss of nutrients and pesticides, which are transported off-site to surface water.
- ***Soil erosion*** is accelerated in areas where the crop is too thin to protect the soil from the wind or raindrop impact. Topsoil is lost and sediment is transported to surface water when the crop is not robust enough to provide adequate protection from erosion.
- ***Soil organic matter depletion*** continues on unproductive fields that are farmed year after year.
- ***Terrestrial habitat for wildlife***– annual crop land often does not provide winter cover for wildlife.

Goals and Objectives

Our goal is to assist producers to convert unproductive annual cropland into perennial vegetation which can be used sustainably for haying and/or grazing while supporting wildlife habitat. The objective of this TIP is to transition 4,500 acres of annual cropland to diverse perennial cover. Once these acres are planted and the potential benefit is realized, it is unlikely that they will be converted back into an annual cropping system. Through this TIP, the outcome will be perennial vegetation maintained for many years past the actual contract length.

Proposed Alternatives

No Action Alternative

If no action is taken, unprofitable and soil degrading practices will continue to be implemented on the affected acres and energy consumption will continue at the current rate. Cropland will also continue to provide low quality wildlife habitat.

Alternative 1

The first alternative considered was seeding a perennial mixture immediately following an annual crop harvest, using either Conservation Cover, Pasture/Hay Planting, or the Range Planting practice.

Alternative 2 (Preferred)

The selected alternative provides the option of planting a cover crop the year after an annual crop, and then seeding the perennial vegetation immediately after that fall or the following spring. Cover crops improve water filtration, reduce weed pressure, increase soil organic matter, and act as biological primer for the soil. Seeding cover crops the year after an annual crop provides a good transition to perennial vegetation.

This TIP will give producers and the NRCS the opportunity to improve soil health and benefit wildlife. Alternatives used to treat the resource concern will be limited to the practices in Table 1.

Table 1. Conservation Practices

EQIP PRACTICE	CODE	PAYMENT RATE[1]
Conservation Cover	327	$171.70 per acre (Introduced Species)
Cover Crop	340	$76.67 per acre (Multiple Species)
Forage and Biomass Planting	512	$98.09 per acre (Introduced Perennial Grasses w/ Legume)
Range Planting	550	$107.09 per acre (Native, Standard Preparation)

[1] Based on 2023 rates.

IMPLEMENTATION

Past signups have shown that there is a lot of interest in transitioning cropland to perennial cover in Sheridan County. The Field Office has already been working with 12 producers (> 1,825 acres) who are willing to participate in the first year of the TIP. Outreach will be done in the Target Area to inform other producers about the TIP and to locate project sites.

Conservation Plans will include:

- Planting the cropland to perennial grass mixes through conservation practices 327 (Conservation Cover), 512 (Pasture/Hay Planting) or 550 (Range Planting).
- Some contracts will also utilize cover crops (340) and pollinator habitat plantings where feasible and needed.

Conservation contracts will be no longer than two years. The average cost will be $171.70 per acre, or $17,170 per contract. Our goals and required financial assistance by fiscal year are below.

EQIP Funds			
Fiscal Year	**Contracts (no.)**	**Acres Treated**	**Total**
2024	20	2,000	$343,400
2025	15	1,500	$257,550
2026	10	1,000	$171,700
Total	45	4,500	$772,650

The Plentywood Field Office has a great deal of experience in successfully implementing the prescribed conservation practices. We will evaluate and monitor sites annually to determine success of perennial vegetation and adjust mixes, planting timing and techniques according to our findings. NRCS and partners will meet with participants for site visits.

Partnerships

- **Ducks Unlimited (DU):** DU will assist us after the seeding is established in monitoring the success of the stand and help us determine what seedings are creating greater quality habitat for wildlife, as well as setting up and conducting wildlife surveys.
- **Montana Fish Wildlife & Parks (FWP):** FWP can provide additional financial resources to the producers if they are willing to provide game bird hunting opportunities.
- **Sheridan County Conservation District (SCCD):** The SCCD will assist us in advertising our TIP project and help us expand our network with producers to increase participation in the TIP area.
- **Prairie Pothole Joint Venture (PPJV):** PPJV provided technical assistance on this TIP proposal and will provide technical assistance for evaluating outcomes via their Science Integration Specialist. PPJV will also support the NRCS field office with communication needs.
- **US Fish & Wildlife Service:** Our local Medicine Lake Wildlife Refuge works with many producers throughout the area and will be a valuable asset in networking and promoting our TIP.

Outcomes

Converting unproductive, inefficient, or difficult to access areas of annual cropland to perennial vegetation will have wide-ranging benefits. Some of those benefits include healthier soils, reduced soil erosion, decreased nutrient and sediment loss, reduced noxious weed invasion, decreased energy use and expenses, and improved habitat for wildlife, pollinators, beneficial insects, and soil microorganisms. Some anticipated outcomes of this TIP are estimated below. Final outcomes will be evaluated using the tools cited below.

- **Reduce fuel consumption by 64,000 gallons:** Energy will be conserved by eliminating machinery operations on non-profitable acres and doubling up on fertilizer, seed, chemicals, and compaction. We are predicting a 90% fuel reduction by switching to perennial vegetation, which amounts to over an estimated 64,000 gallons of fuel saved (see Energy Savings Example below).
- **Sequester the equivalent of 2,370 metric tons carbon dioxide annually**: Perennial crop systems can reduce carbon emissions and facilitate soil storing carbon. Transitioning 4,500 acres of cropland to perennial cover is estimated to reduce greenhouse gas emissions by 2,370 metric tons CO_2 per year (equivalent to 299 homes' energy use for one year; comet-planner.com).
- **Create 4,500 acres of wildlife habitat**: Planting cropland back to perennial vegetation will create year-around habitat for wildlife, including priority grassland bird species in steep decline (see the ***Wildlife Conservation Values Appendix*** for more information). Outcomes from this TIP directly support goals and objectives of the NRCS Working Lands for Wildlife Great Plains Grasslands Biome Framework (NRCS 2021).

Energy Savings Example

Converting Small Areas of Cropland to Perennials

Operations & Fertilizer	**System - Gallons Diesel/Acre**	
	No-Till Spring Wheat/Lentil	Perennial Hay
Field Operations (WEPS comparison)	2.6	1.3
Urea fertilizer- 100 lb/ac @ 0.129 gal/lb N diesel fuel equivalent (Iowa State Extension)	12.9	0
Total	**15.5**	**1.3**
500 Acres Converted	**7750**	**650**
Dollars Saved (Based on $5.00 Dyed Fuel)	**$38,750**	**$3,250**

Ranking Questions

1	Select one of the following: Will the seed mix include…	
	Only native species	
	A mix of introduced and native species	
	Only introduced species	
2	Select one of the following: Will the seed mix include…	
	5 or more species	
	Less than 5 species	
3	Select one of the following: Will the seed mix include…	
	3 forb species	
	2 forb species	
	1 forb species	
	0 forb species	
4	Select one of the following: Application includes…	
	Cover crops	
	No cover crops	
5	Based on the waterfowl breeding density (pairs/mi^2) map and grassland bird core map*, what is the highest habitat priority area included in the offered acres?	
	T-Storm Priority 1-3 (60-100+ duck pairs)	
	4+ grassland bird species OR T-Storm Priority 4-5 (25-60 duck pairs)	
	2-3 grassland bird species OR T- Storm Priority 6 (10-25 duck pairs)	
	0-1 grassland bird species AND T-Storm Priority 7 (0-10 duck pairs)	
6	Based on the pollinator map*, what is the proximity of the offered acres to the nearest 247 ac grassland patch?	
	< 0.62 mi (Blue)	
	> 0.62 mi (Yellow) and offered acres plus existing contiguous vegetation will be ≥ 247 ac	
	> 0.62 m (Yellow) and offered acres plus existing contiguous vegetation will be < 2470 ac	

*The waterfowl breeding density (Fig. A1a), grassland bird core (Fig. A1b), and pollinator maps (Fig. A2b) are included in the Wildlife Conservation Values appendix.

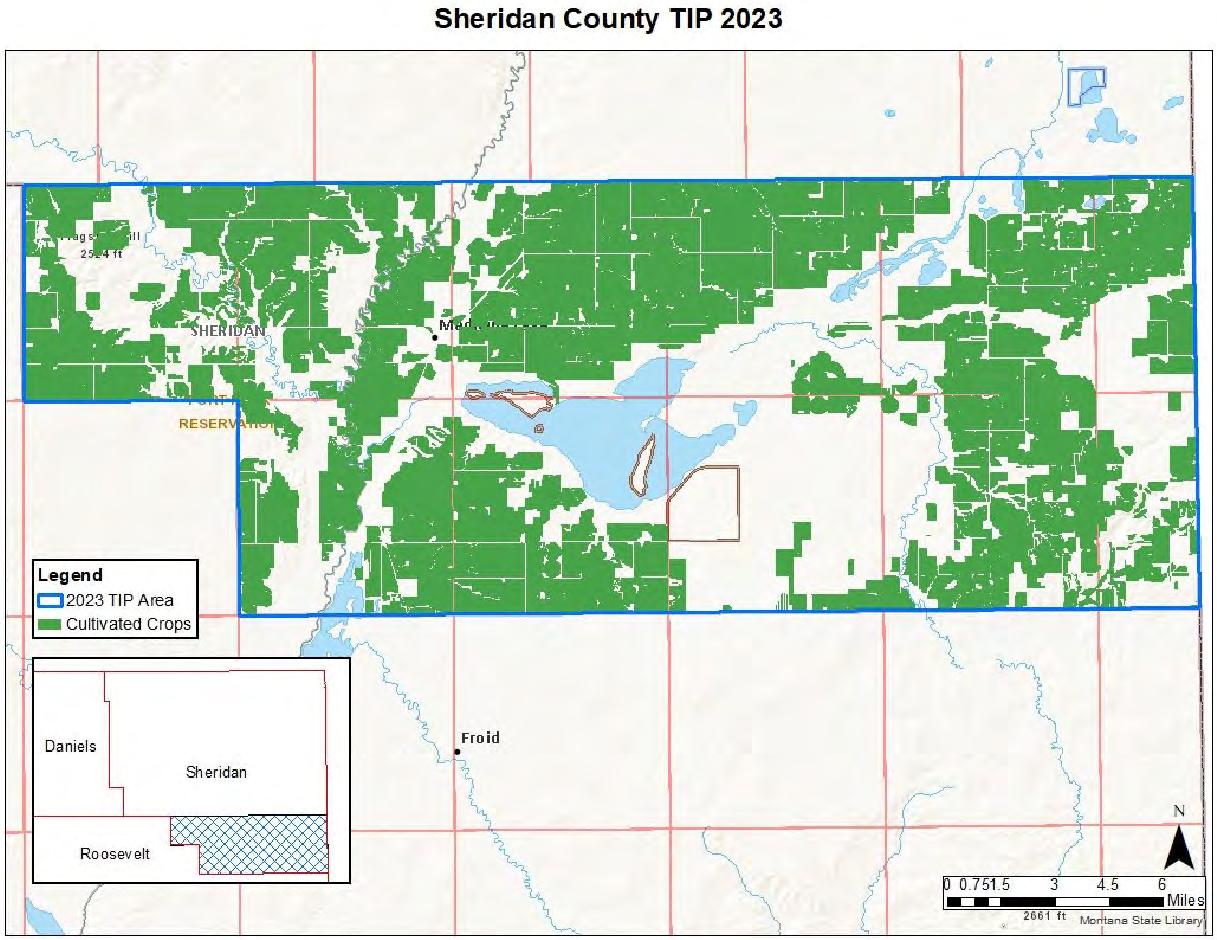

Figure 2. Sheridan County 2023 TIP Project Area

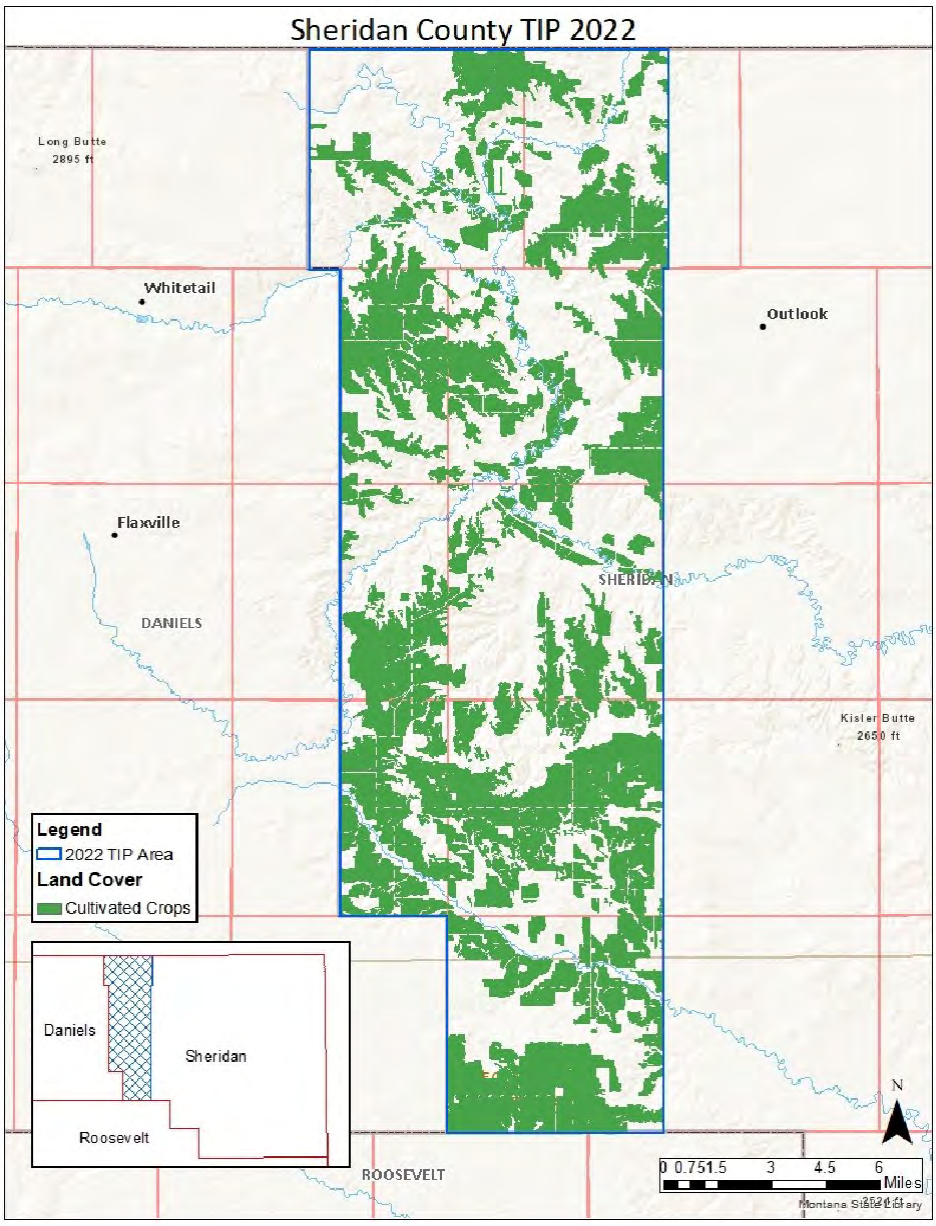

Figure 3. Sheridan County 2022 TIP Project Area

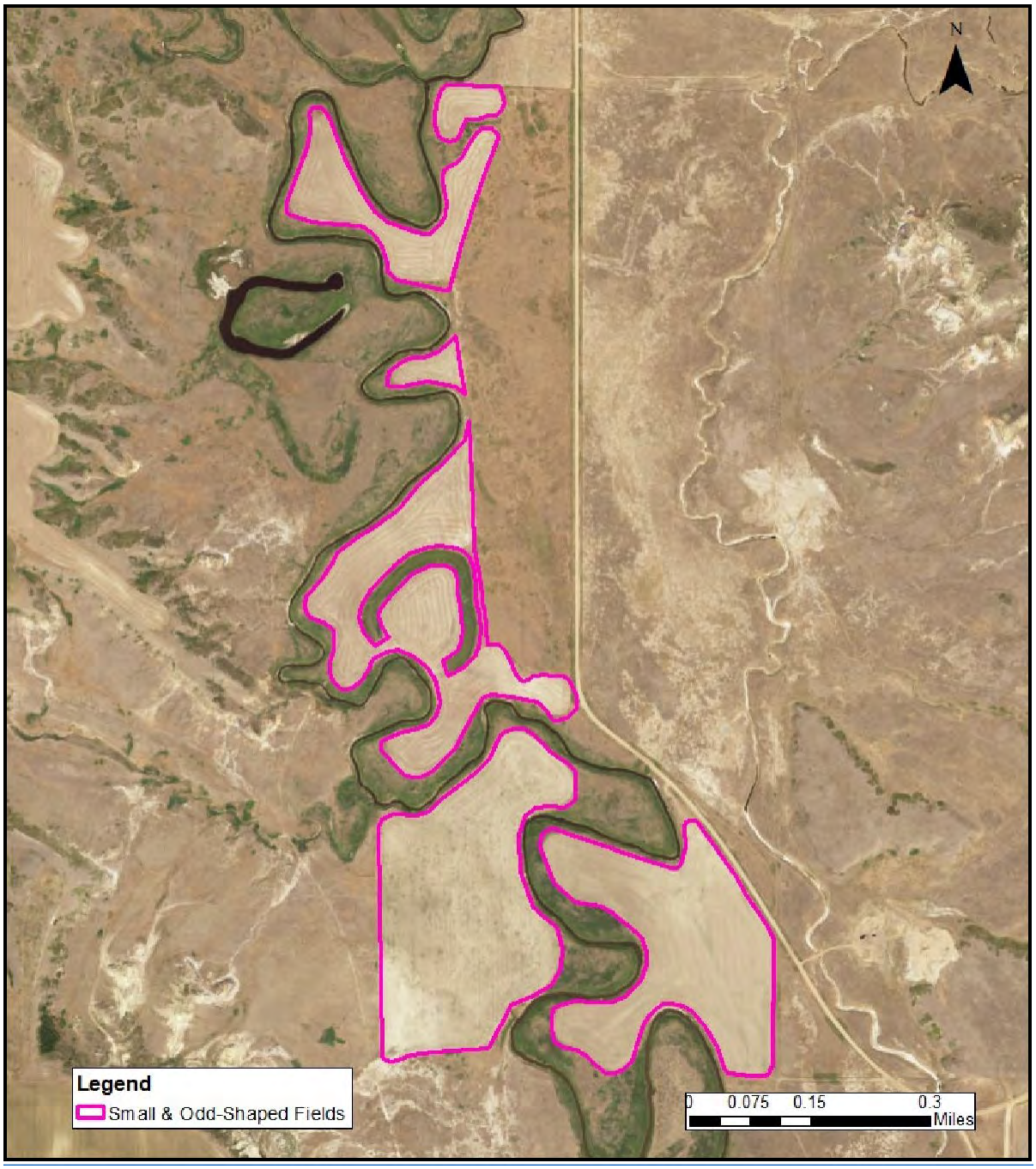

Figure 4. Sheridan County 2023 TIP Small & Odd-Shaped Field Example

APPENDIX – Wildlife Conservation Values

Sheridan County is important to several priority birds, including grassland birds and ducks (PPJV 2017). Sheridan County supports some of the highest grassland bird species richness (9 species) and densities of upland-nesting duck pairs in Montana, with the TIP area alone supporting 7% of the upland-nesting duck pairs in the state (>43,000 pairs, Fig. A1). Densities of priority grassland bird species in the TIP area are also high, with 7-83% of the TIP area coinciding with 50% core population areas for Baird's Sparrow, Bobolink, Chestnut-collared Longspur, Clay-colored Sparrow, Grasshopper Sparrow, Sprague's Pipit, and Western Meadowlark (Fig. A1). Nearly the entire TIP area also has moderate to high habitat suitability for Ring-necked Pheasants and Sharp-tailed Grouse (MTNHP 2022).

Transitioning cropland to grassland in the TIP area will add wildlife habitat in an area primarily consisting of cropland (57% of all land) and where the risk of losing existing wildlife habitat is high. Sheridan County has a high average conversion risk (59), the fourth highest average for a Montana county, and 67% of the TIP area is classified as having a high or very high (>50) conversion risk (Fig. A2). The TIP area has experienced significant cropland expansion over the past decade (>37,000 acres from 2009-2016) which has generally occurred in areas marginal for crop production but significant for wildlife, including breeding waterfowl (Lark et al. 2020).

Restoration of perennial grassland in small and odd-shaped crop fields will provide habitat for priority wildlife species. Wildlife benefits increase as patches increase in size and proximity. Proximity is of particular importance for species with limited dispersal ability such as pollinators. The TIP area overlaps the range of several priority pollinator species: Ottoe Skipper, Western Bumble Bee, and Yellow-Banded Bumble Bee (USFWS 2020). Although patch size requirements and dispersal abilities vary by species, pollinator species generally benefit most from patches within 0.62 mi of a 247 ac patch (Niemuth et al. 2021). The majority of cropland in the TIP boundary (55%; 212,966 ac) falls within this threshold and therefore restoration of perennial cover here is expected to benefit pollinators (Fig A2). Restoration of perennial cover in the remaining 45% (172,699 ac) of cropland could benefit pollinators if patches were at least 100-ha.

Restoring grassland aligns with the goals of the Prairie Pothole Joint Venture (PPJV) 2017 Montana State Tactical Plan, including an objective of restoring 5,000 acres of grassland in the Hi-Line (PPJV 2017). The PPJV will support this TIP by providing technical assistance for evaluating outcomes via their Science Integration Specialist and financial and communications assistance (e.g., workshops, outreach) when possible.

Literature Cited

Barnes, K. W. 2022. Web App: Priority Grassland Bird Weighted Mean Occurrence (Baird's Sparrow, Sprague's Pipit, Chestnut-collared Longspur, Thick-billed Longspur). US Fish and Wildlife Service - Habitat and Population Evaluation Team, Bismarck, North Dakota, USA. Available at: https://kevinwbarnes.users.earthengine.app/view/priority-grassland-bird-weighted-mean-occurrence

[HAPET] Habitat and Population Evaluation Team, and [NPWRC] USGS Northern Prairie Wildlife Research Center. 2021. Upland accessibility by breeding duck pairs in the Prairie Pothole Joint Venture Area (Thunderstorm Map). US Fish and Wildlife Service, Bismarck, North Dakota, USA.

Lark, T. J., S. A. Spawn, M. Bougie, and H. K. Gibbs. 2020. Cropland expansion in the United States produces marginal yields at high costs to wildlife. Nature 11:4295.

[MTNHP] Montana Natural Heritage Program. 2022. Sharp-tailed Grouse (*Tympanuchus phasianellus*) and Ring-necked Pheasant (*Phasianus colchicus*) predicted suitable habitat model created on March 25, 2022. Montana Natural Heritage Program, Helena, Montana, USA.

Niemuth, N. D., B. Wrangler, J. J. LeBrun, D. Dewald, S. Larson, T. Schwagler, C. W. Bradbury, R. D. Pritchert, and R. Iovanna. 2021. Conservation planning for pollinators in the U.S. Great Plains: considerations of context, treatments, and scale. Ecosphere 12:e03556

Olimb, S. K., and B. Robinson. 2019. Grass to grain: probabilistic modeling of agricultural conversion in the North American Great Plains. Ecological Indicators 102:237-245.

[PPJV] Prairie Pothole Joint Venture. 2017. Prairie Pothole Joint Venture Implementation Plan. S. P. Fields, editor. US Fish and Wildlife Service, Denver, Colorado, USA.

[USFWS] US Fish and Wildlife Service. 2020. Grassland ecosystem conservation priorities: a strategic habitat conservation approach. US Fish and Wildlife Service, Lakewood, Colorado, USA.

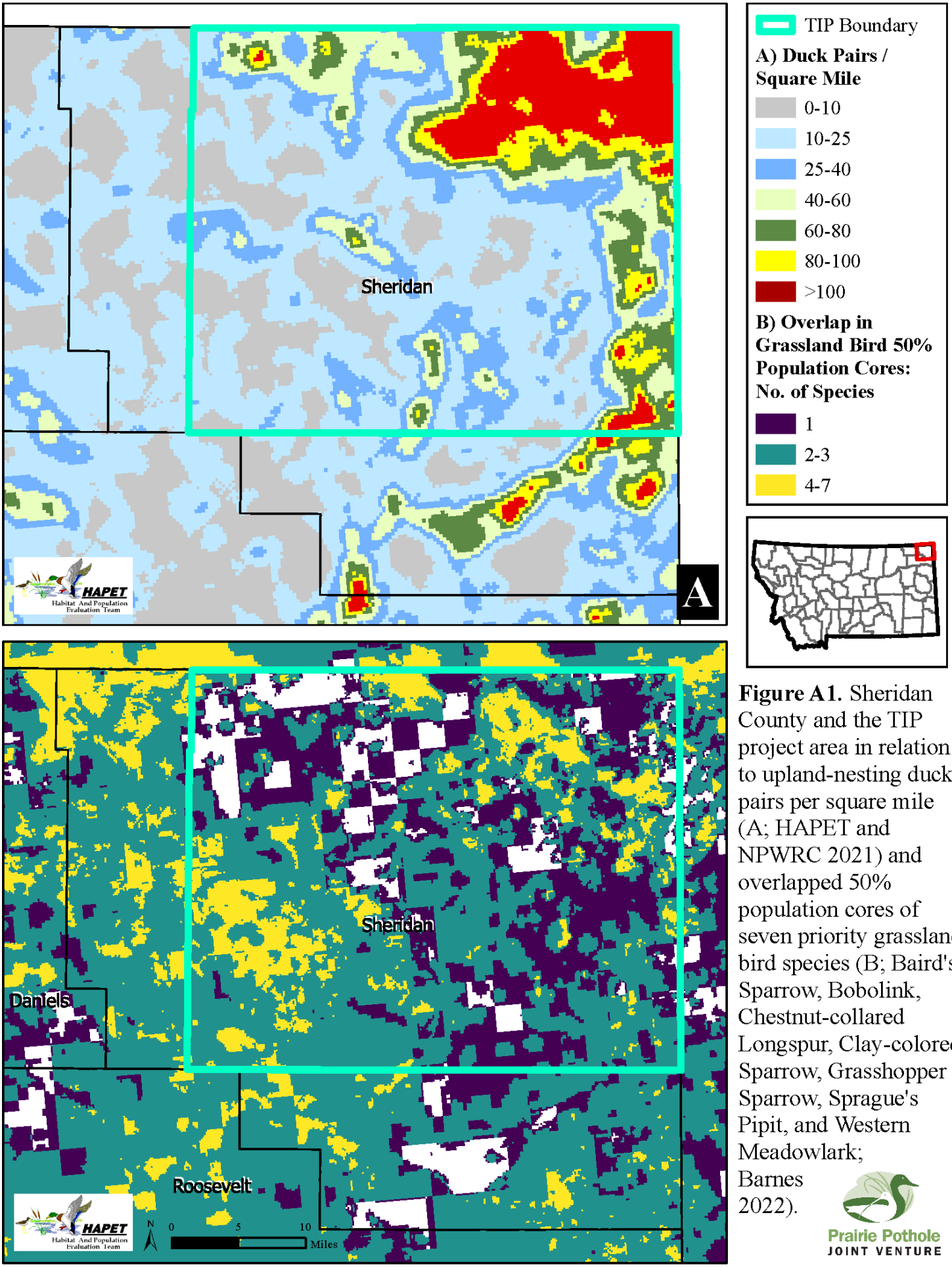

Figure A1. Sheridan County and the TIP project area in relation to upland-nesting duck pairs per square mile (A; HAPET and NPWRC 2021) and overlapped 50% population cores of seven priority grassland bird species (B; Baird's Sparrow, Bobolink, Chestnut-collared Longspur, Clay-colored Sparrow, Grasshopper Sparrow, Sprague's Pipit, and Western Meadowlark; Barnes 2022).

Prairie Pothole JOINT VENTURE

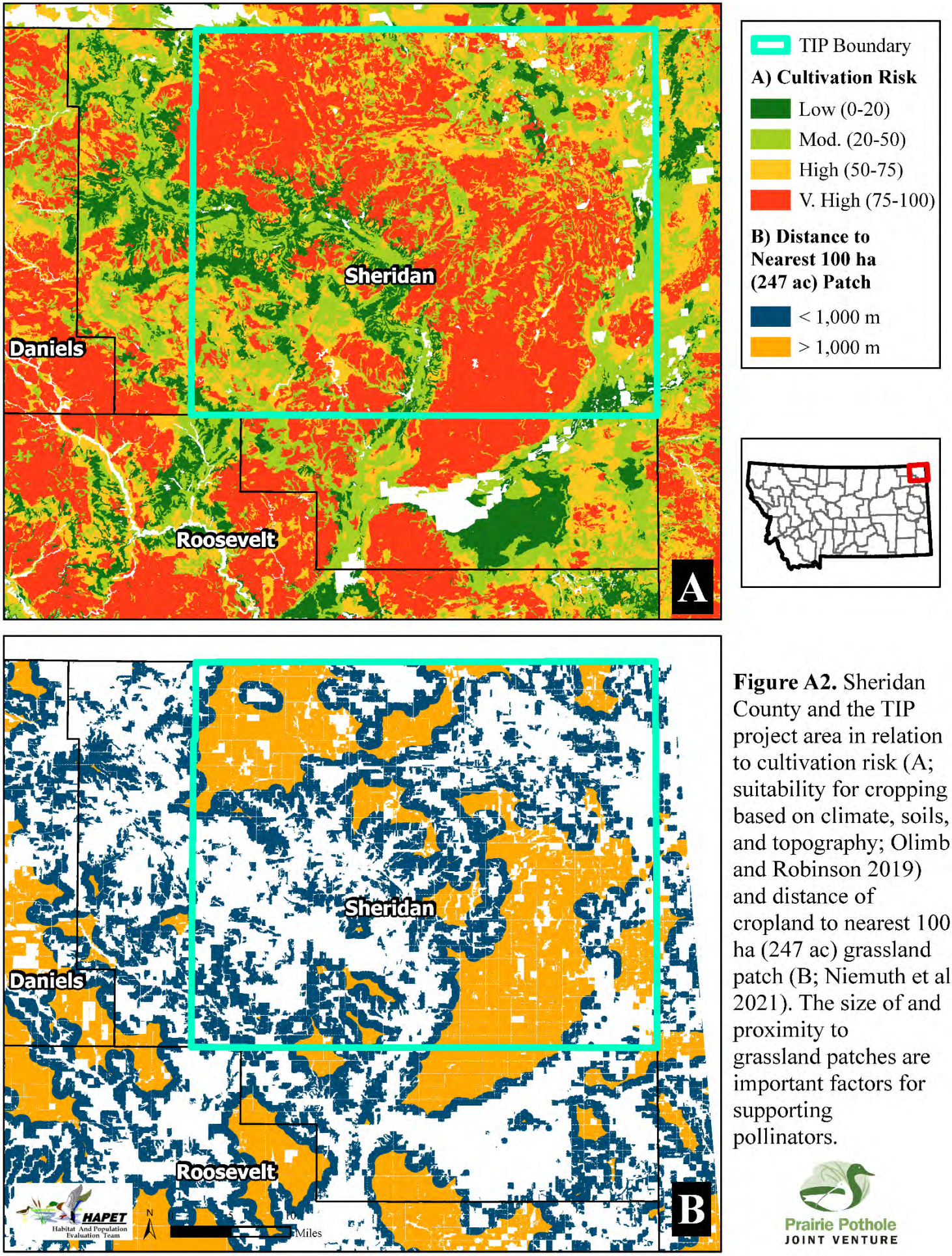

Figure A2. Sheridan County and the TIP project area in relation to cultivation risk (A; suitability for cropping based on climate, soils, and topography; Olimb and Robinson 2019) and distance of cropland to nearest 100 ha (247 ac) grassland patch (B; Niemuth et al. 2021). The size of and proximity to grassland patches are important factors for supporting pollinators.

Prairie Pothole
JOINT VENTURE