



# Nature's Terrace:

**Prairie Strips as a Way to Protect Soil and Reduce Nutrient Loss**

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# What are prairie strips?

“The prairie strips practice establishes diverse perennial vegetation, oriented linearly within row crops fields. Prairie strips may not exceed 25% of the cropland area per tract and range from 30-120 feet in width. Machinery traffic is allowed on locations that replace turn rows on the perimeter of the field. Prairie strips reduce soil erosion, improve water quality and provide wildlife habitat.”

## Where can prairie strips be placed?

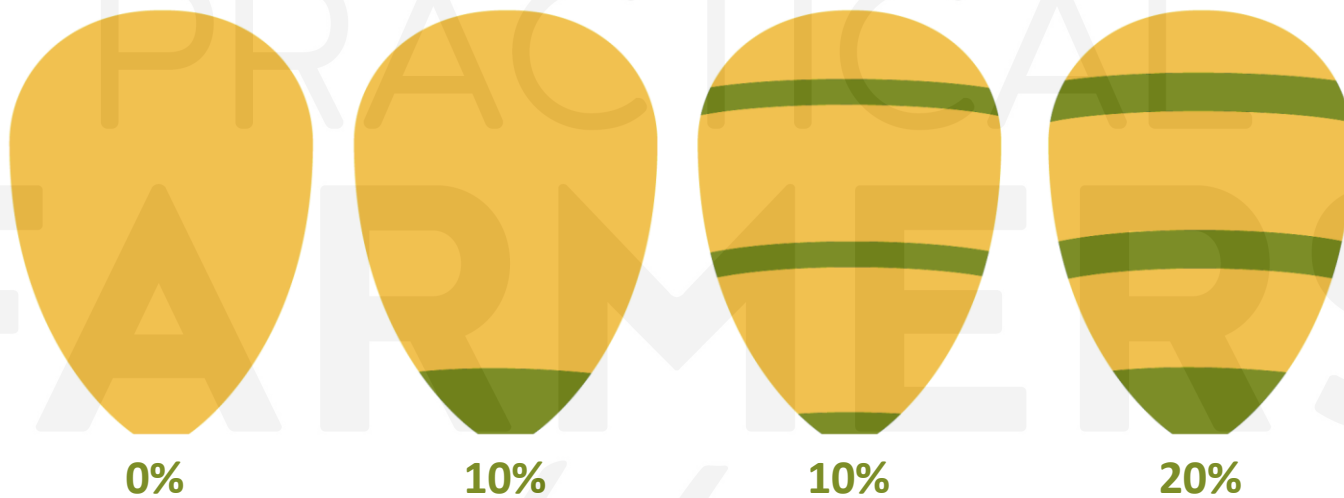
“In row crop production systems: Around the field, Through the field, In terrace channels, Next to waterways, Pivot corners”

# STRIPS Phase 1: Research & Demonstration on Small Experimental Catchments

12 catchments – 0.4-3.2 ha; 1-8 ac; 6-11% slope

Randomized Incomplete Block Design:

3 reps X 4 treatments X 4 blocks



 = *never till* corn and soybean *row crops*  
 = reconstructed *prairie*

# Why Prairie?

1

Perennial

2

Deep roots

3

Stiff stems that stay  
erect in a pounding rain

4

Diverse

5

Native



Image: Sarah Hirsh

Image: Lisa Schulte Moore

**100% crops**

**100% prairie**

**90% crops:  
10% prairie**



Images: Jasper Co., Jose Gutierrez

Sources: Zhou et al. 2012, Helmers et al. 2012, Hernandez-Santana et al. 2013, Iqbal et al. 2014, Mitchell et al. 2014, Zhou et al. 2014

# Highlights from the 1<sup>st</sup> Decade of STRIPS Research

Strategically adding 10% prairie to no-till corn-soy fields:

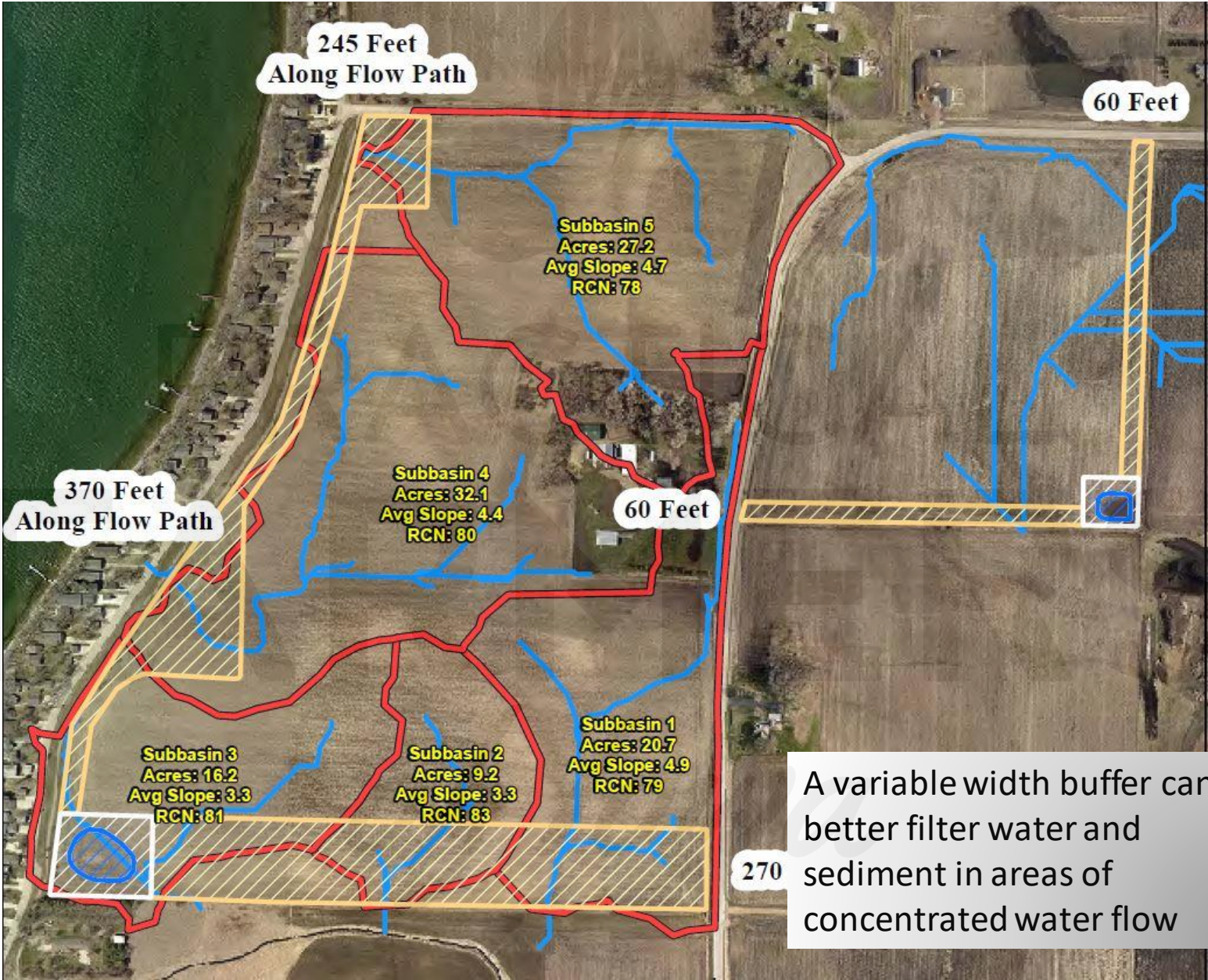
- 95% reduction in sediment loss<sup>a</sup>
- 37% reduction in water runoff<sup>a</sup>
- 77% reduction in phosphorus runoff and 70% reduction in nitrogen runoff<sup>a</sup>
- 70% reduction in subsurface nitrate concentrations (not tiled)<sup>a</sup>
- 75% reduction in nitrous oxide emissions at footslope position<sup>b</sup>
- 0.07 t/ac/yr increase in soil organic carbon or (in top 15 cm)<sup>c</sup>
- More than triple pollinator and double bird abundance<sup>a</sup>
- Influence on crop yield proportionate<sup>a,d</sup>
- No additional weed problems in cropfields<sup>e</sup>
- Cheaper, more flexible than terraces; cost comparable to cover crops<sup>f</sup>

Sources: <sup>a</sup>Schulte et al. 2017; <sup>b</sup>Iqbal et al. 2015; <sup>c</sup>Dutter et al. 2023; <sup>d</sup>Damiano & Niemi 2021; <sup>a</sup>Hirsh et al. 2013; <sup>a</sup>Tyndall et al. 2013

# Phase 2: On-farm Research and Refinement



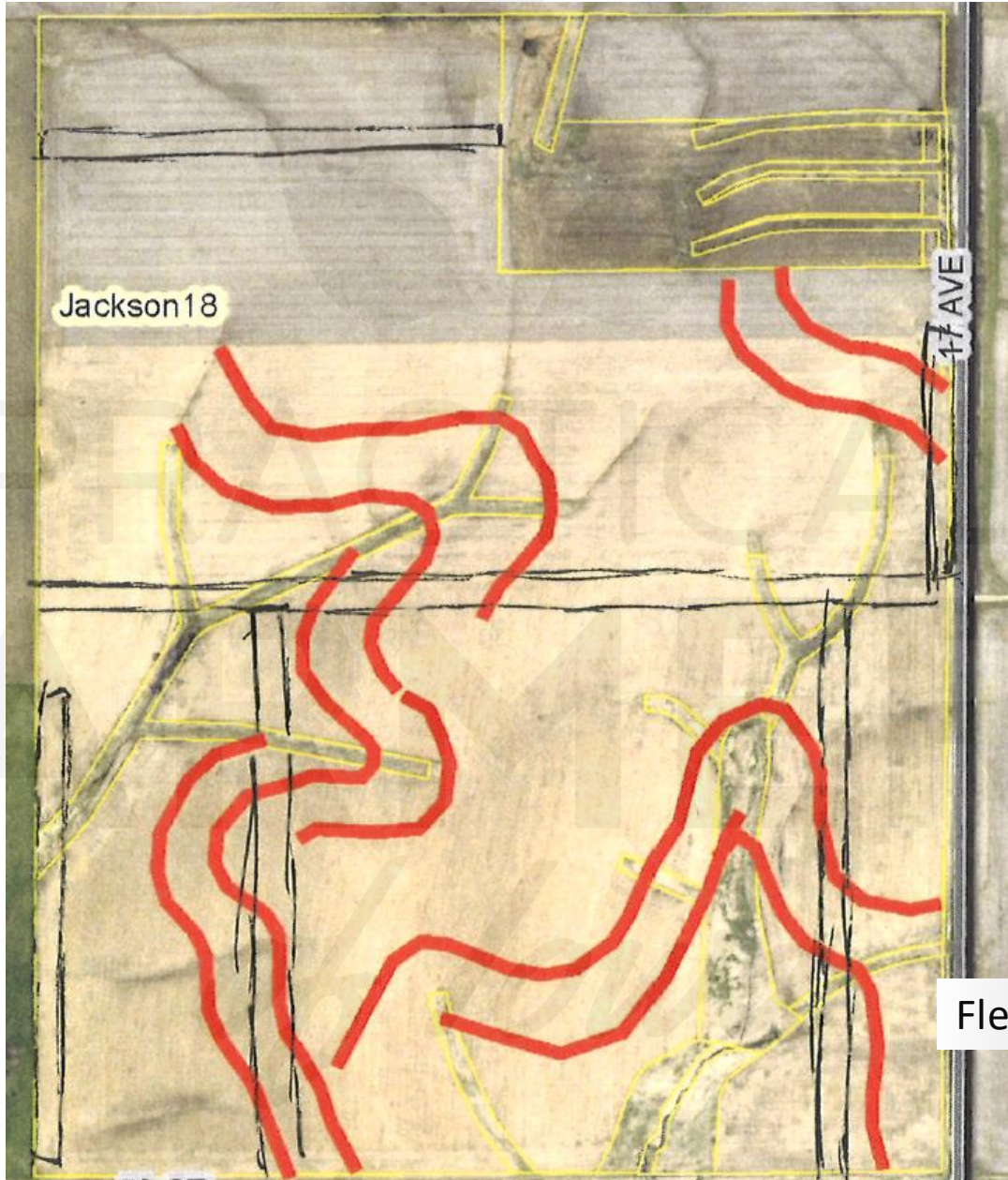
# Prairie Strips Design



A variable width buffer can better filter water and sediment in areas of concentrated water flow



# Prairie Strips Design



Flexibility, farmability

# Prairie Strips Design



Final design must work best for all stakeholders involved while meeting cost-share parameters.

# Agriculture Improvement Act of 2018 ('Farm Bill')

## Subtitle B—Conservation Reserve Program

### SEC. 2201. CONSERVATION RESERVE.

H. R. 2—42

(b) ELIGIBLE LAND.—Section 1231(b) of the Food Security Act of 1985 (16 U.S.C. 3831(b)) is amended—

(1) in paragraph (1)(B), by striking “Agricultural Act of 2014 (except for land enrolled in the conservation reserve program as of that date)” and inserting “Agriculture Improvement Act of 2018, on the condition that the Secretary shall consider to be planted cropland enrolled in the conservation reserve program”;

(2) by redesignating paragraphs (4) and (5) as paragraphs (5) and (6), respectively;

(3) by inserting after paragraph (3) the following:

“(4) cropland, marginal pasture land, and grasslands that will have a positive impact on water quality and will be devoted to—

“(A) a grass sod waterway;

“(B) a contour grass sod strip;

“(C) a prairie strip;

“(D) a filterstrip;

“(E) a riparian buffer;

“(F) a wetland or a wetland buffer;

“(G) a saturated buffer;

“(H) a bioreactor; or

“(I) another similar water quality practice, as determined by the Secretary.”:

# 2020 Iowa Farm & Rural Life Poll Survey Data

**Table 5. Awareness of and interest in the prairie strips practice**

		Yes	Maybe	No
Before reading the description above, had you ever heard of the prairie strips conservation practice?	2020	66%	6%	28%
	2018	56%	8%	36%
Would you be interested in learning more about the prairie strips conservation practice?	2020	27%	26%	47%
	2018	22%	36%	42%
Would you be interested in planting prairie strips on your farmland?	2020	20%	31%	48%
	2018	15%	39%	46%
Prairie strips are now eligible for annual rental payments through the Conservation Reserve Program (CRP). Would CRP payments increase your interest in establishing prairie strips?	2020	47%	22%	31%
	2018	--	--	--

*of Iowa*

# CRP CP43

State	Acres
ILLINOIS	7,966 (44%)
<b>IOWA</b>	<b>5,426 (30%)</b>
MINNESOTA	1,737
NEBRASKA	808
SOUTH DAKOTA	772
INDIANA	580
<b>NATIONAL TOTAL:</b>	<b>18,195</b>

CRP Contract Summary and Statistics Reports

<https://www.fsa.usda.gov/programs-and-services/conservation-programs/reports-and-statistics/conservation-reserve-program-statistics/index>

*of Iowa*

# Highlights from STRIPS Research on Commercial Farms

Strategically adding prairie strips to commercial farm fields:

- Multiple measures of soil health increase through time within prairie strips, but negligible effects on soil health in adjacent cropland soil<sup>a,b,c</sup>
- Reduces sediment and nutrient concentrations in runoff water including:
  - Total suspended solids by 92% (annually and outside of primary growing season)<sup>d</sup>
  - Total nitrogen by 90% (annually)<sup>d</sup>
  - Total phosphorus by 90% and dissolved phosphorus by 88% (annually)<sup>d</sup>
- Increases abundance, diversity of native pollinators<sup>e</sup>; increases honey bee forage and productivity<sup>f</sup>; does not increase bee exposure to insecticides<sup>g</sup>
- Provide habitat for many grassland birds, but not for snakes and lizards<sup>h</sup>
- Are one of the most cost-effective conservation practices, especially when located on chronically unprofitable cropland<sup>i</sup>
- Iowans are willing to pay for the environmental benefits<sup>j</sup>

**Funding from multiple sources including USDA Farm Service Agency**

Sources: <sup>a</sup>Dutter 2022; <sup>b</sup>Henning 2022; <sup>c</sup>Nelson 2022; <sup>d</sup>Helmerts & Witte, unpublished data; <sup>e</sup>Kordbacheh et al. 2020; <sup>f</sup>Ge et al. 2021, Ge et al. 2023; <sup>g</sup>Hall et al. 2022, Hall et al. In review; <sup>h</sup>Stephenson 2022; <sup>i</sup>Audia et al. 2022, Bravard et al. 2022, Summers & Tyndall unpublished data; <sup>j</sup>Khanal et al. 2022

# Do prairie strips provide benefits to bees?

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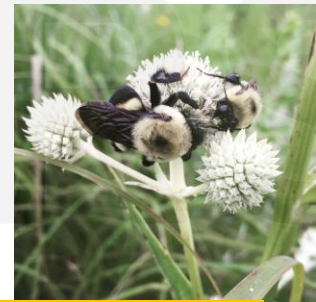
## Yes for Honey bees!

- Larger and heavier colonies
- Improved overwintering success in some years
- More abundant pollen forage



## Yes for Wild bees!

- More abundant and diverse wild bee communities
- More complex bee-plant interaction networks with more links between species, support for rare species



Thus far, pesticide exposure data suggest low levels of risk to bees.  
Prairie strips are a win-win for bees, farmers, and beekeepers in Iowa.

# Wildlife Summary: Conservation practice design

- Large patch prairie restorations are needed for area sensitive birds and snakes
- Probably, the larger the better for core prairie habitat areas
- Land acquisition opportunities and budgets are limited
- Prairie strips represent an improvement over low-diversity conservation practices
- The accessibility of the CP-43 represents a major opportunity to improve wildlife habitat across large areas while work continues on dedicated nature reserves



# Annual survey of strips collaborators

What are the **experiences** of these conservation adopters as they **implement** and **maintain** a beneficial yet rigorous conservation practice?

# Results: Quotes

“Nice to see the prairie plants growing and replacing crops and invasive grasses---seems to be more butterflies---and songbirds---STRIPS are more aesthetically pleasing than terraces”

-Landowner, 2015

“pride of seeing the progress of the prairie grasses; of having people notice and comment on its beauty; of knowing we are helping in some small way our water quality...Oh and seeing the songbirds flit in and out of the grasses.”

-Farmer, 2017

“We continue to see more species emerge and greater biomass in our prairie strips as they mature. Also, love seeing so many native bees and butterflies feeding on the forbs.”

-Farmer, 2022

# Importance of Mowing



Grey-headed coneflower seedlings  
- No mow                      - Mow

Mowing gives deep-rooted perennials competitive advantage over annual weeds

# Long term Maintenance



- Prescribed fire should be used to control invasive weeds and promote growth of native species
- Low maintenance – not NO maintenance. Invasive weeds, especially aggressive perennials like Canada thistle should be controlled during establishment.

# Take Home Points

- Many conservation practices, including prairie strips, are part of USDA programs
- Research has shown prairie strips effectively address soil, water, and wildlife conservation, all at the same time
- A majority of Iowa farmers indicate some interest in prairie strips, and that interest substantially increases with CRP
- Prairie strips can be applied in a variety of ways, depending on land characteristics and landowner goals