USDA Natural Resources Conservation Service
U.S. DEPARTMENT OF AGRICULTURE

Wheat & Ecosystem Services: Enhancing Farm Resilience through Increased-Fiber Wheat

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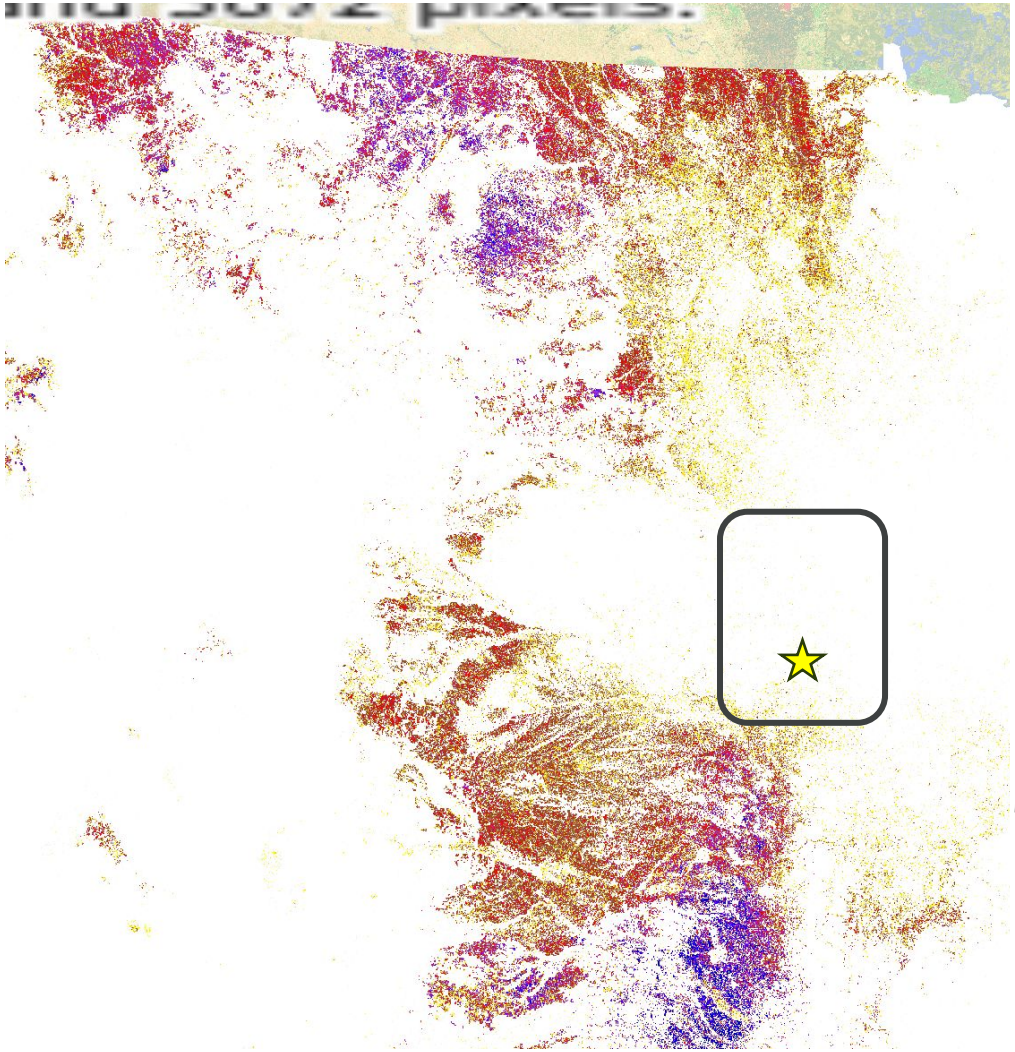
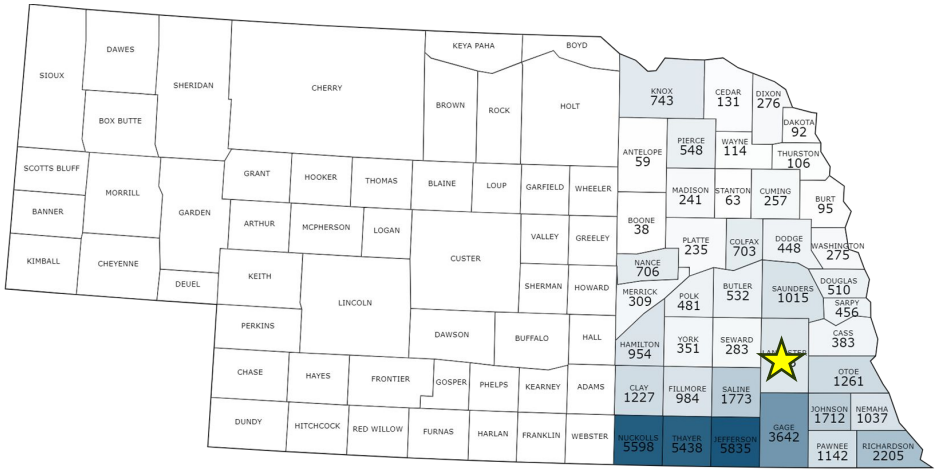
About Nebraska NRCS

- The Soil Conservation Act was passed April 27, 1935 amid the Dust Bowl, leading to the creation of what is now NRCS.
- Support Nebraskans through **77 field offices**
- What we do:
  - Provide **one-on-one, personalized conservation advice** to those who grow our nation's food and fiber.
  - Help people make **investments in their operations and local communities** to keep working lands working, boost rural economies, increase the competitiveness of American agriculture, and improve the health of our air, water, soil, and habitat.
  - Generate, manage and share the data, technology and standards that **enable partners and policymakers to make decisions** informed by objective, reliable science.

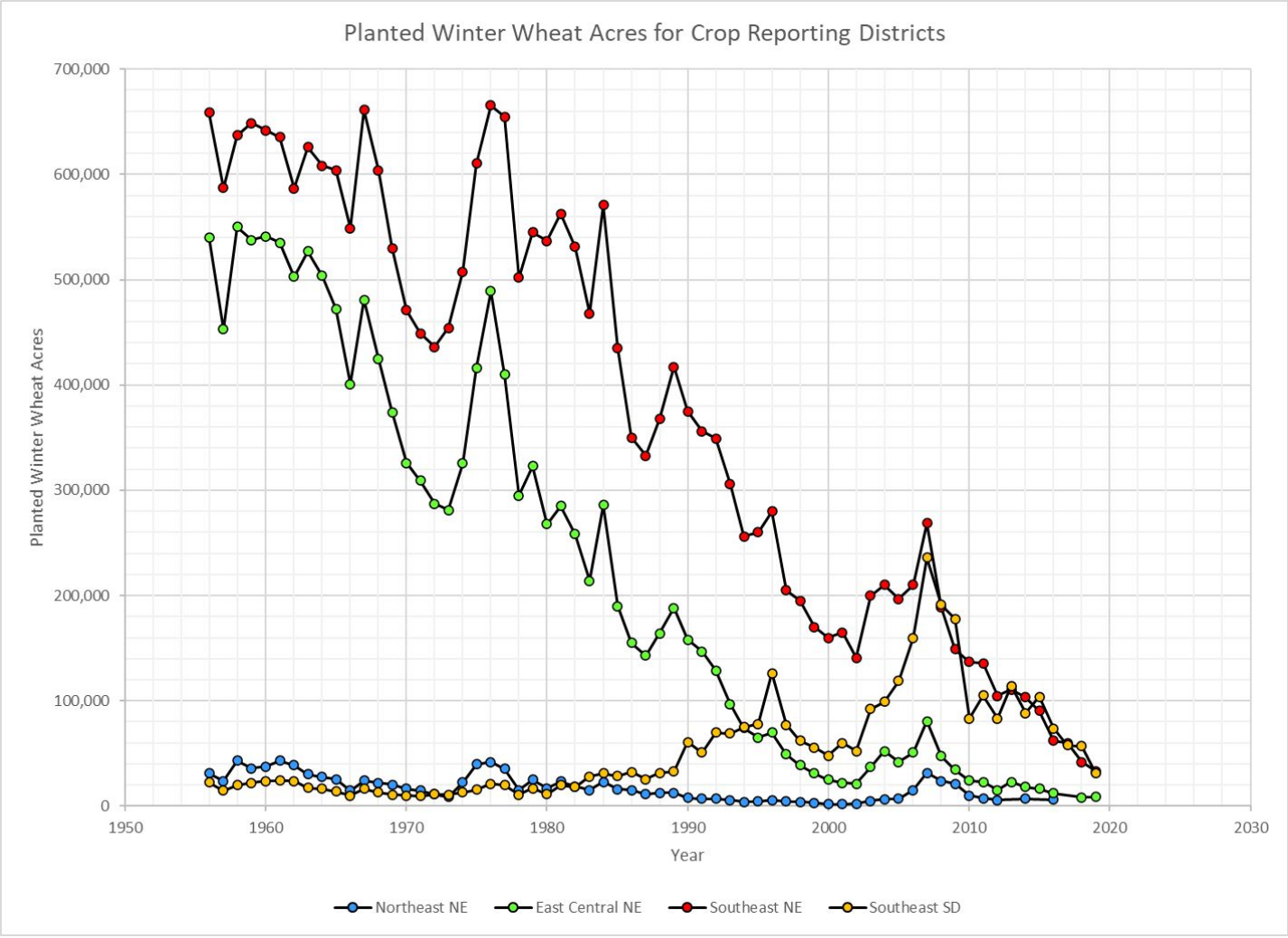
Regional wheat production

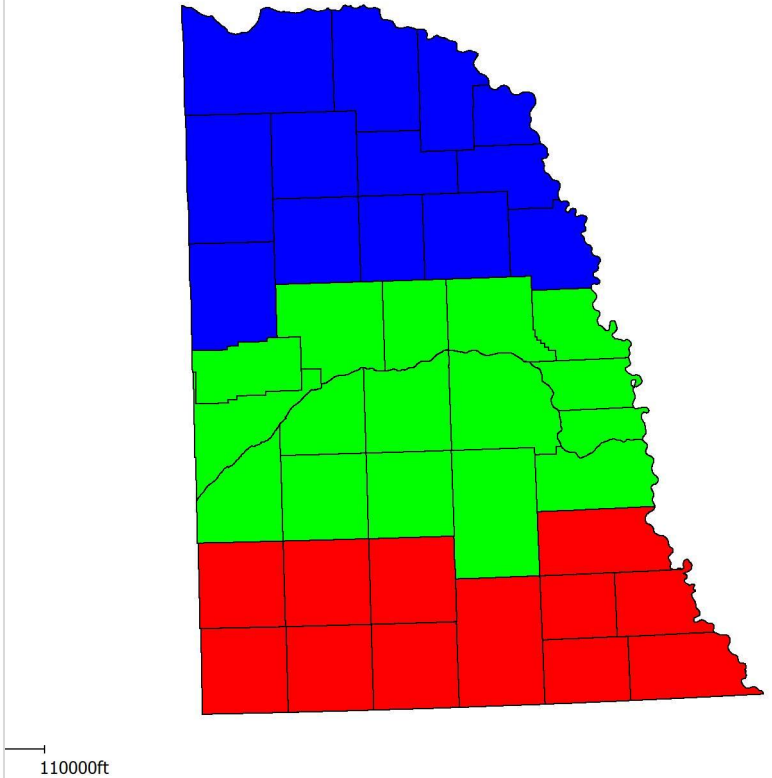
USDA CropScape – Wheat frequency from 2008-2023





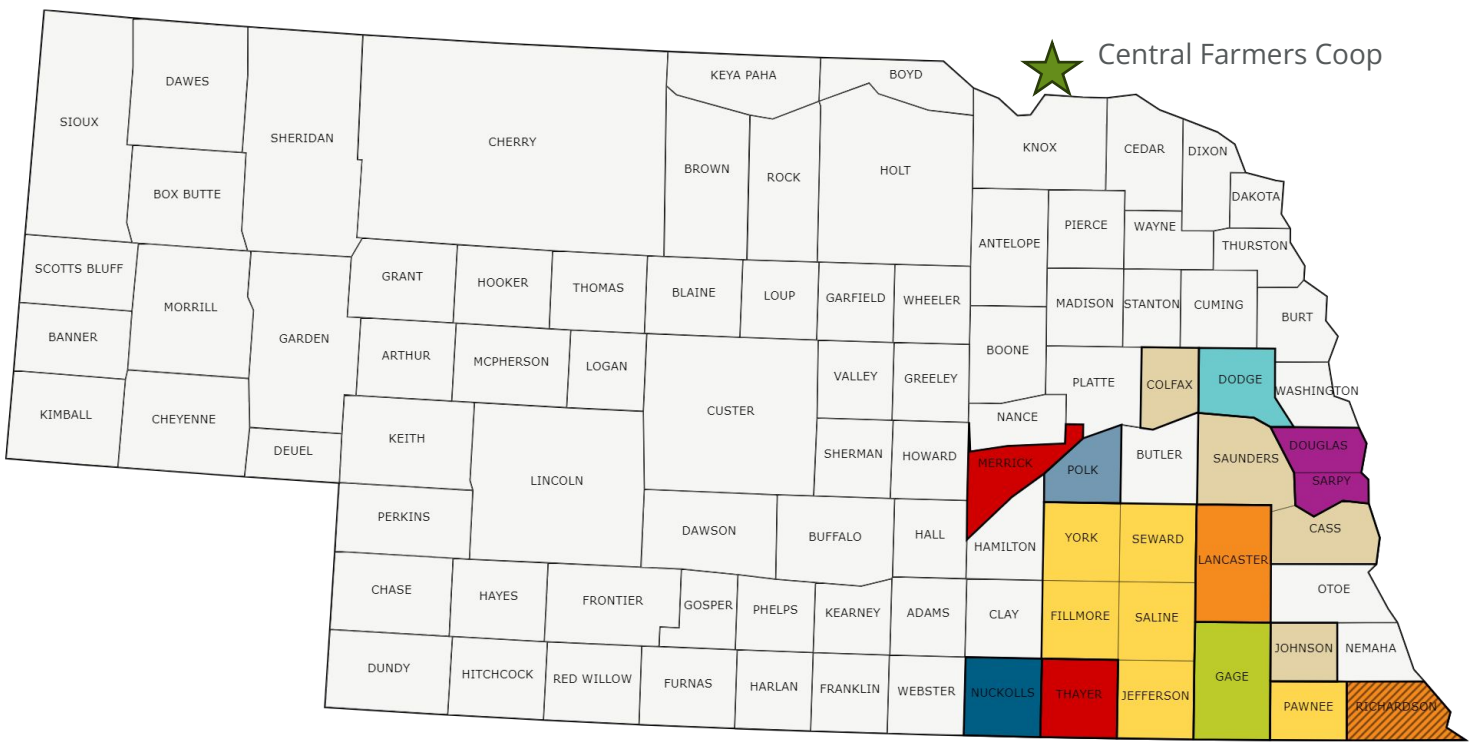
USDA NASS planted winter wheat acres





Infrastructure gaps and opportunities

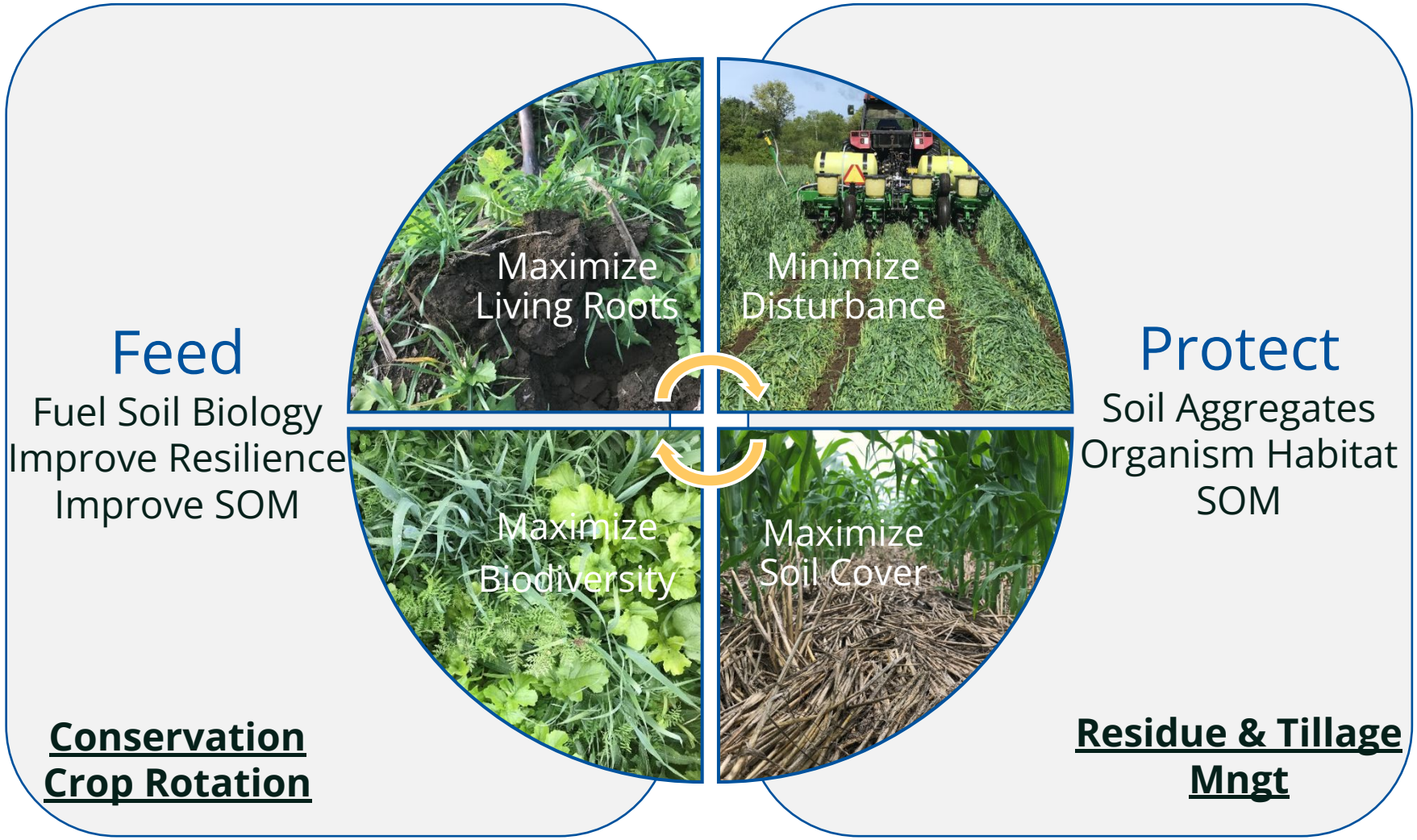
Local Elevators for Hard Red Winter Wheat



Entities

- CVA
- Farmers Cooperative
- Scoular
- ADM, Farmers Coop, Frontier
- Frontier & Farmers Coop
- Hansen-Mueller
- Frontier Coop
- CPI & Aurora Coop
- Aurora Coop
- Ag Partners

Soil Health Principles to Support High Functioning Soils



Research journal articles – Soil health

- **Putting the soil health principles to the test in Iowa.**
  - McDaniel and Middleton, 2024. Soil Sci. Soc. Am. J. 1-16.
- **Reduced tillage and rotational diversity improved soil health in Missouri.**
  - Veum et al. 2022. Agronomy Journal 114:3027-3039
- **Long-term rotation diversity and nitrogen effects on soil organic carbon and nitrogen stocks.**
  - Schmer et al., 2020. Agrosyst, Geosci. Environ. 3
- **Crop rotation and tillage effects on soil physical and chemical properties in Illinois.**
  - Zuber et al., 2015. Agronomy Journal 107:971-978

Basics of crop rotation

- Components missing in corn-soybean rotation
  - ❑ Crop intensity
  - ❑ Years separating the same crop type
  - ✔ Utilizing both grass and broadleaf crops (*yes, corn and soybean*)
  - ❑ Having both spring and fall planted crops
  - ❑ Presence of warm and cool season crops

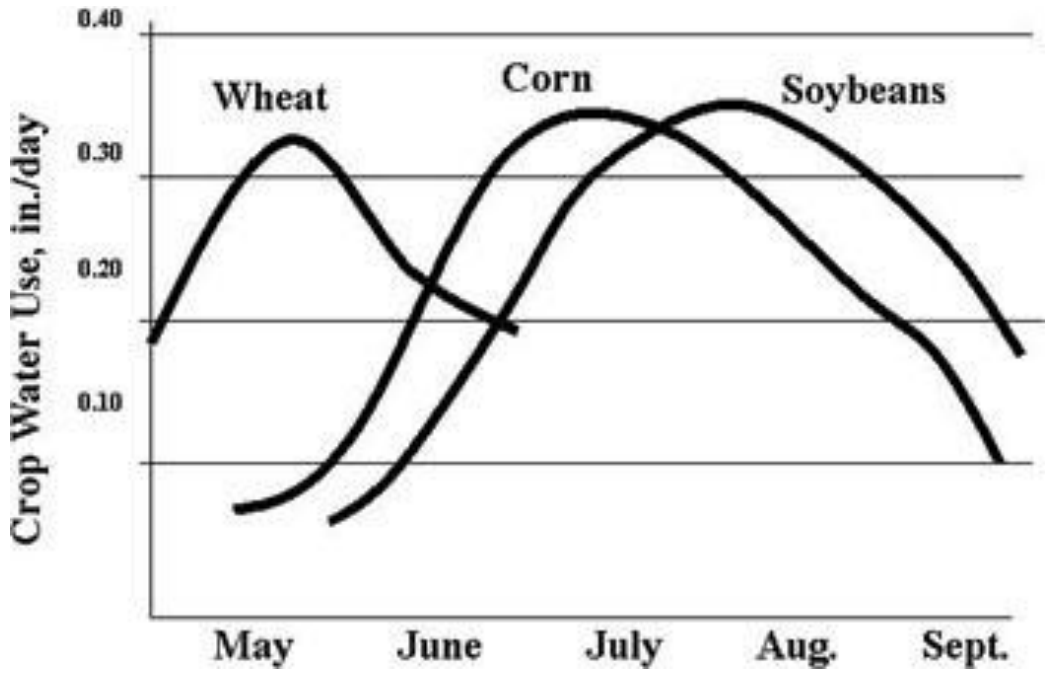
- Example crop rotation w/wheat (checks all 5 components)
  - ✔ To C-C-S-W-S or C-S-C-S-W (40% corn, 40% soybean, 20% wheat)

Rainfed crop rotation survey results

Crop	Previous crop	Number of no-till fields	No-till yield (bu/ac)	Difference in yield (bu/ac)
Corn	Corn	144	86	
Corn	Soybean	364	108	
Corn	**Wheat**	**86**	**126**	**+18 (vs. corn-soy)**
Soybean	Soybean	29	36	
Soybean	Corn	266	39	
Soybean	**Wheat**	**26**	**42**	**+3 (vs. corn-soy)**

- Conducted by Paul Hay, former UNL Extension Educator in southeast Nebraska
- Data collected from 2,894 fields from 1994 – 2007
- Purpose
  - To quantify crop rotation responses
  - Identify best rotations
  - Seek answers to common concerns

Managing risks from extreme weather



Source: Crop Water Use Curves from Colorado State University
http://extension.colostate.edu/topic-areas/agriculture/limited-irrigation-managementprinciples-and-practices-4-720/

Seasonal crop water use (ET) in Eastern Nebraska when water is not limiting.	
Crop	Inches/year
Corn	21-24
Soybean	20-22
Winter Wheat	16-18
Alfalfa	31-35
Source: water.unl.edu	

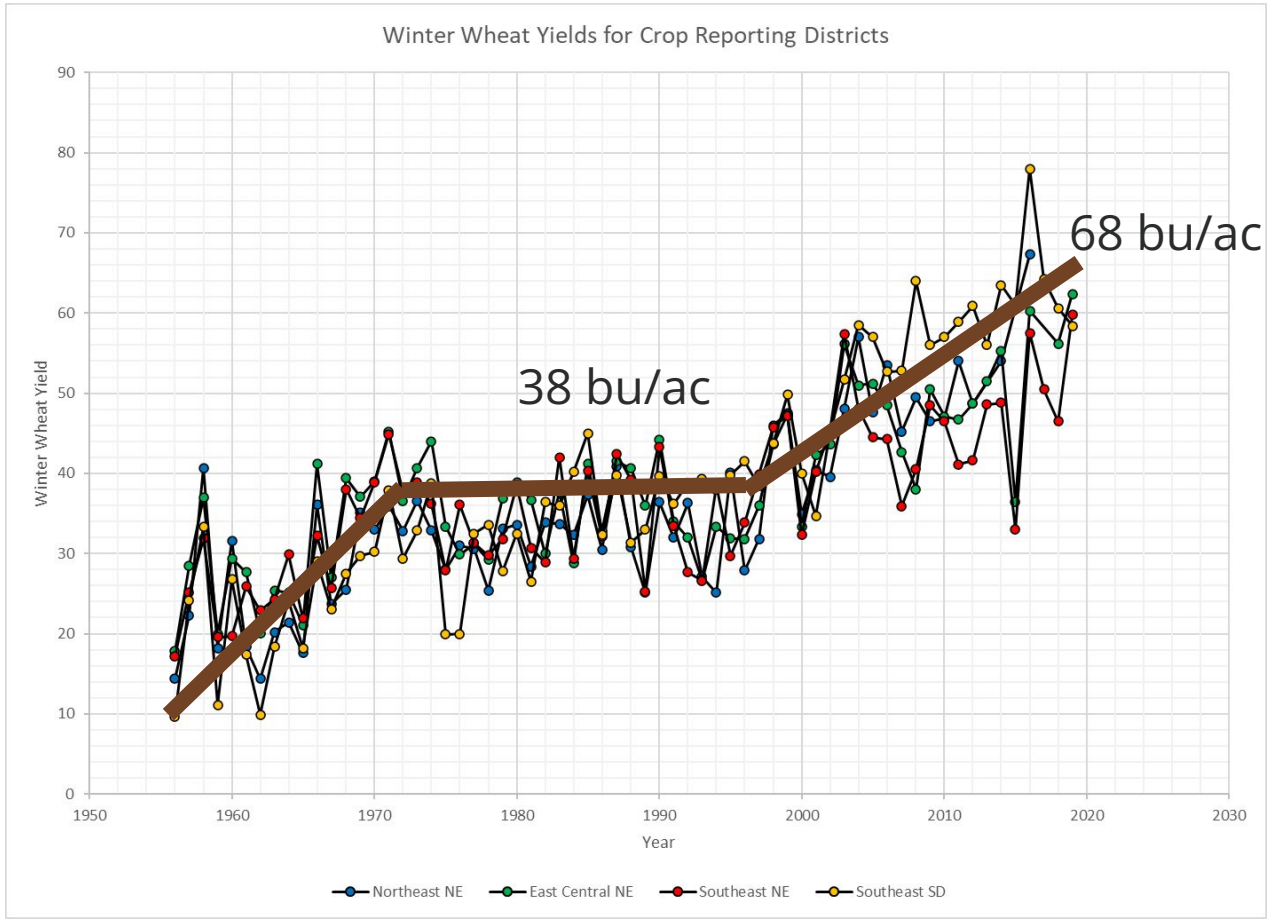
Research journal articles - Resiliency

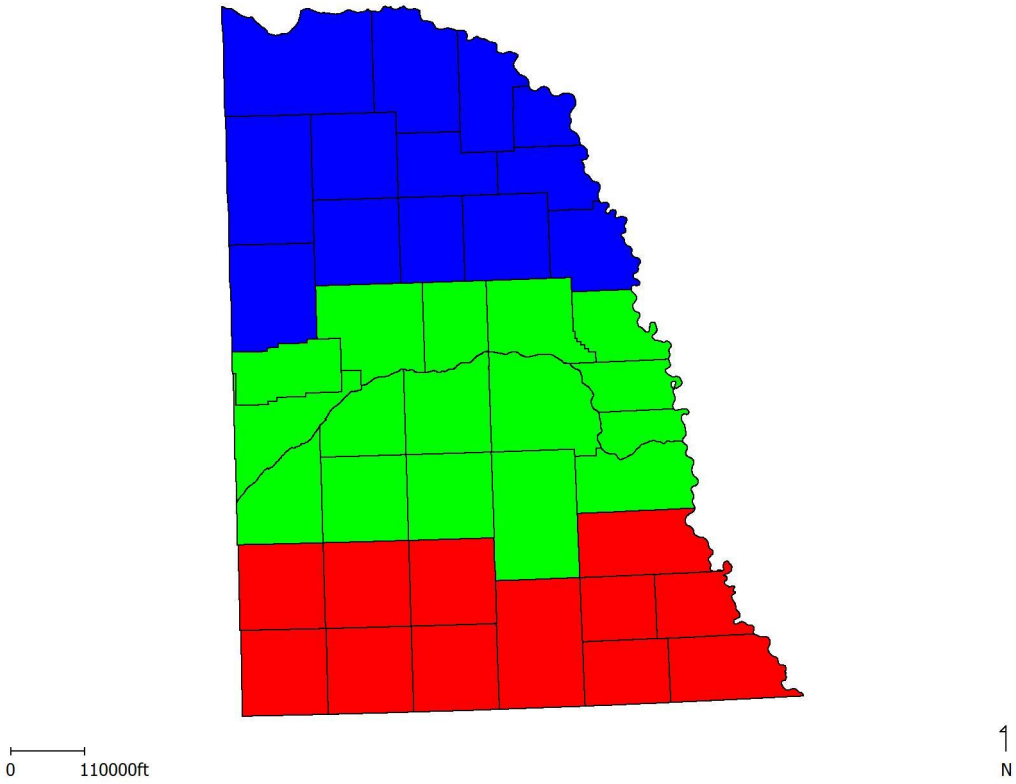
- **Rotational complexity increases cropping system output under poorer growing conditions.**
  - ByBee-Finley et al. 2024. One Earth 7, 1638-1654
- **Long-term evidence shows that crop-rotation diversification increases agricultural resilience to adverse growing conditions in North America.**
  - Bowles et al., 2020. One Earth 2, 284-293
- **Increasing crop diversity mitigates weather variations and improve yield stability.**
  - Gaudin et al., 2015 PLOS One 10(2)
- **Corn and soybean yields and returns are greater in rotations with wheat.**
  - Janovick et al., 2021. Agronomy Journal 113:1691-1711

Producer rationale and motivation

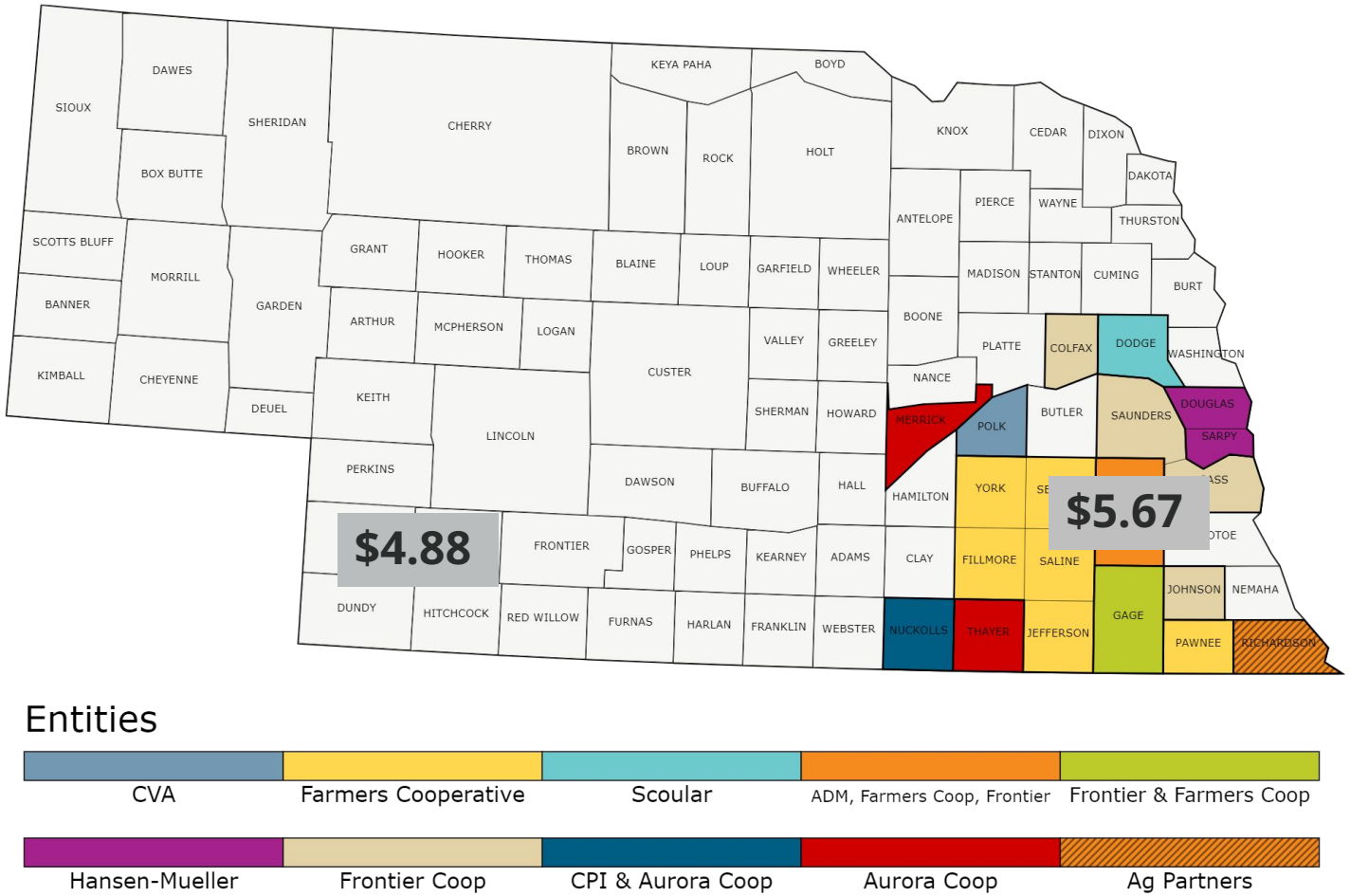
- **Rationale and Motivation of Agricultural Producers in adopting crop rotation in the Norther Great Plains, USA.** Kasu et al. 2019. International Journal of Ag. Sust. V17 no. 4, 287-297
  - 1.83 time more likely to adopt- Produces who **perceive** that crop rotation is beneficial to farm profitability
  - The lack of time or resources is the primary adoption barrier!

Wheat yields higher than most farmers know





Prices better than farmers know



Other considerations

- Implications of management missteps
- Weed control & herbicide cost
- Manure management flexibility
- Double crop or forage crop options
- Revenue from straw ($100/ton)
- Potential nitrogen credit from cover crop
- Cost-share, e.g. USDA NRCS - EQIP & CSP
  - 2024 EQIP - $12.20 per acre/year
  - 2024 CSP - $5.35 per acre/year