

Morgan S. Donaldson<sup>1</sup>, Bryan M. Kluever<sup>2</sup>, Mallory White<sup>1</sup>, Page E. Klug<sup>3</sup>

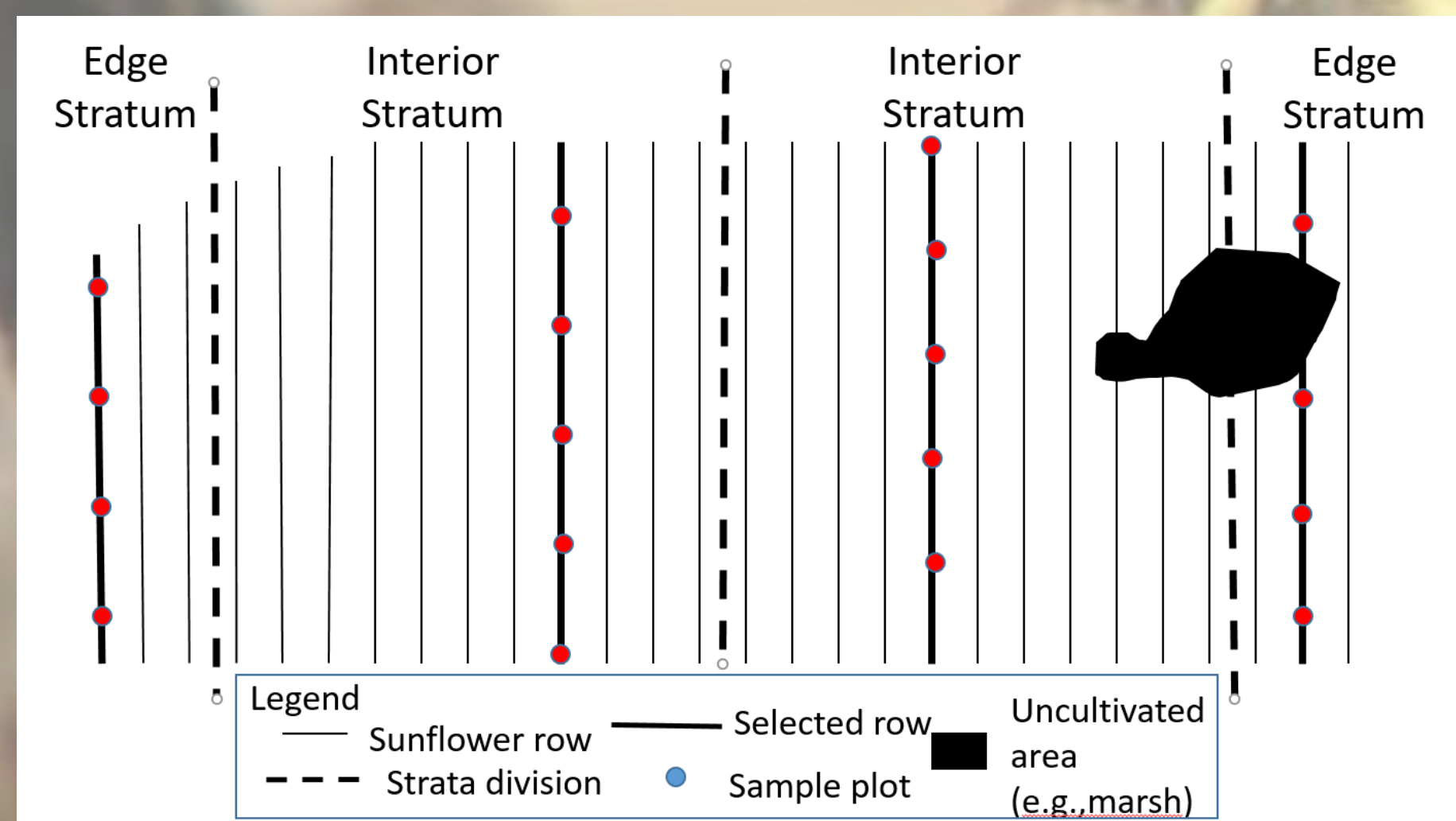
<sup>1</sup>North Dakota State University, Biological Sciences Department, Fargo ND, <sup>2</sup>USDA-APHIS-Wildlife Services National Wildlife Research Center, Florida Field Station, Gainesville ND, <sup>3</sup>USDA-APHIS-Wildlife Services ... Wildlife Research Center, North Dakota Field Station, Fargo ND

## Background

- Sunflower producers face millions (\$) worth of crop losses due to blackbirds each fall [1]
- Blackbird damage is highly localized; regional estimates do not reflect severe economic losses faced by some [2]
- Crops damage estimates are typically assessed by trained professionals, but take significant time and money
- Producer surveys can encompass larger areas with greater detail, but unknown biases and accuracy of producers' damage estimates needs to be investigated. [3]
- Understanding damage distribution and producers' perception across the state informs deployment of management tools and methods [4]

## Objectives

- Compare in-field to producer damage estimates
- Understand producer's perception of blackbird damage to use for comparison



**Figure 1.** In each field we randomly selected 1 row from each strata ; 5 consecutive sunflowers were measured every 135 m

## Methods

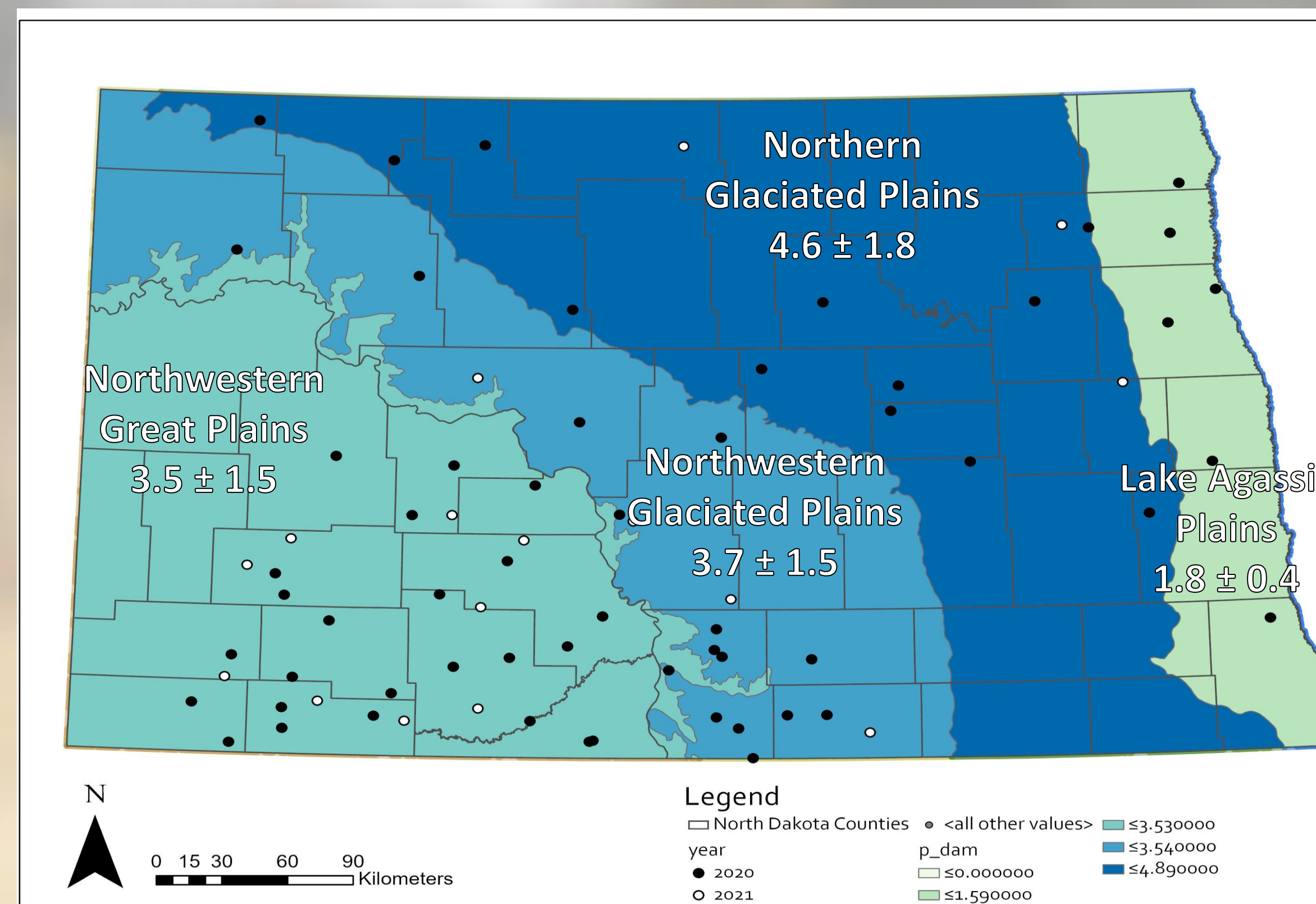
- Selected fields across North Dakota; #/ county based on average sunflower acres (2018 – 2021)
- Surveyed sunflower fields (**Fig. 1 & 2**)
- Sent surveys to 7,350 producers from the NSA mailing list Jan 2021 (online version available on Qualtrics)
- Received 1,065 survey responses (9.2%); ND producers that grew sunflower in 2020 = 821

## Acknowledgements

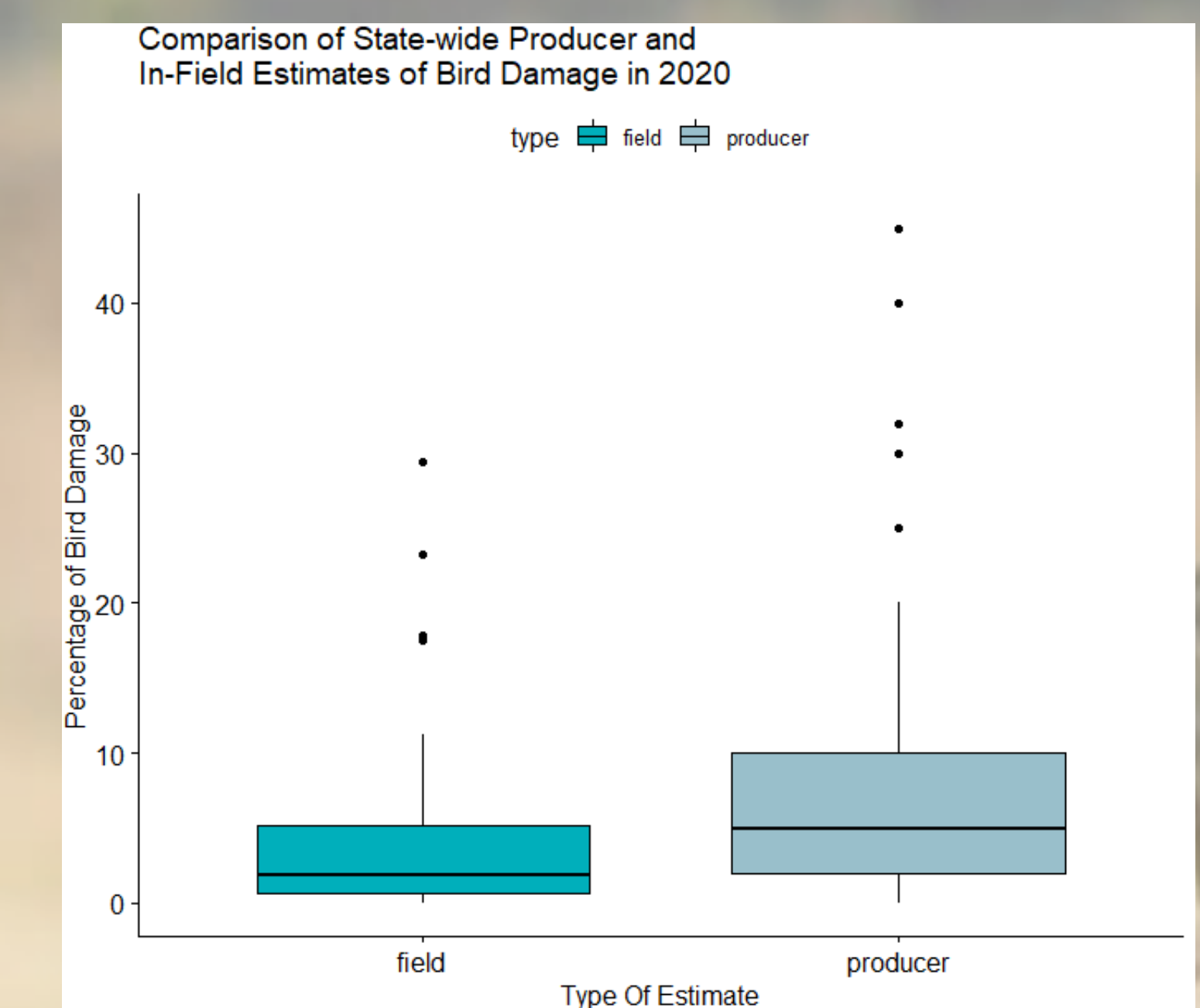
Thank you to all producers for allowing us to survey their property and for field assistance from Emma Counce, John Curnyn, Jessica Duttenhefner, Colin Danch, Isaac Carbajal, Mallory White, USDA, and Wildlife Services blackbird technicians.

## Results

**Figure 3.** Field size ranged from 8 to 614 ha ( $41 \pm 11.5$ ;  $n = 74$ ) and % damage ranged from 0 to 29% ( $4.1 \pm 0.8$ ) in 2020 and 0 – 31% ( $2.3 \pm 0.6$ ) in 2021. In both years damage was similar between ecoregions (Kruskal-Wallis,  $\chi^2 = 0.9$ ,  $p = 0.8$ ,  $n=74$ )

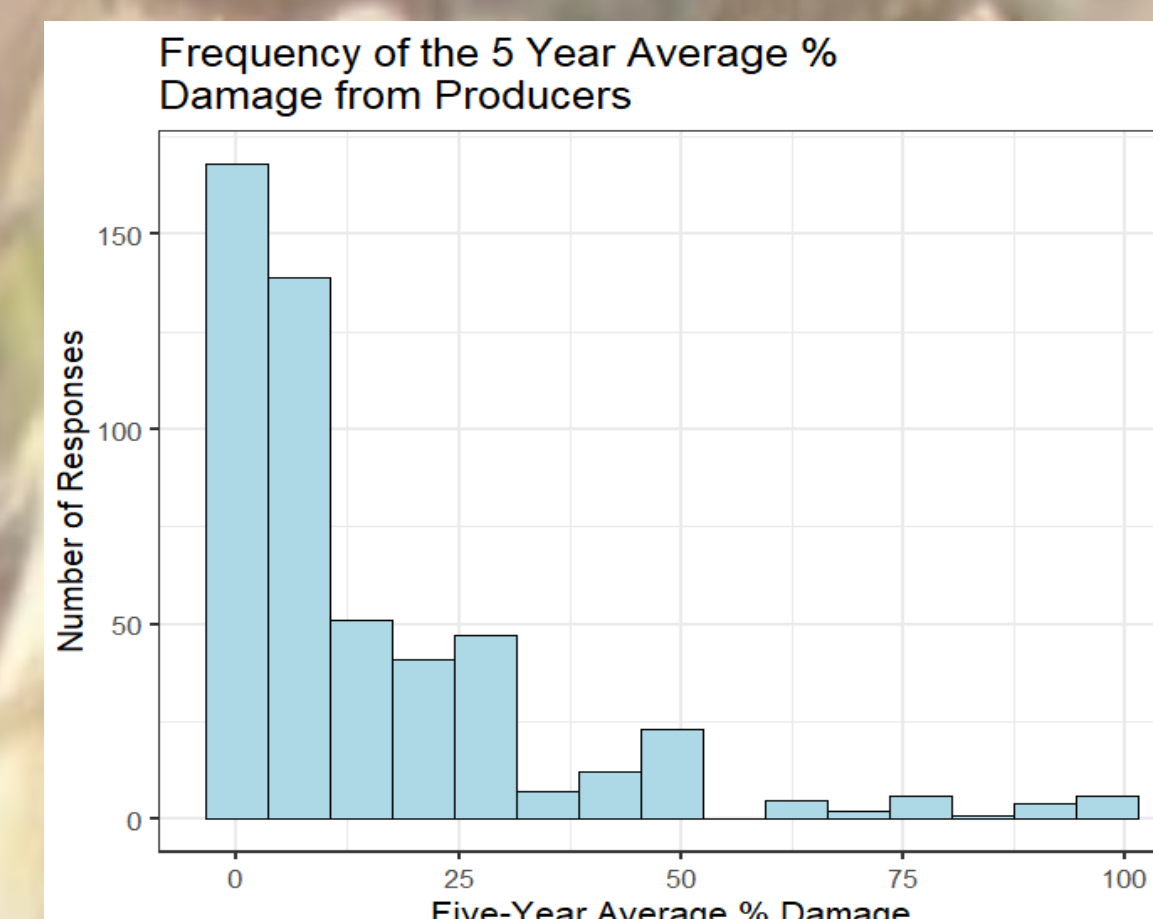


**Figure 5.** Comparison of producer (11.4%) and in-field estimates (4.1%) of sunflower damage. Estimates were different between groups in 2020 (Wilcoxon rank sum  $W=4734$ ,  $p < 0.001$ ). Outliers  $n=10$  were removed if above 2 standard deviations above the mean.



## Survey Results

Type of Seed	Average % Damage	SE	Range
All Types	11.4	1.0	0-100
Confection	14.5	3.7	0-90
Oil	11.2	1.1	0-100
Conoil	9.6	3.3	0-100



**Average Acres Planted in 2020:**  
 $652 \pm 690$  (10 – 6,000)

**Figure 4.** Responses from producers' 5-15.3 ± 0.8 (0-100) year damage estimates



**Figure 2.** We measured head & undeveloped diameters and area damaged for each sunflower

## Summary

- The average bird damage (4.1%) for 2020 and 2021 (2.2%) was similar to past in-field estimates
- Damage was similar between ecoregions
- State-wide producer estimates were not similar to in-field estimates possibly because survey responses were biased towards those who have damage and this comparison was done statewide

## Future Directions

- We will use crop damage estimates to understand which within-field, field, and landscape variables best predict damage.
- We will further compare in-field to producer damage estimates at the same fields

## Literature Cited:

- [1] Ernst, K., Elser, J., Linz, G., Kandel, H., Holderieath, J., Degroot, S., Shwiff, S., Shwiff, S., 2019. The economic impacts of blackbird (Icteridae) damage to sunflower in the United States. *Pest Manage. Sci.*
  - [2] Linz, G.M., Hanzel, J., 1997. Birds and Sunflower. *Sunflower Technology and Production*, 381-394.
  - [3] Elser J, Lindell C, Steensma K, Curtis P, Leigh D, Siemer W, Boulanger J, Shwiff S. 2019. Measuring bird damage to three fruit crops: A comparison of grower and field estimates. *Crop Protect.*
  - [4] Tracey, J.P., Saunders G.R., 2010. A technique to estimate bird damage in wine grapes. *Crop Protect.* 29, 435-439.
- of Agronomy, Crop Science Society of America, Soil Science Society of America, Madison, WI, USA, pp. 263-278.