Considerations for Management of Bird Predation in Sunflower

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U.S. Department of Agriculture (USDA)
To provide leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on public policy, the best available science, and effective management.

Wildlife Services (WS)
To provide Federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist.

National Wildlife Research Center (NWRC)
To find solutions to wildlife damage management problems related to agriculture, property, human health and safety, and natural resources.

Western Region

Eastern Region

Mammals & Forests
Corvallis, OR

Birds & Agriculture
Fargo, ND

Predators
Millville, UT

NWRC Headquarters
Fort Collins, CO

Pacific Island Invasive Species
Hilo, HI

Wildlife Collision
Sandusky, OH

Birds & Aquaculture
Starkville, MS

Invasive Species
Gainesville, FL

WASHINGTON
OREGON
CALIFORNIA
NEVADA
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Research Field Stations







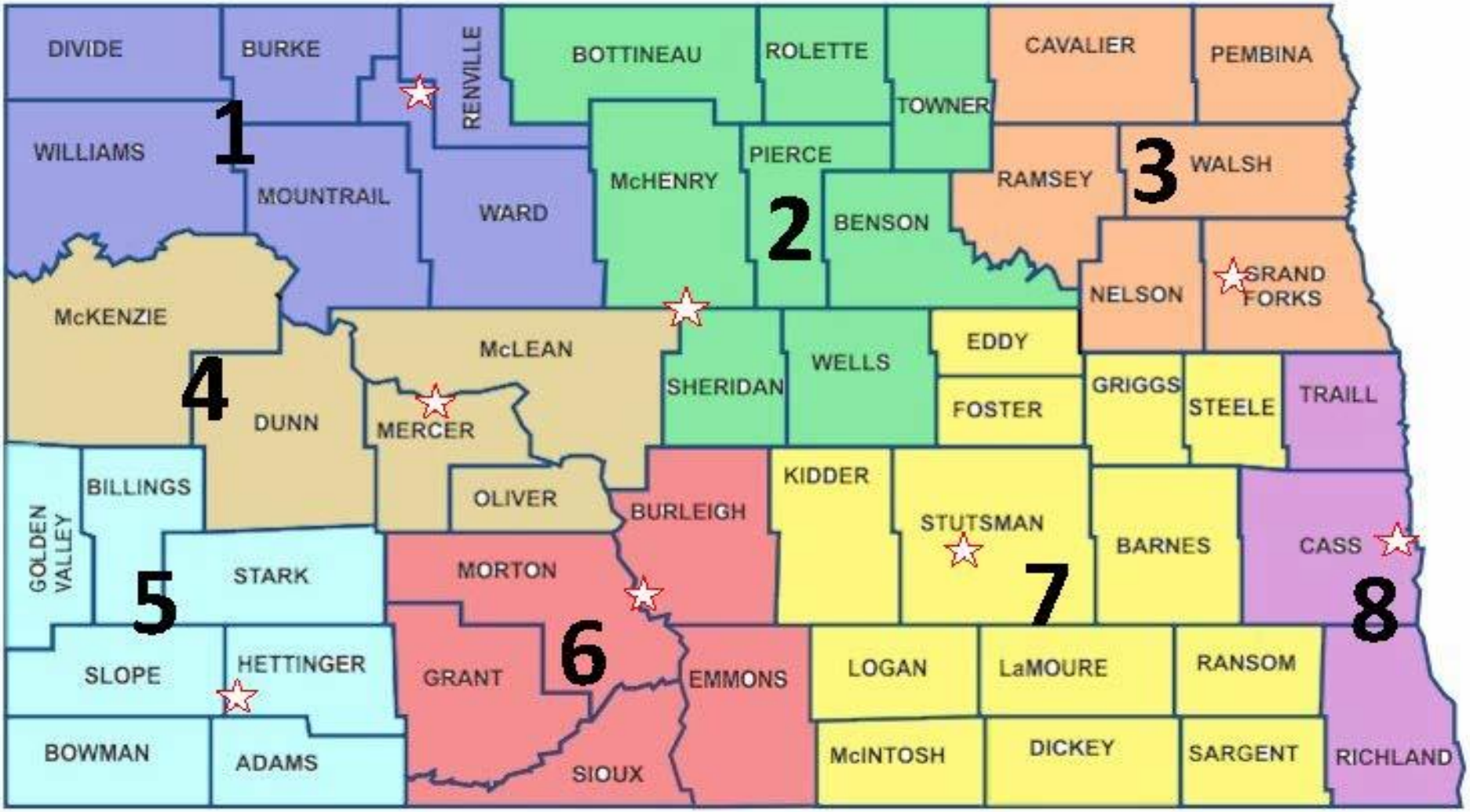

United States Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services – National Wildlife Research Center

* Emphasis on non-lethal methods when possible

USDA

USDA United States Department of Agriculture

2022 Blackbird Damage Management



District 1: Tyler Haase	701-339-5738	District 6: WS Specialist	701-471-6067
District 2: Rick Tischaefer	701-390-3714	District 7: Dwight Rasmussen	701-390-4001
District 3: Nat Bornsen	701-425-1876	District 8: Ross Renner	701-471-5147
District 4: Andrew Wiseman	701-319-8470	State Office	701-355-3300
District 5: Brent Belland	701-440-6939		

Management Tools (follow all federal, state, municipality regulations)

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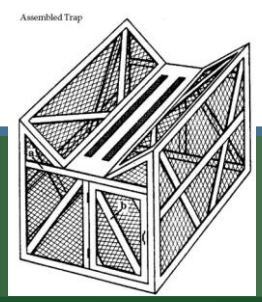





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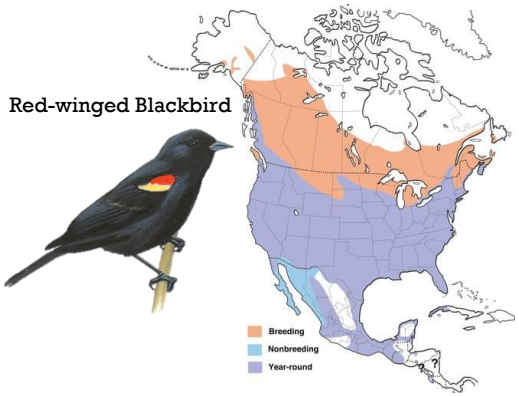
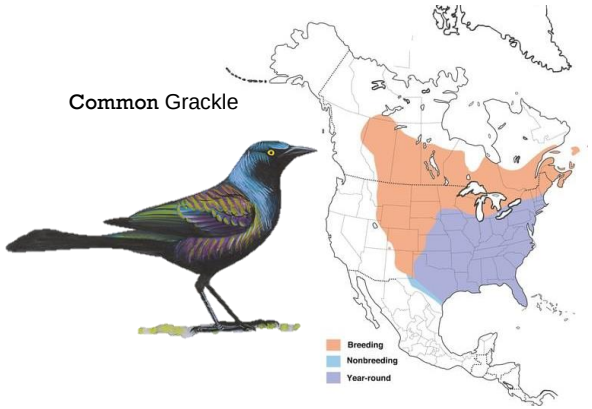
BLACKBIRDS & STARLINGS

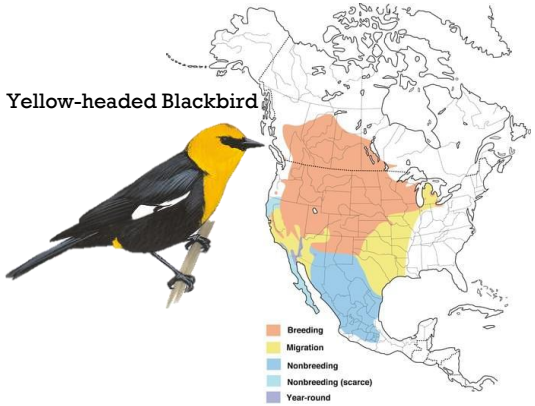
Red-winged Blackbird



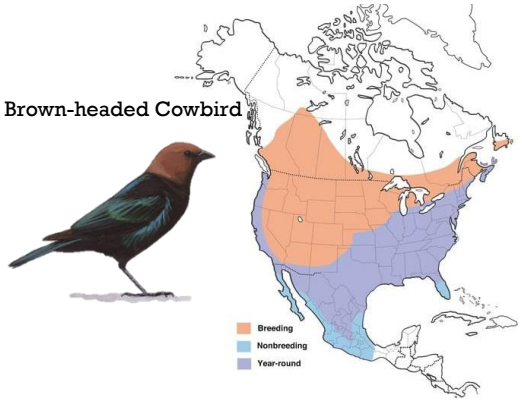
Common Grackle



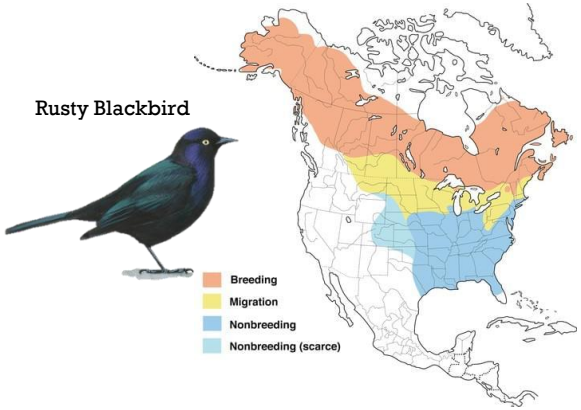
Yellow-headed Blackbird



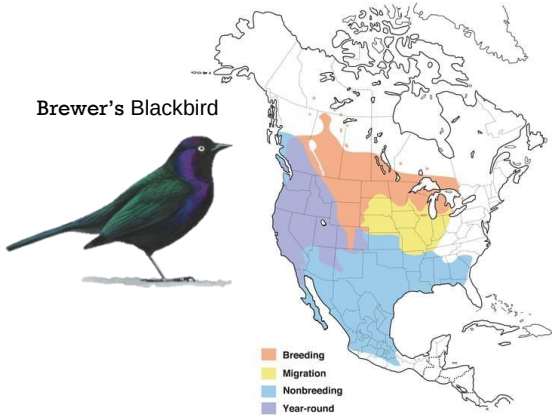
Brown-headed Cowbird



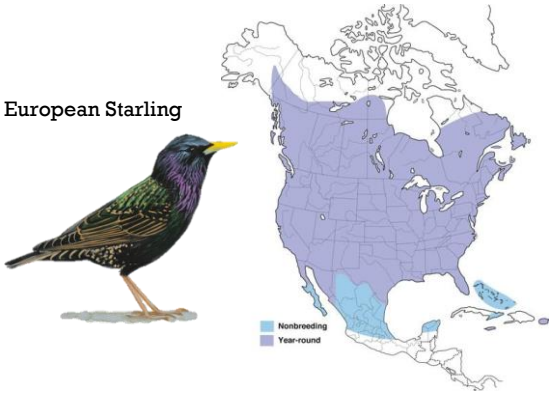
Rusty Blackbird



Brewer's Blackbird

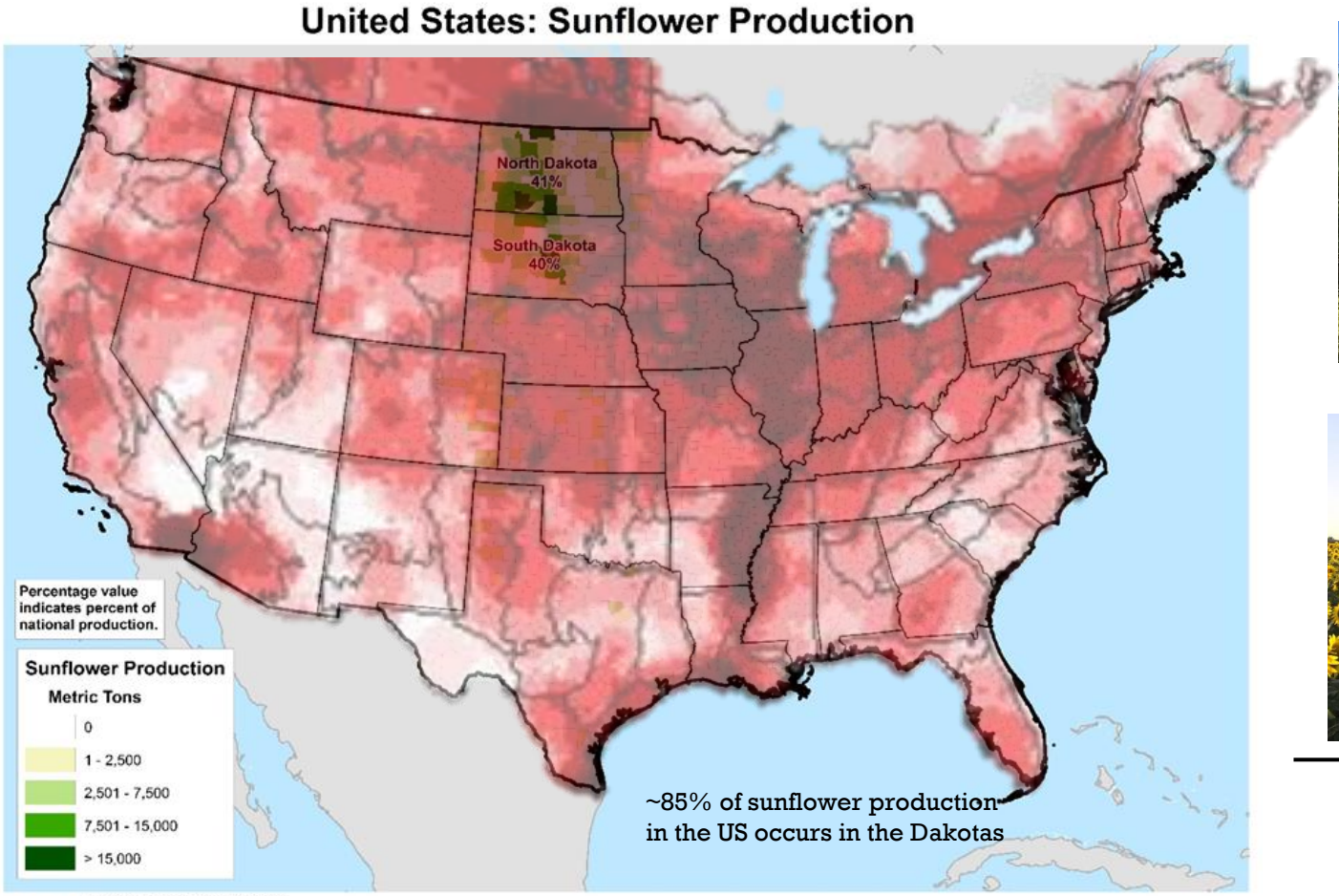


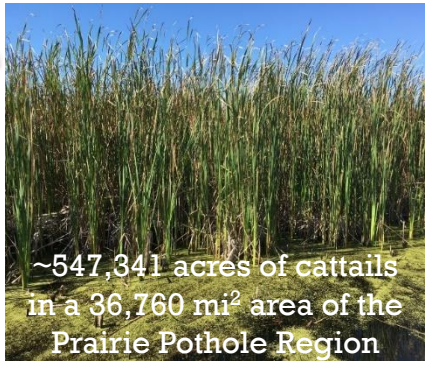
European Starling



Any person, business, organization, or government official acting under this depredation order must provide an annual report using FWS Form 3-202-21-2143 to the appropriate USFWS Regional Migratory Bird Permit Office.

~85% of sunflower production in the US occurs in the Dakotas





+

single roost >1 million blackbirds

Sunflower Damage in Prairie Pothole Region

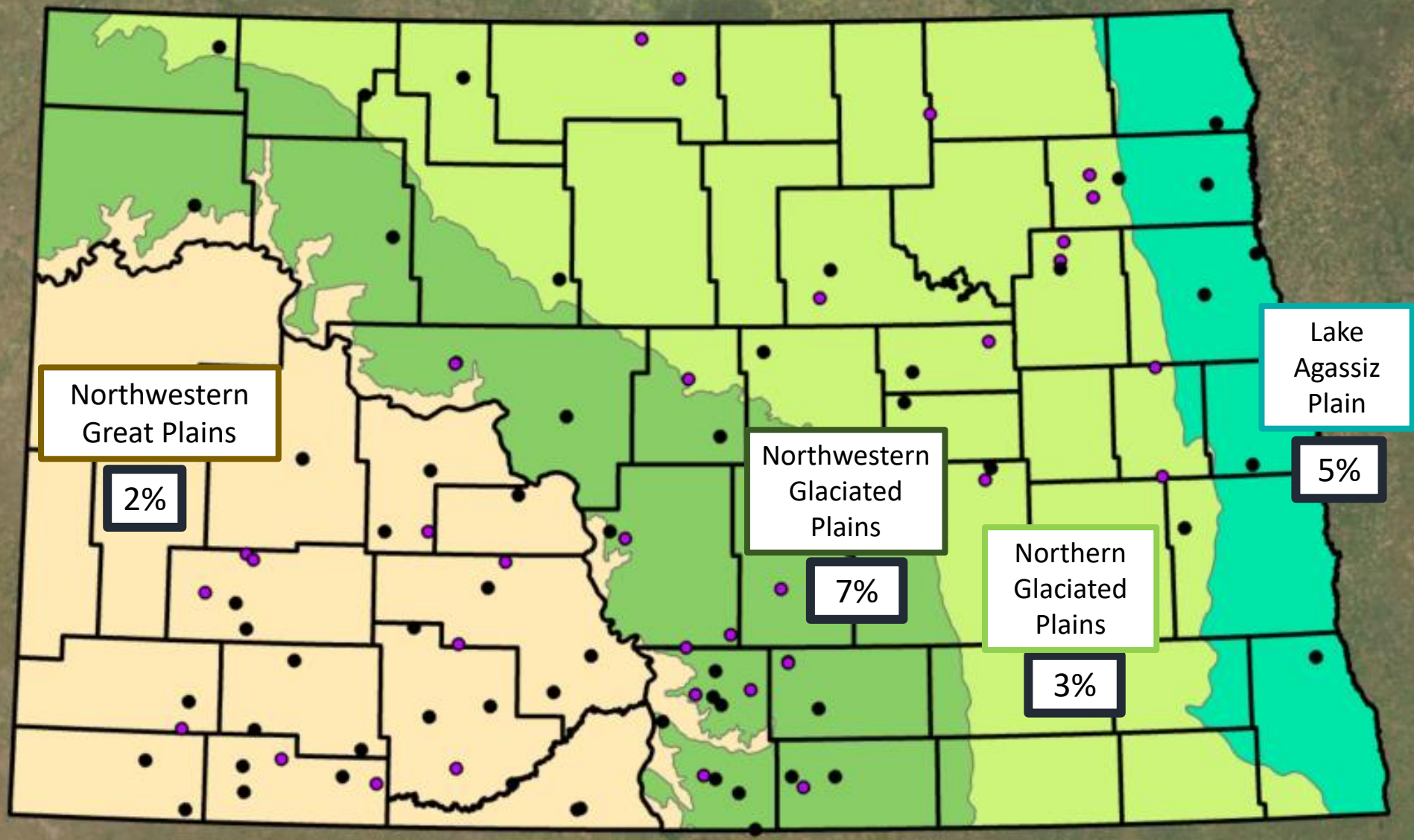
>$3.5 million annually

Sunflower Damage in North Dakota

>$10.7 million annually

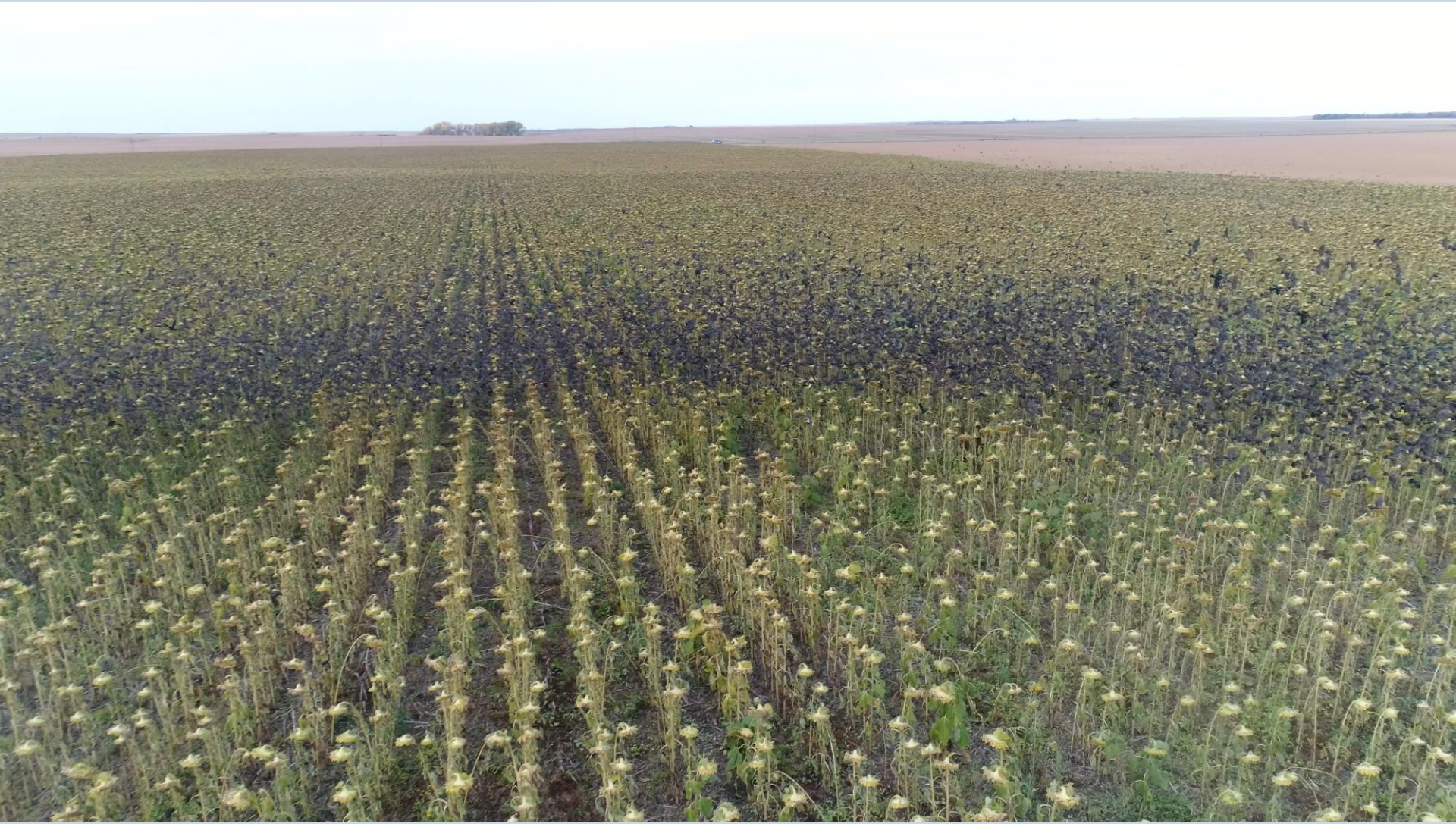
(regionally 2%, locally >20%)

Blackbird Damage to Sunflower Varies by Ecoregion

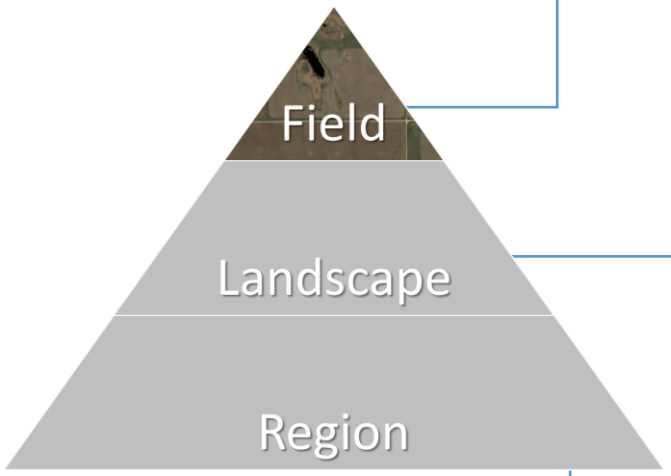


Damage Estimates (2020 & 2021) = 4% (n = 93)

Not an Easy Task

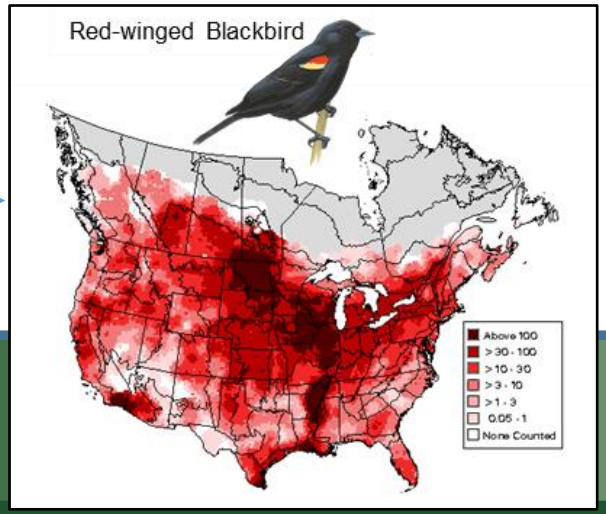


Scale of Tool Implementation



Deploy frightening devices/shooting
Apply chemical avian repellents
Advance harvest
Delay disking after harvest/no-till

Coordinate planting & harvest w/neighbors
Plant large fields w/ interior access
Reduce roosting habitat
Plant decoy food plots (lure crops)
Support natural predators



Population at start of spring = 170 million
Population at start of autumn
328 million (92% increase)
Population by next spring = 170 million
Thus, in a 10-month period about 525,000 blackbirds die/day naturally

Farmers find managing surrounding habitat the most effective tool but more commonly use frightening devices

Bird damage significantly impacts profit (78%)

Male (99.7%)

≥ 3rd Generation (84%)

Sunflower acres = 652 (range: 10-6,000)

≥ Undergrad degree (75%)

Annual cost to control bird damage: $1,093 (range: $0-30,000)

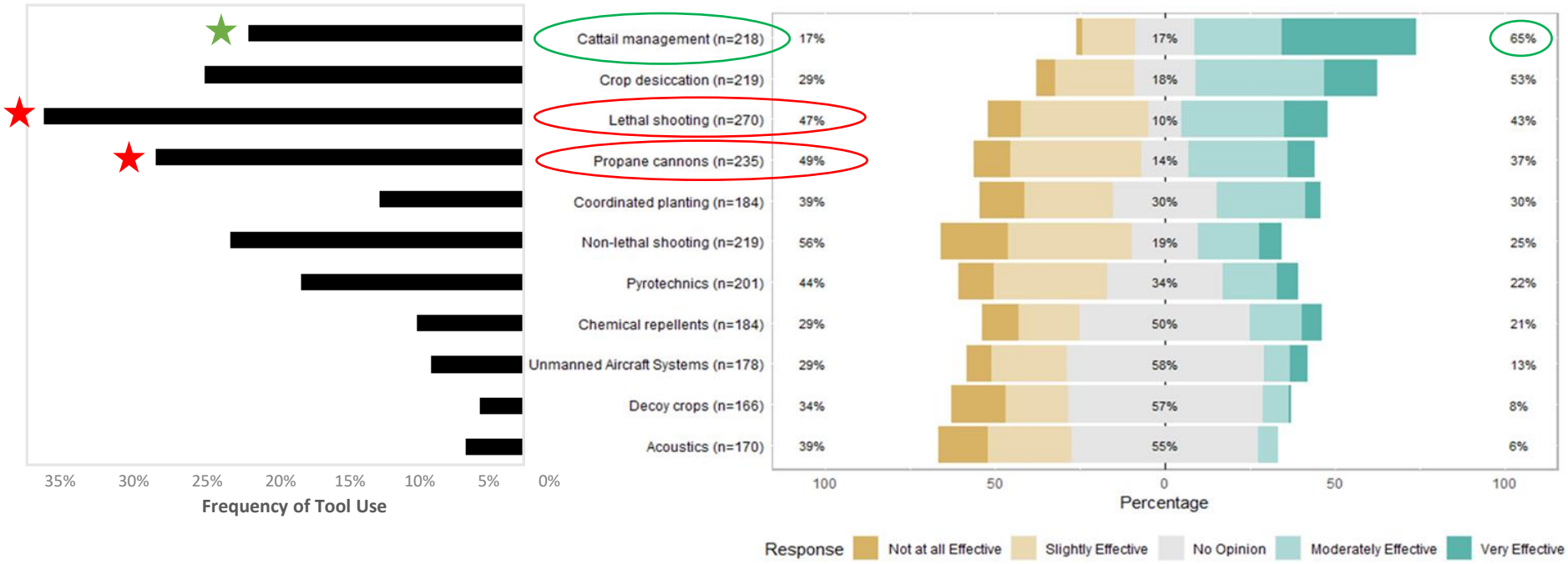
Age = 55 (range: 24-86)

Sunflower experience = 19 yrs. (range: 1-48)

National Sunflower Association list

Surveys Mailed:
ND = 7,346
SD = 2,568

Responses = 1,065
(2020 growers = 343)
11.4% response rate



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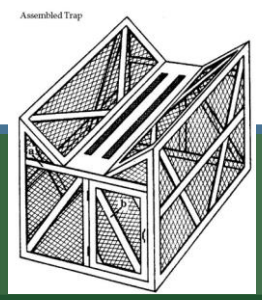
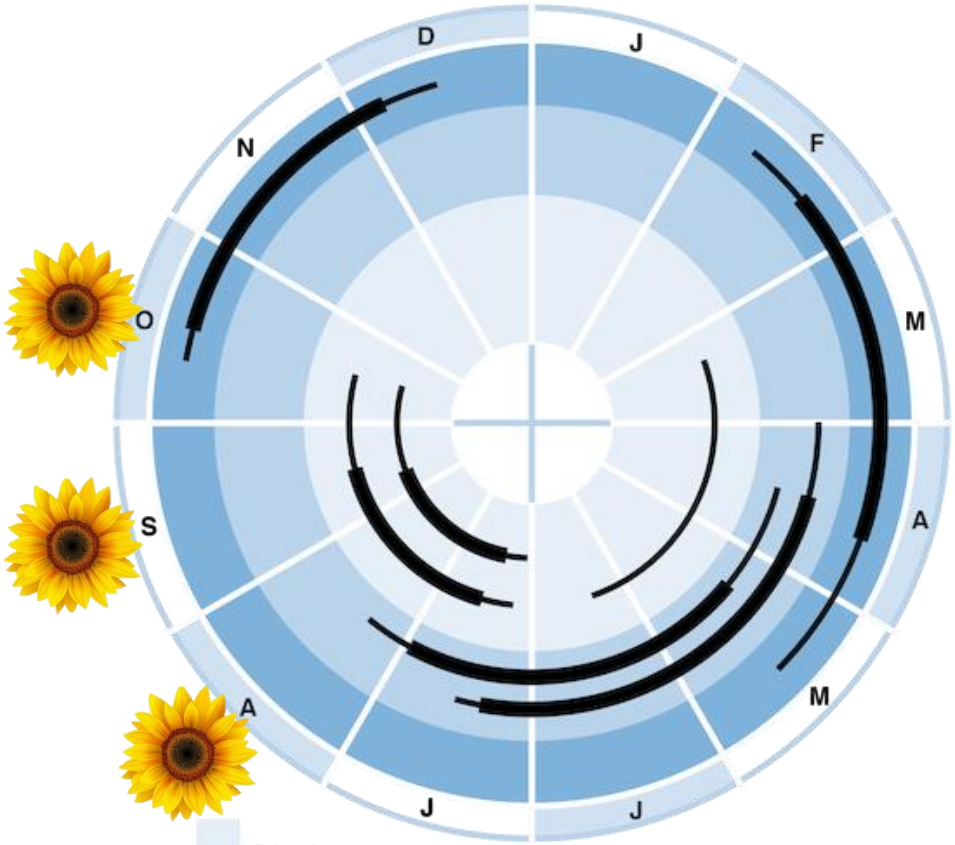


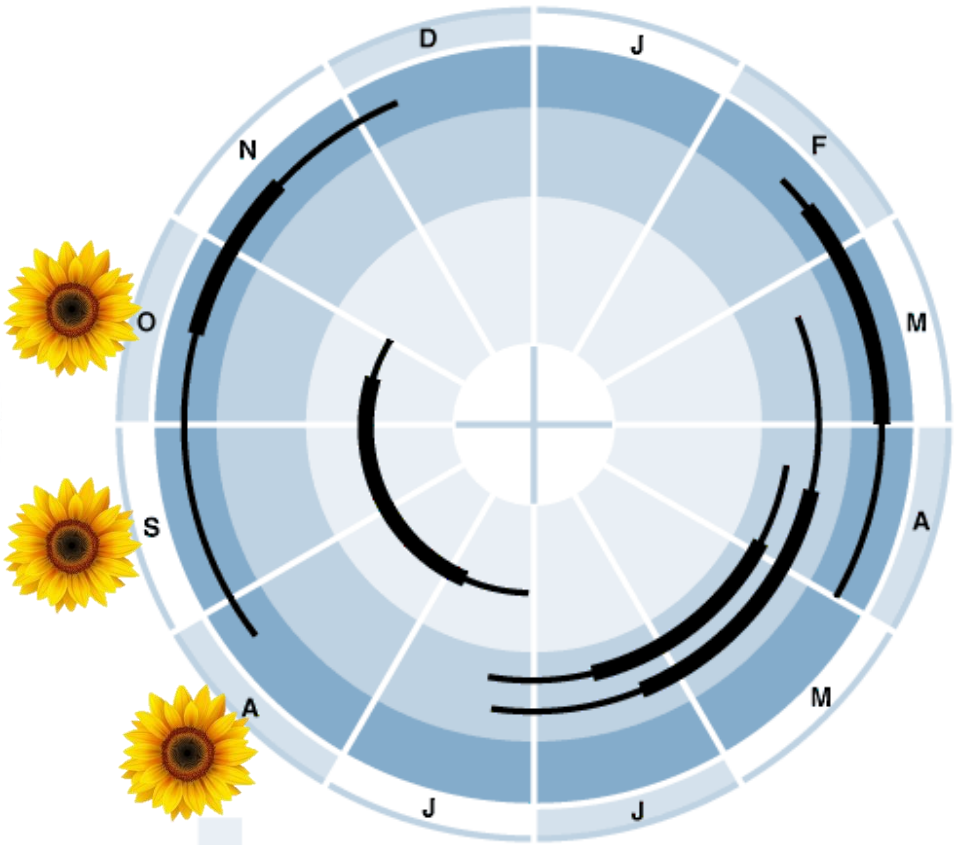




Avian Annual Cycles & Sunflower Damage Season

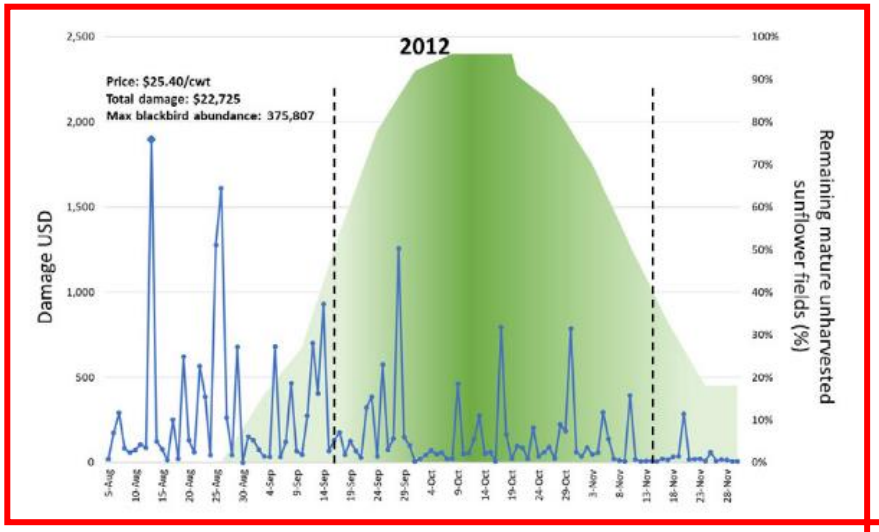
Breeding, molting, migrating, & overwintering in two blackbird species



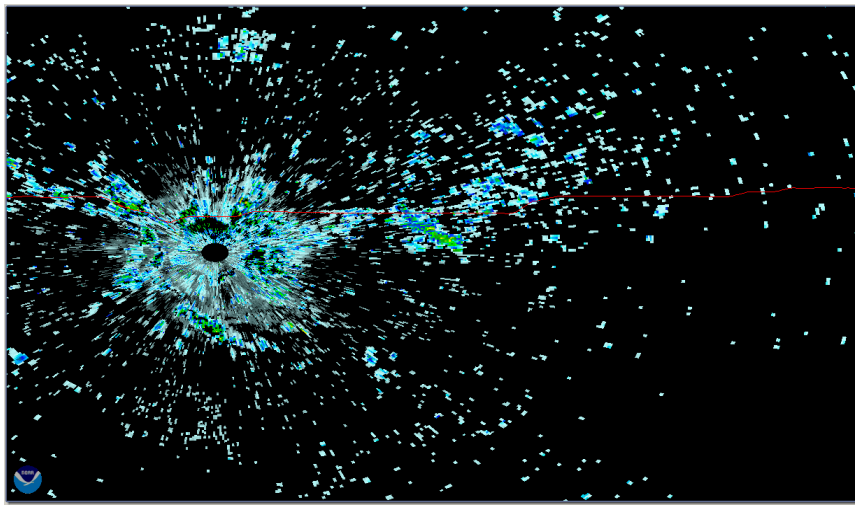


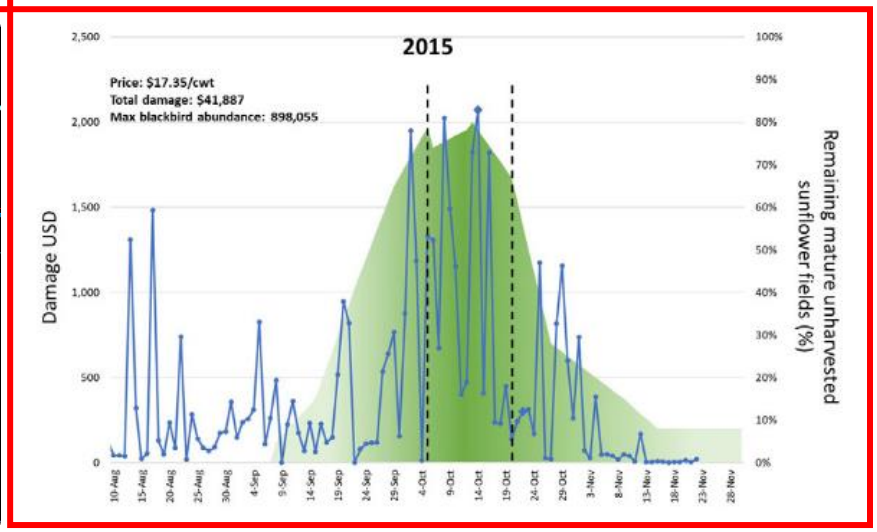
* Timing pertains to North American populations

Plant early-maturing varieties early and desiccate to avoid blackbirds

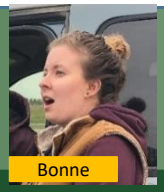


Maximum daily damages were $900 to $2,000 per day at one megaroost





Clark BA, Klug PE, PM Stepanian, JF Kelly. 2020 Human-Wildlife Interactions 14:427-441.

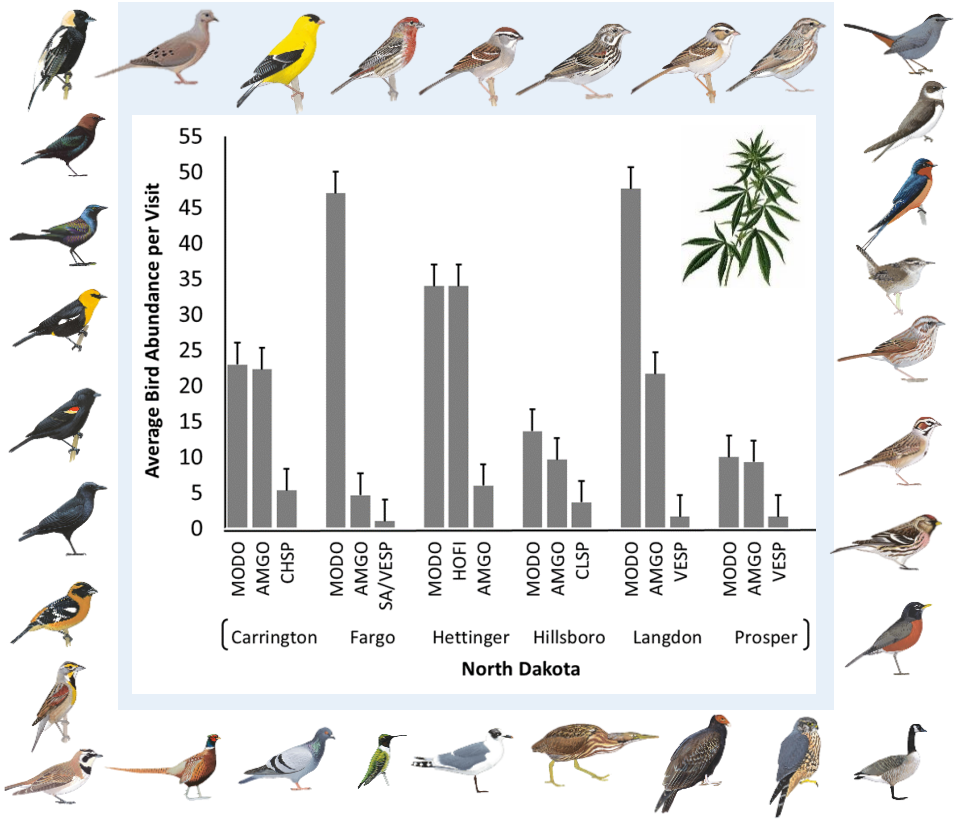


The UNIVERSITY of OKLAHOMA

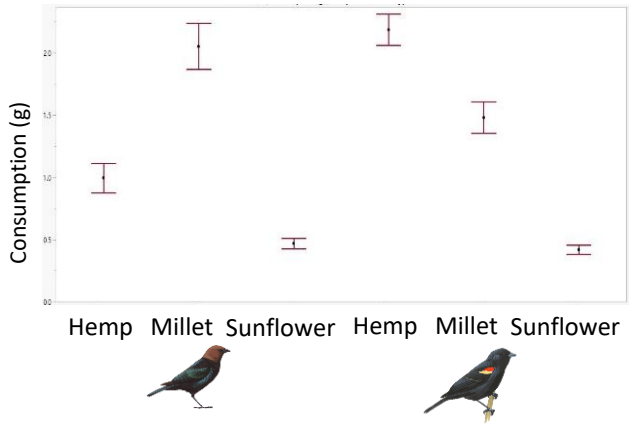
USDA

Opportunities for oilseed hemp as a decoy crop for sunflower

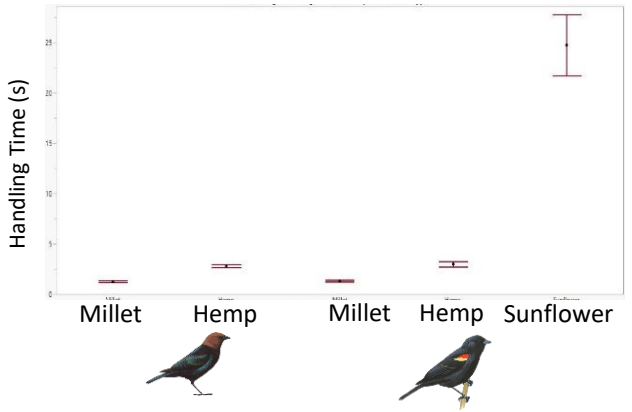
Site	Site Diversity	Field Diversity
Carrington	7	5
Fargo	16	10
Hettinger	9	6
Hillsboro	10	5
Langdon	7	5
Prosper	14	11



Kotten et al. 2022 Human-Wildlife Interactions In press



Red-winged blackbirds prefer hemp and brown-headed cowbirds prefer millet when offered three seed types.



Seed handling did not differ between species but differed with seed type for both species.

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Emily

NDSU NORTH DAKOTA STATE UNIVERSITY

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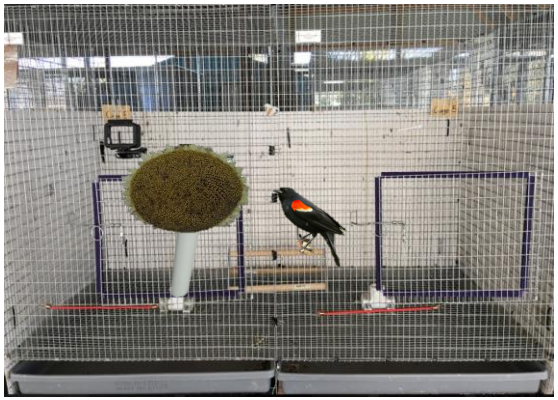
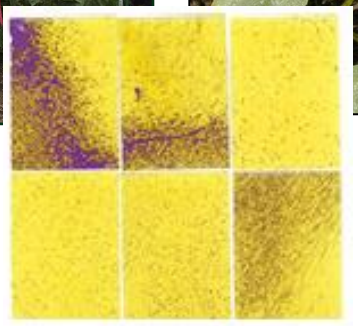
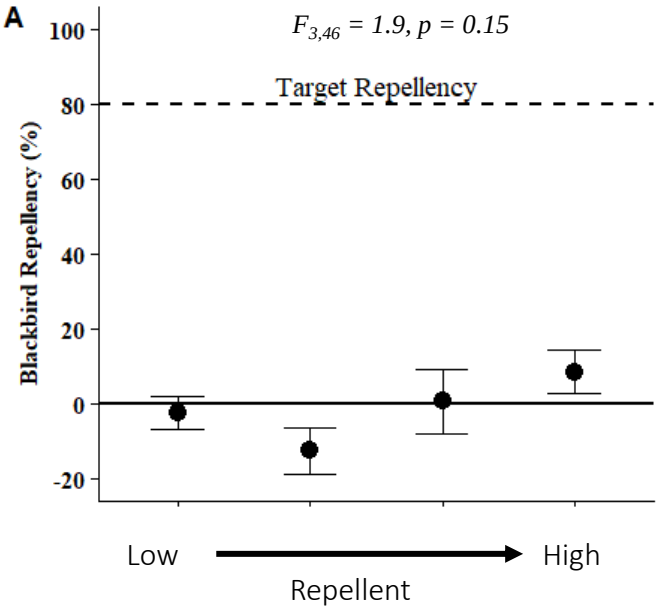
Chemical repellents are ineffective due need for high residues

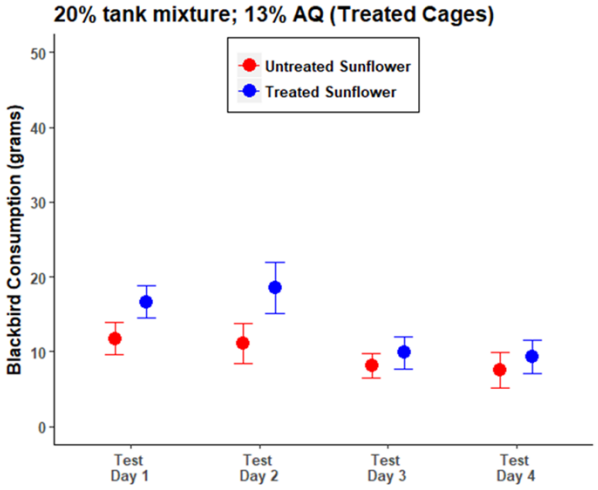


Lab



Field





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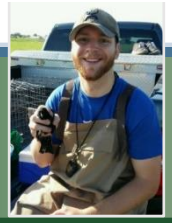
Brandon Kaiser
NDSU



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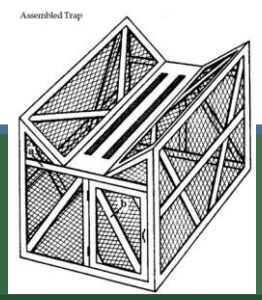
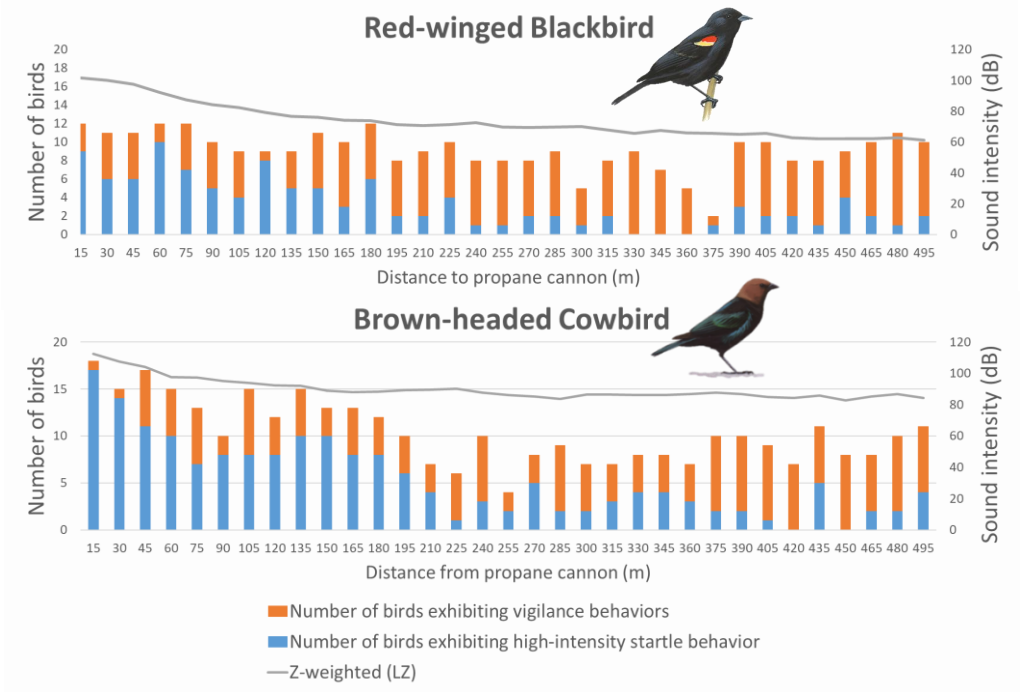
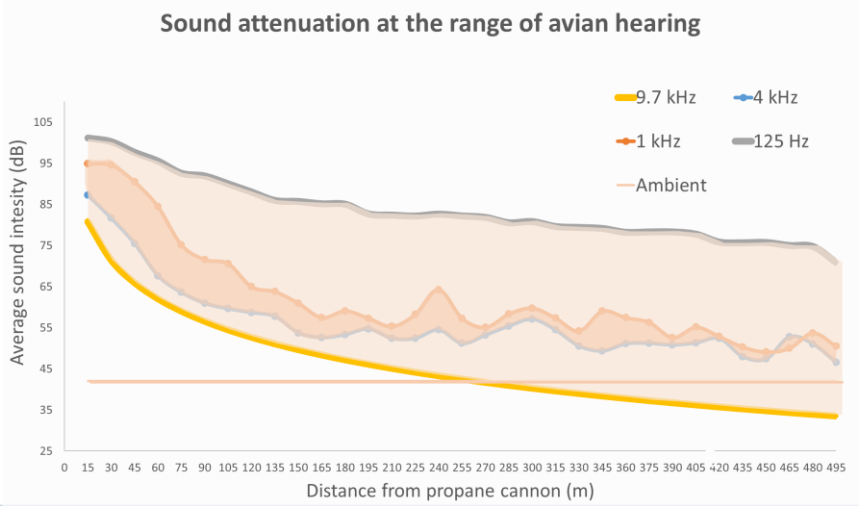


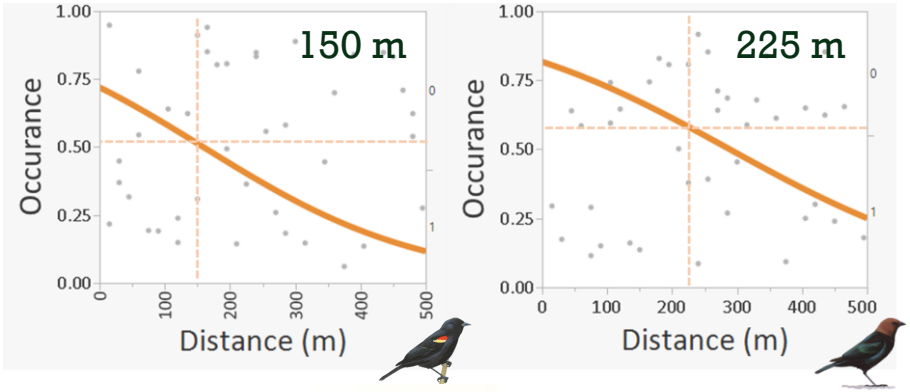




Deploy propane cannons every 300 to 450 m







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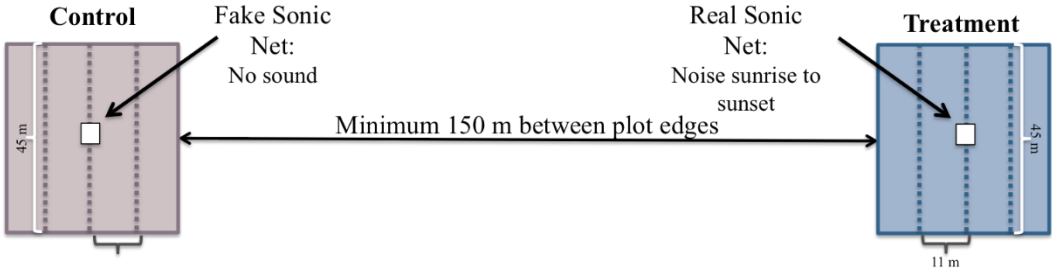
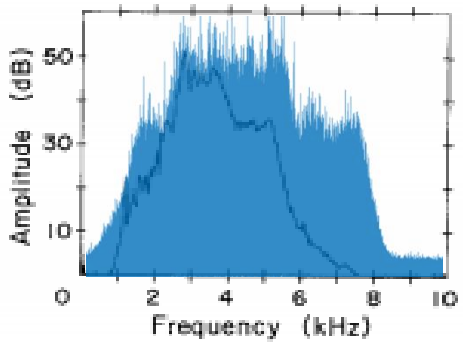
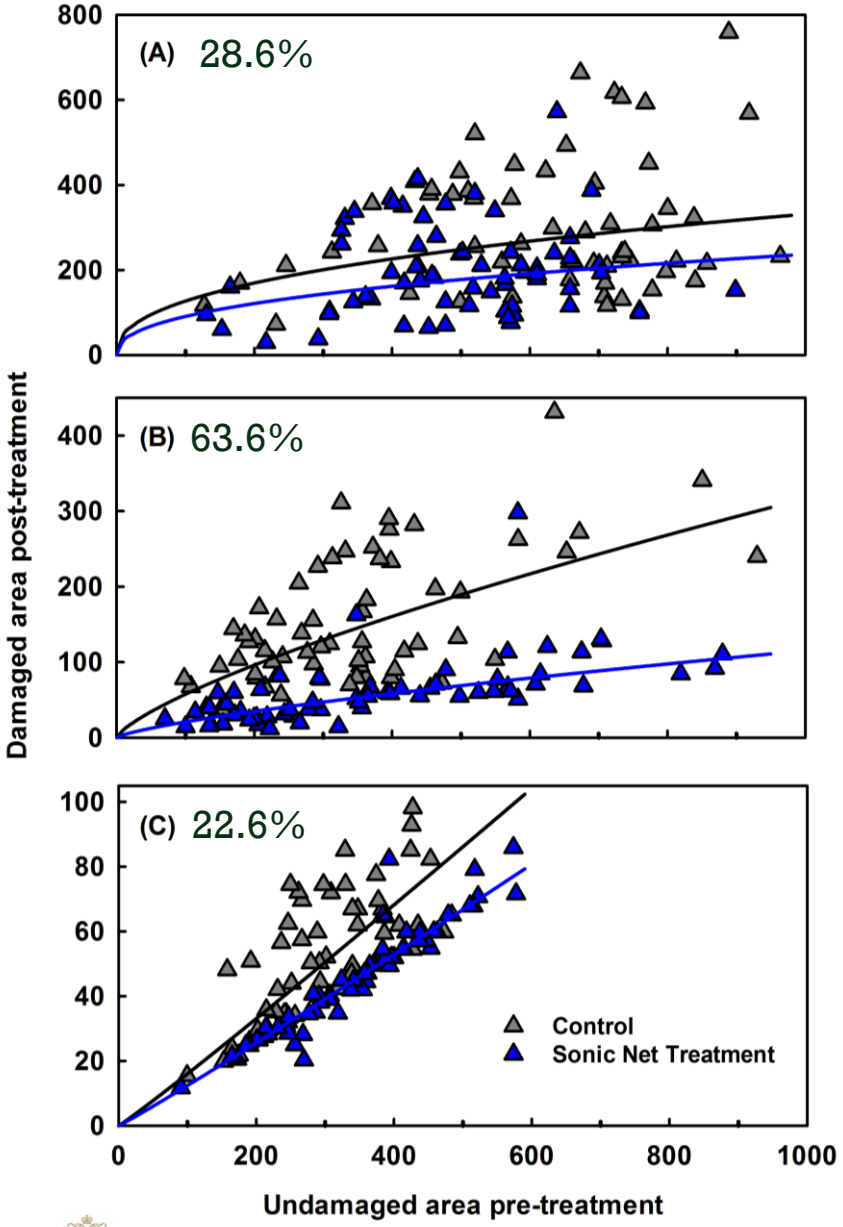
A Sonic Net can reduce bird damage, but extent of effectiveness is limited







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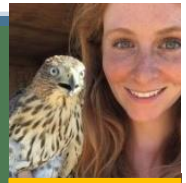

Amanda

William & Mary
Werrell et al. 2021 Crop Protection 144:105579

Management Tools

Population Control

- Shooting (50 CFR § 21.43 - Depredation order for blackbirds, cowbirds, crows, grackles, and magpies)
- Traps & Nets (mist nets, hand nets, decoy traps with necessary permits)
- Avicides (DRC-1339, restricted use for blackbirds, starlings, corvids, magpies, pigeons, collared doves, & gulls)
- Fertility Control (contraceptive/none registered; nest destruction with necessary permits)
- Natural Predators (nest boxes, perches, falconry)

Modify Habitat & Crop

- Roosting Habitat (e.g., cattail management for blackbirds in ND)
- Surrounding Habitat (e.g., natural food availability, may vary by environmental conditions)
- Decoy or lure crops (e.g., alternative forage)
- Agricultural Practices (e.g., alter agricultural timing, siting, spacing, or crop varieties)

Exclusion

- Netting, wires over crops
- Bagging fruiting bodies

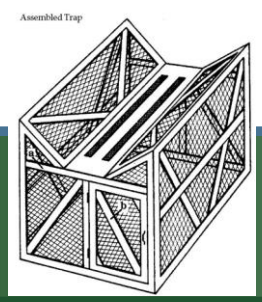
Visual, Auditory, & Physical Deterrents

- **Visual (e.g., drones,** lasers, scarecrows, tubemen, balloons, eyes, hawk kites, reflective ribbons, strobe lights)
- Loud sounds (e.g., pyrotechnics, propane cannons
- Bioacoustics (e.g., species-specific distress/alarm calls, predator noises)
- Sonic Nets (i.e., sound to avian mask communication & create risky environment)
- Physical (e.g., compressed air or high-pressure water sprayer)

Chemical Repellents

- Methyl anthranilate (sensory), Anthraquinone (gustatory)

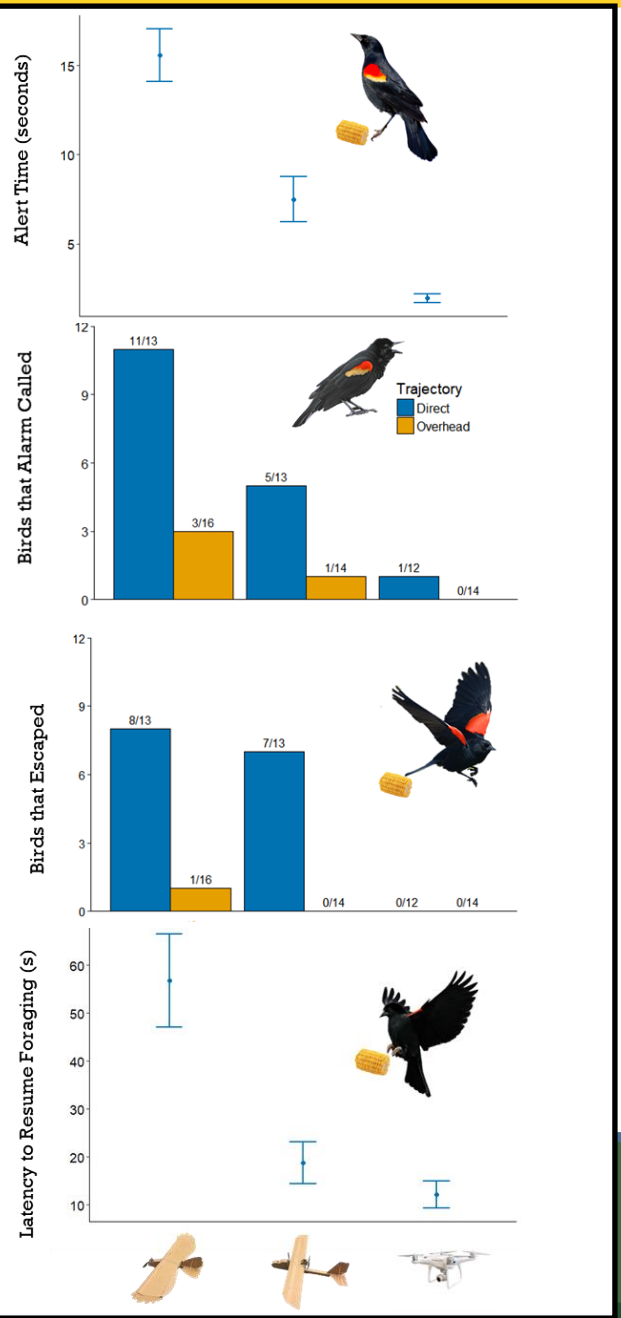




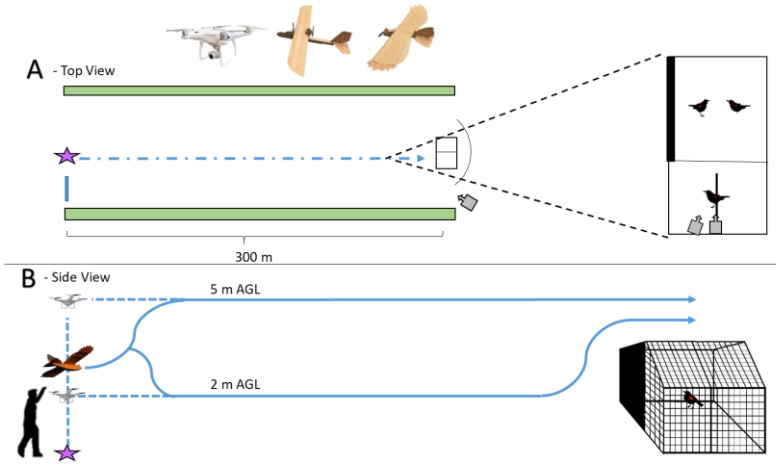




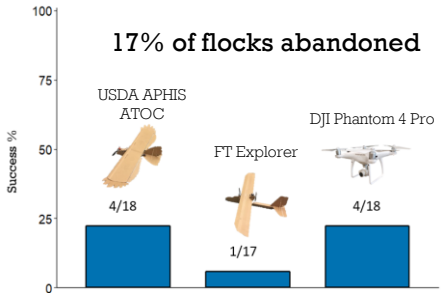
Response to drone shape dependent on bird numbers and landscape

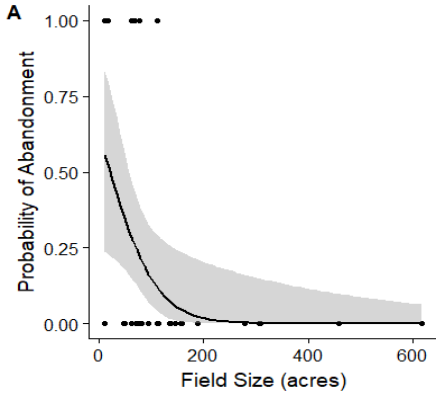


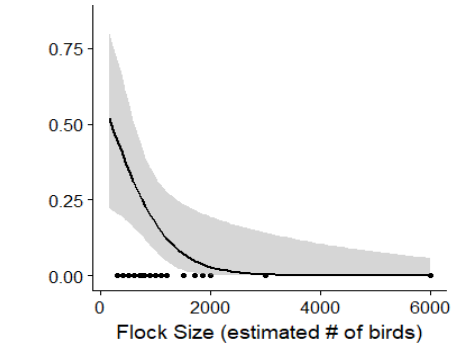
Seminatural Aviary Study



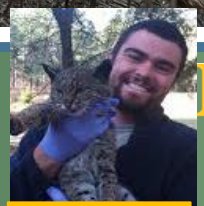
Field Study







Egan CC, Blackwell BF, Fernández-Juricic E, Klug PE. 2020. Condor 122:1-15



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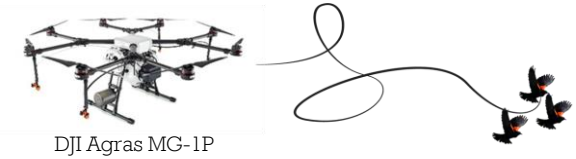
USDA

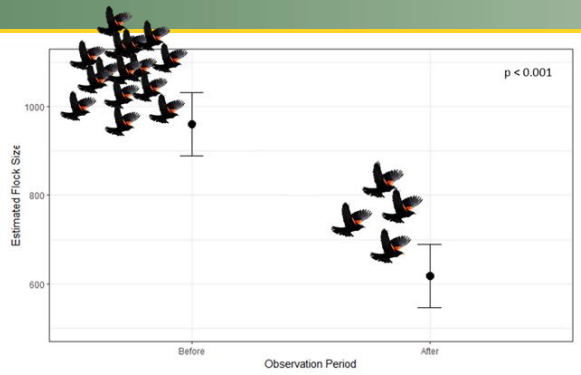
Drone hazing is more effective on smaller flocks & late in the day

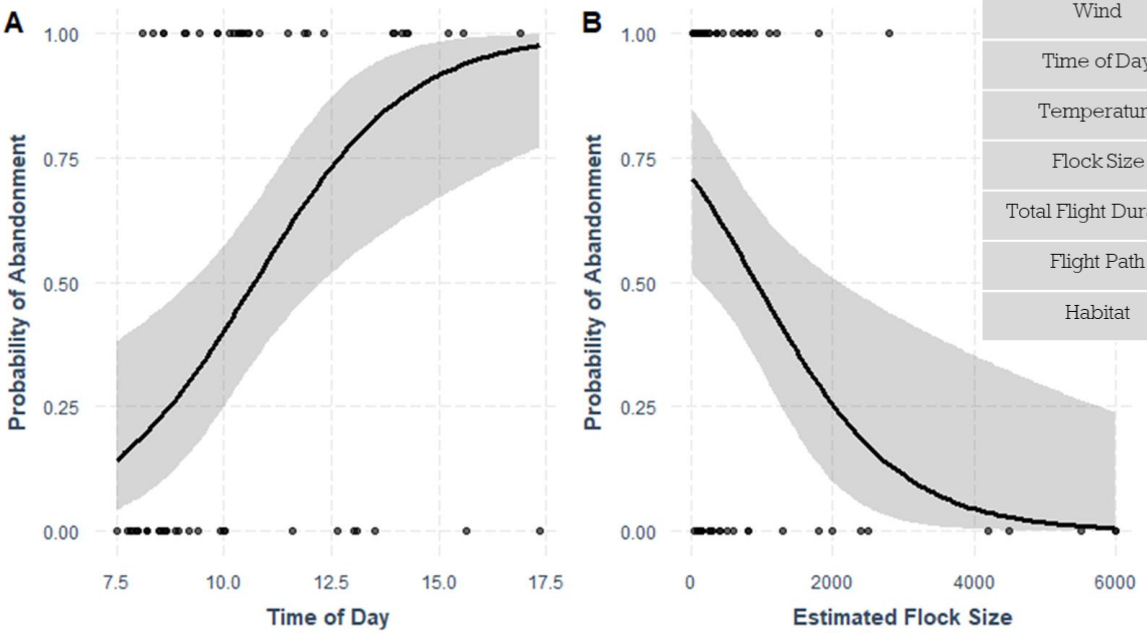
- 52% of flocks abandoned
- 81% of flocks returned within 15 min

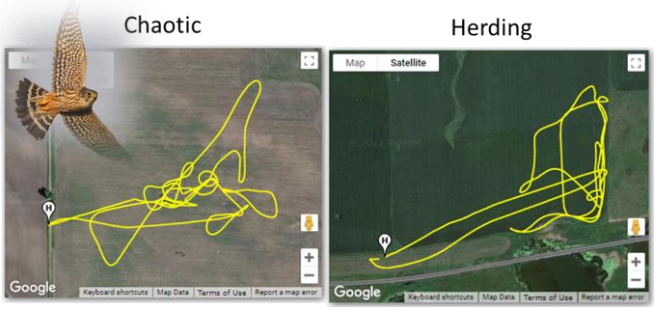


DJI Agras MG-1P

Covariates
Julian Day
Cattail Area
Sunflower Area
Wind
Time of Day
Temperature
Flock Size
Total Flight Duration
Flight Path
Habitat







Optimal Model: glm(Success ~ Time + Flock Size + Temp)

White, MG. 2021. NDSU MS Thesis

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Wildlife Services – National Wildlife Research Cen

Mallory

USDA

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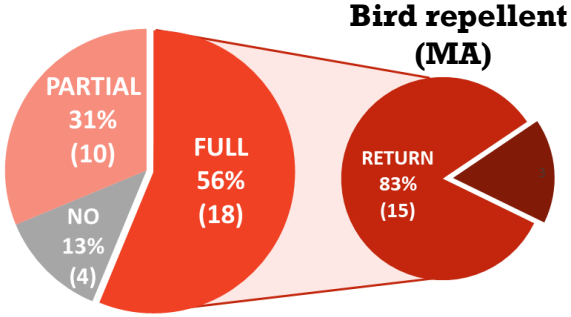
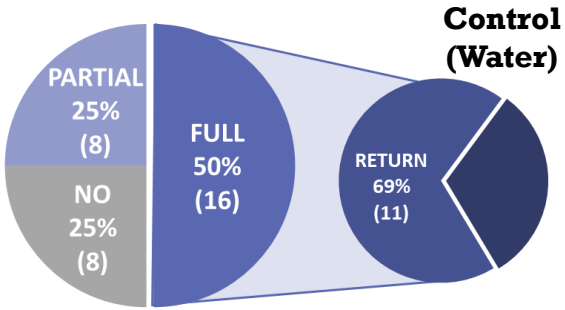
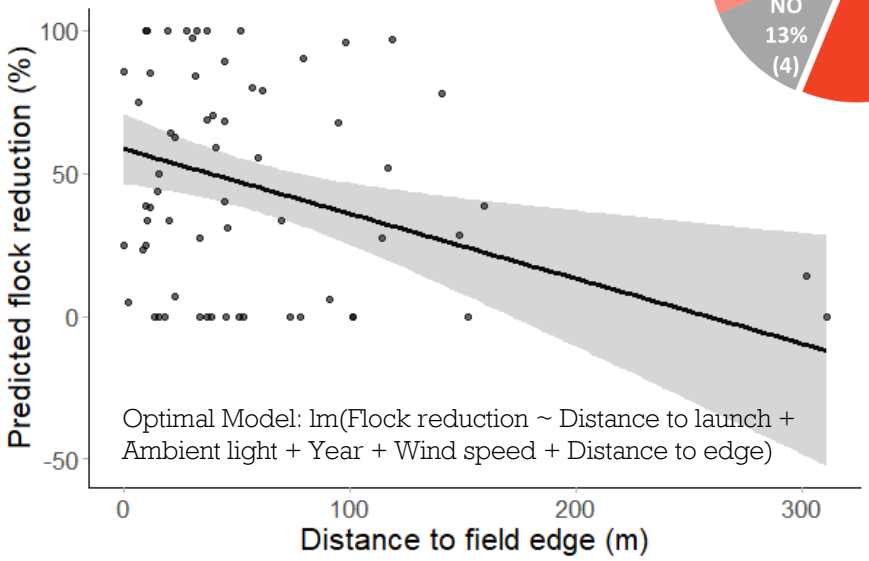
National Sunflower Association

Distance to edge informs abandonment & flock reduction; drone speed informs return time

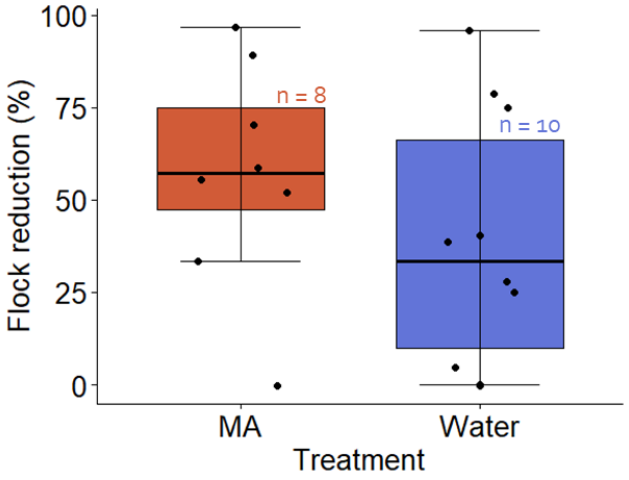
DJI Agras MG-1P



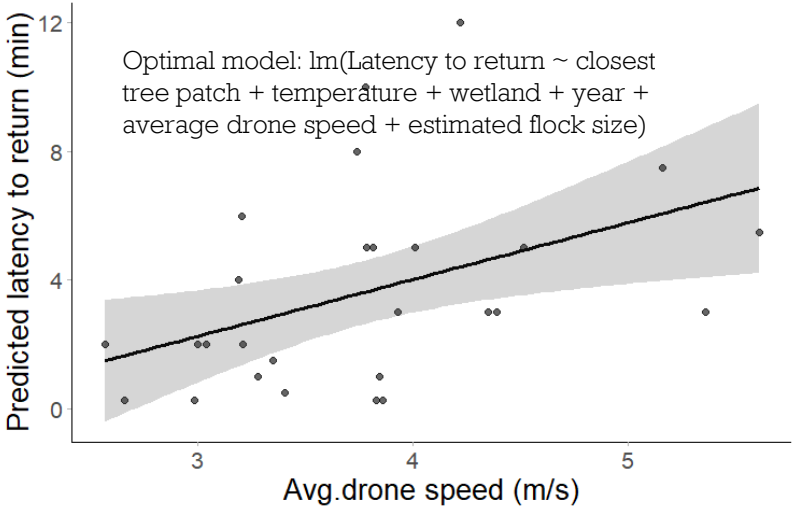




Optimal Model: lm(Flock reduction ~ Distance to launch + Ambient light + Year + Wind speed + Distance to edge)



Average decline was **56±10%** for MA and **38±10%** for water.



Optimal model: lm(Latency to return ~ closest tree patch + temperature + wetland + year + average drone speed + estimated flock size)

Duttenhefner, JL. Expected 2023. NDSU MS Thesis

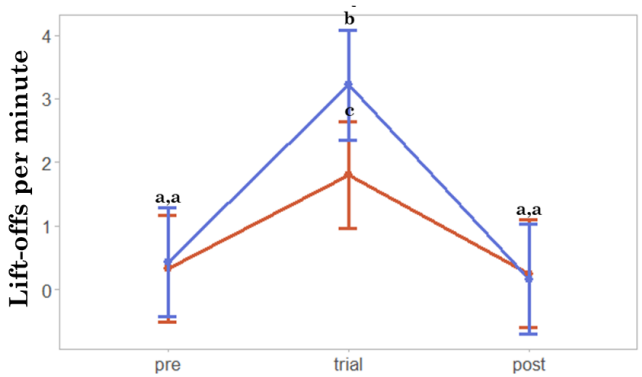
Jessica

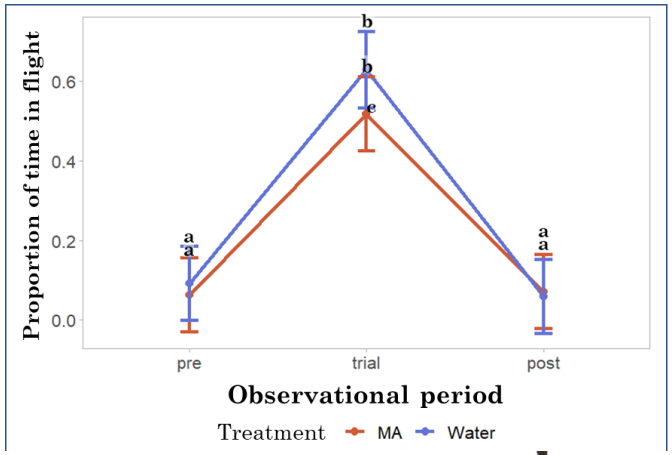
NDSU

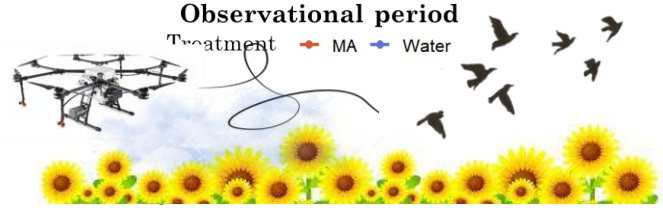
National Sunflower Association

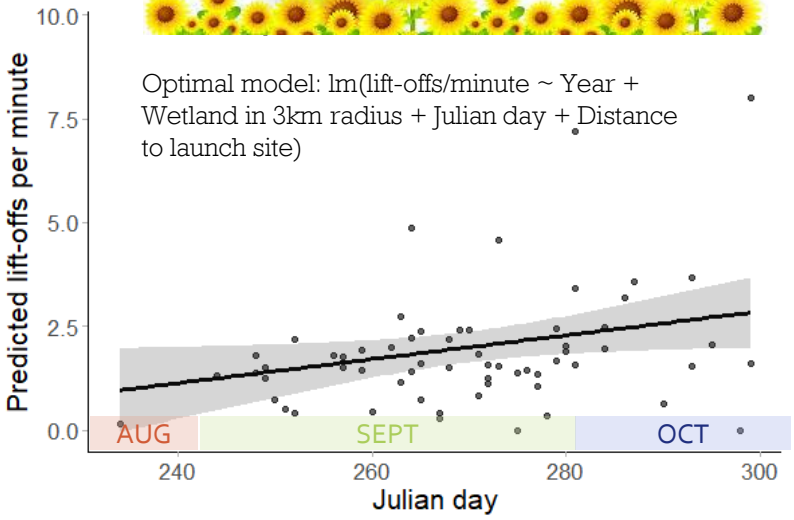
USDA

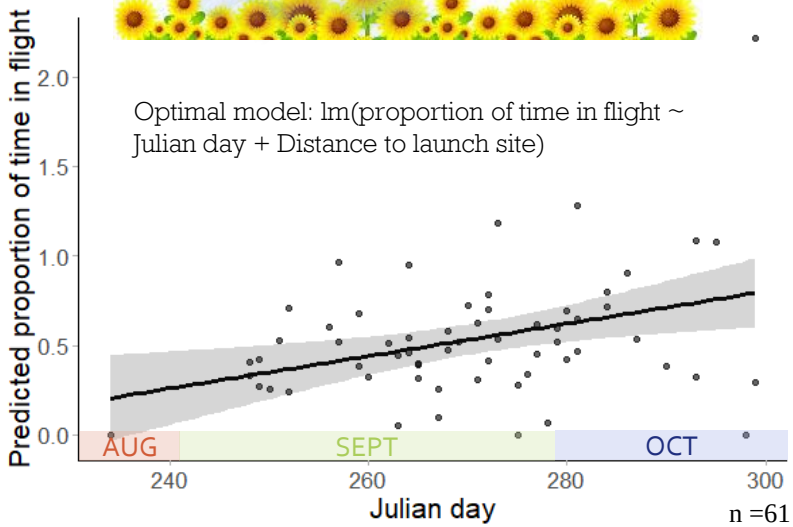
Water trials had more lift-offs & time in flight than repellent trials











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Jessica

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Management Recommendations

Cultural Practices (e.g., alter agricultural timing, siting, spacing, or crop varieties)

Plant early-maturing varieties early and desiccate to avoid blackbirds
Avoid planting sunflower near cattail marshes or woodlots
Coordinate planting with neighbors to avoid being the first or last field on the landscape
Start management early in the damage season when flocks are small and establishing feeding areas

Modify Surrounding Habitat

Reduce roosting habitat (e.g., cattail management)
Decoy or lure crops (e.g., alternative forage)

Visual, Auditory, & Physical Deterrents

Loud sounds (e.g., pyrotechnics, propane cannons, shooting [reinforce frightening devices not for population reduction])
Bioacoustics (e.g., species-specific distress/alarm calls, predator noises)
Sonic Nets (i.e., sound to avian mask communication & create risky environment)

Drones

More effective on small flocks, on smaller fields, and early in the season
Although more effective later in the day, use drones early in the day to discourage flocks from establishing feeding site
Although blackbirds find raptor shaped drones riskier, multirotor drones are easy to fly, fast, and maneuverable
Tests need to be done that evaluate hazing duration needed to improve efficacy
Tests need to be done that evaluate how the speed and size of the drone impact efficacy
Integrating drones with other tools will create a risky environment and encourage them to move on

Chemical Repellents

Methyl anthranilate (sensory) is the only registered avian repellent, but application issues and the need for high residues do not make it effective
Drones deploying chemical repellents changed blackbird behavior, but tests need to be done to evaluate the duration of hazing and amount of chemical needed to improve efficacy

Successful bird dispersal involves a combination of tools & timing of use, as well as skill & persistence

Thank You!

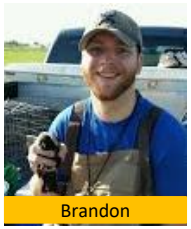
National Sunflower Association
John Sandbakken, Board of Directors, and sunflower producers

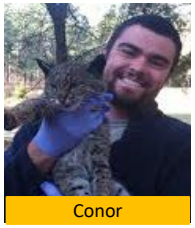
NDSU Biological Sciences
Dr. Tim Greives; Brandon Kaiser, Conor Egan, Mallory White, Morgan Donaldson, Amanda Werrell, Jessica Duttenhefner, Emily Kotten

USDA-APHIS-WS North Dakota John Paulson and field staff

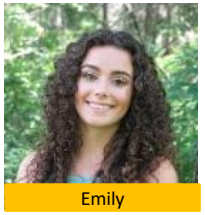
University of Oklahoma Dr. Jeff Kelly, Bonne Clark

College of William & Mary Dr. John Swaddle, Amanda Werrell


Brandon

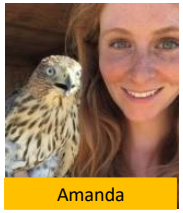

Conor

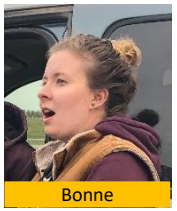

Jessica


Emily


Mallory


Morgan


Amanda


Bonne

Disclaimer:

Wildlife can threaten the health and safety of you and others. Use of damage prevention and control methods also may pose risks to humans, pets, livestock, other non-target animals, and the environment. Be aware of the risks and take steps to reduce or eliminate those risks.

Some methods discussed may not be legal, permitted, or appropriate in your area. Read and follow all pesticide label recommendations and local requirements. Check with personnel from your state wildlife agency and local officials to determine if methods are allowed.

The findings and conclusions in this presentation are those of the author and should not be construed to represent any official USDA or U.S. Government policy or determination. Use of tradenames does not imply endorsement by the U.S. government, nor does omission constitute criticism.