The Efficacy of Switchgrass Monocultures for Decreasing Breeding Bird Hazards

Project Principal Investigators

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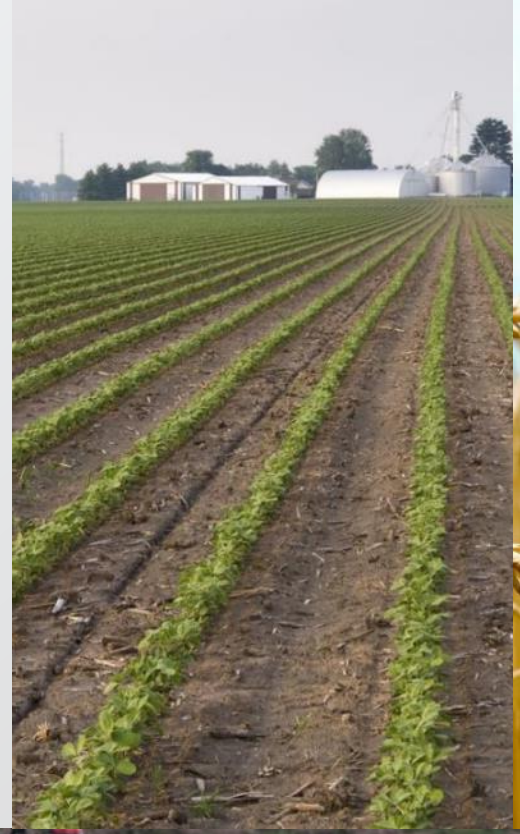
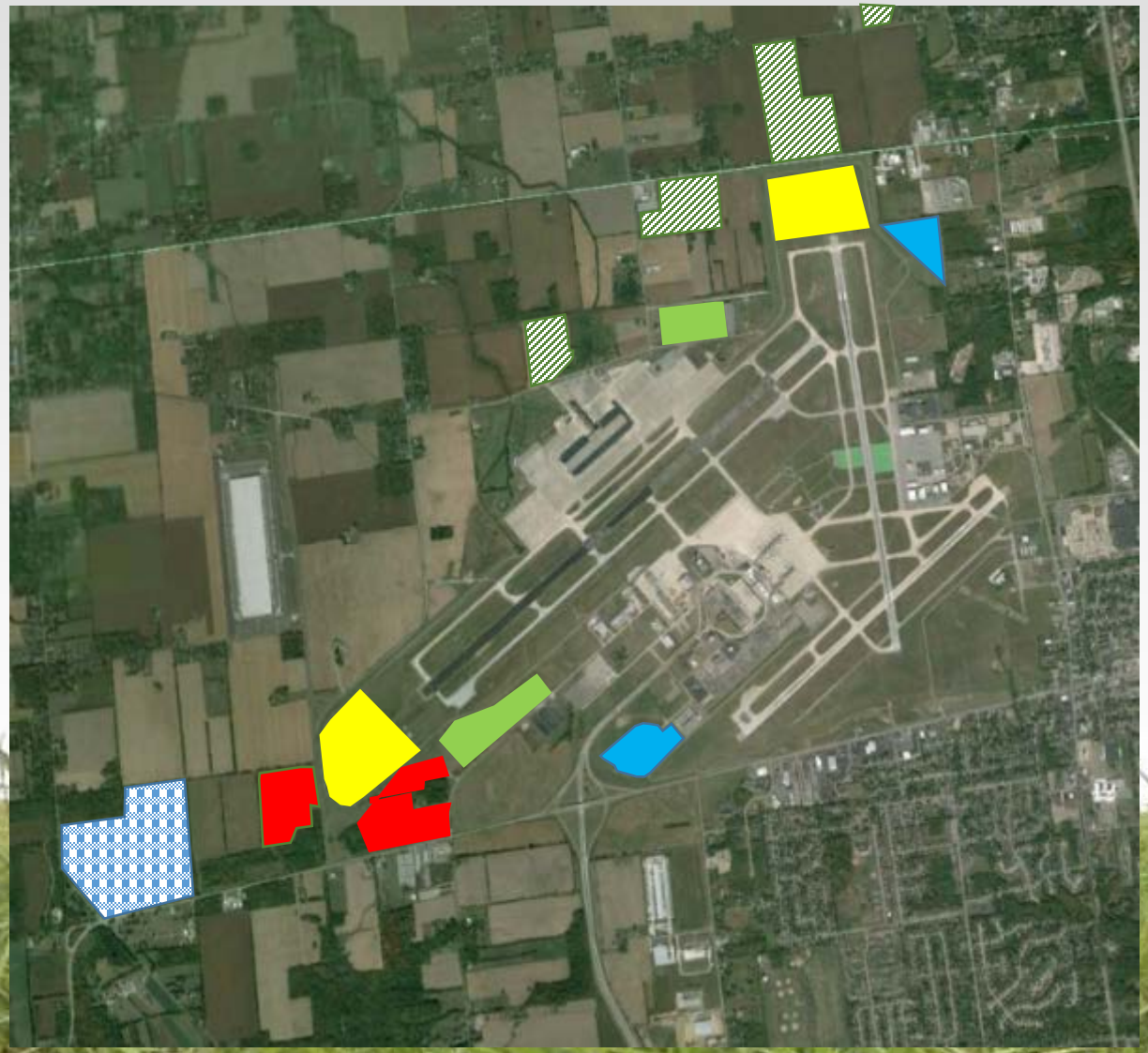
Common Field Management Outside Active Areas



Surrounding Land Covers and Bird Hazards

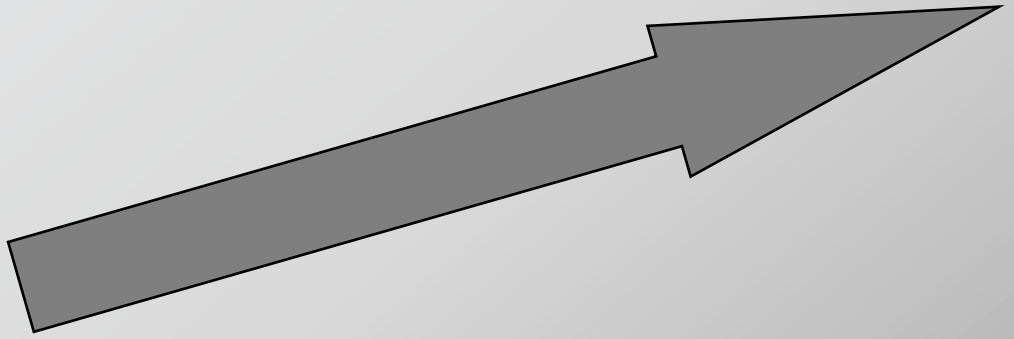


- Switchgrass monoculture
- Airport Grassland outside AOA
- Tall-grass Prairie NEW
- Tall-grass Prairie Knoop Prairie
- Row crop
- Airport Grassland AOA

Can Alternative Land Covers Reduce Bird Hazards?

Why Switchgrass?

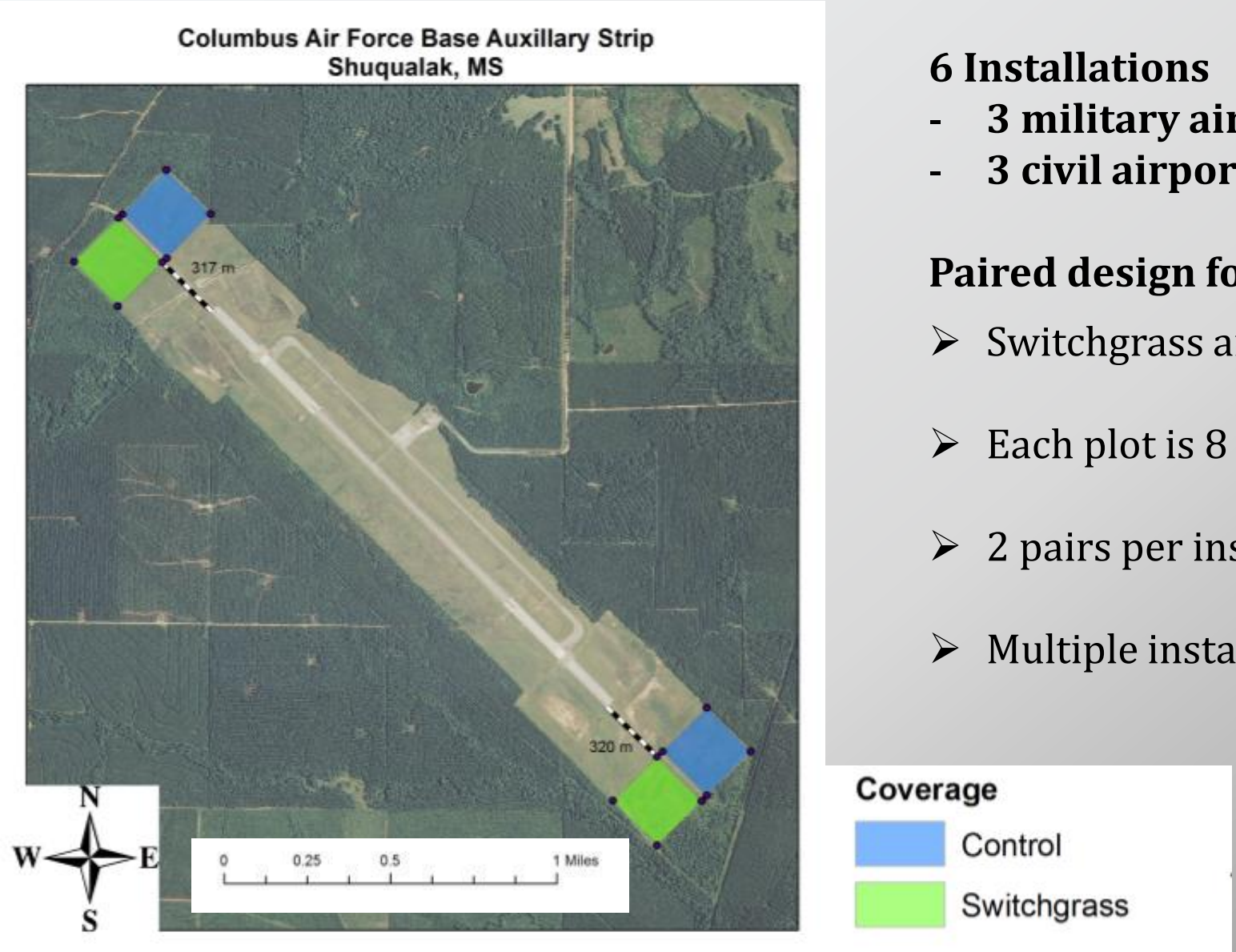
Is there a negative relationship between switchgrass coverage and hazardous bird use?



Switchgrass Coverage (%)

Switchgrass Demonstration Project

Switchgrass Demonstration Project



6 Installations
- **3 military airfields**
- **3 civil airports**

Paired design for each installation

- Switchgrass and control plot pairs
- Each plot is 8 ha
- 2 pairs per installation
- Multiple installations for spatial replication

Point Transects (Counts)

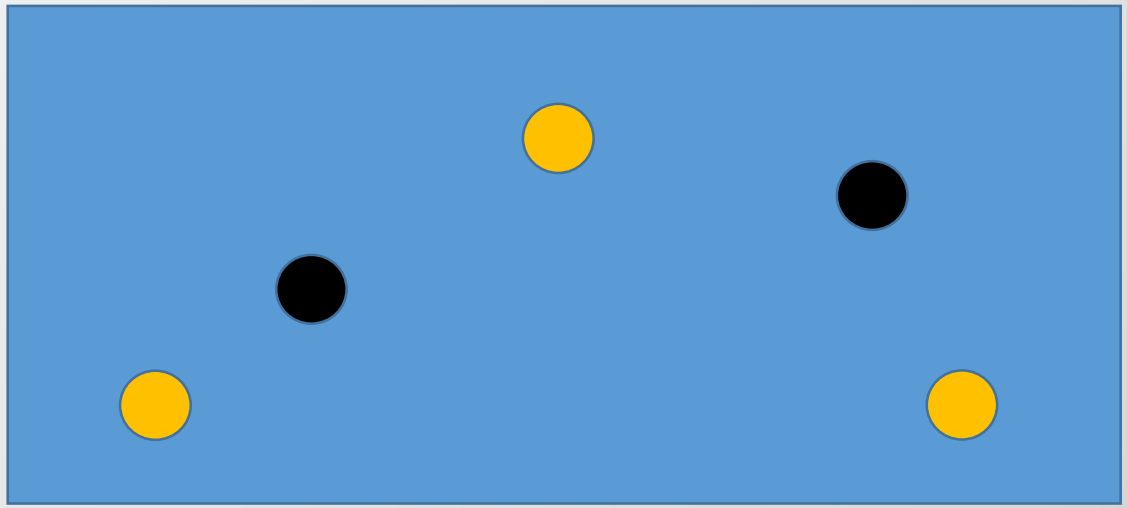
Breeding Season (May-July), 2015-2017

Method

5-minute point counts
3 points per plot
Avoided double counting
Estimated distance and direction to bird

Switchgrass Coverage

October 2015-2017



Switchgrass Establishment

Most sites planted in 2015

- Competition control (glyphosate)
- Seed-drill switchgrass at 9 lbs/acre PLS
- Follow-up competition control (2,4-D, other broadleaf herbicides, and mowing)

Vegetation Changes Over Time

Preparation and Planting Years (2015 and 2016)

Gerald R. Ford International

Columbus Air Force Base

Vegetation Changes Over Time

Early Establishment (2016-2017)

Dayton International Airport

Wright-Patterson Air Force Base

Vegetation Changes Over Time

Early Establishment (2016-2017)

Detroit Metropolitan Airport

NAS Whiting Field

Vegetation Changes Over Time

Established (2018)

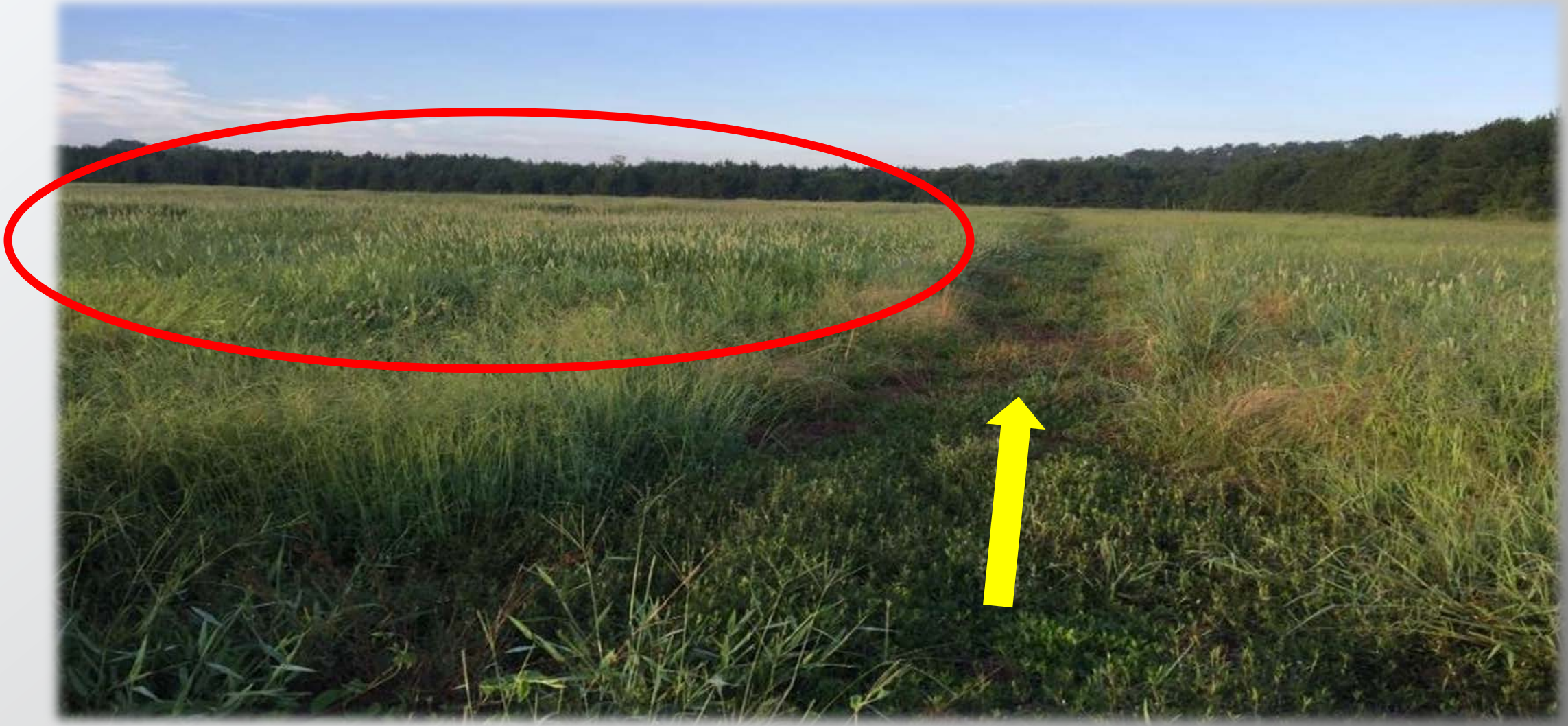
Vegetation Changes Over Time

Established (2018)

Switchgrass Establishment Concerns

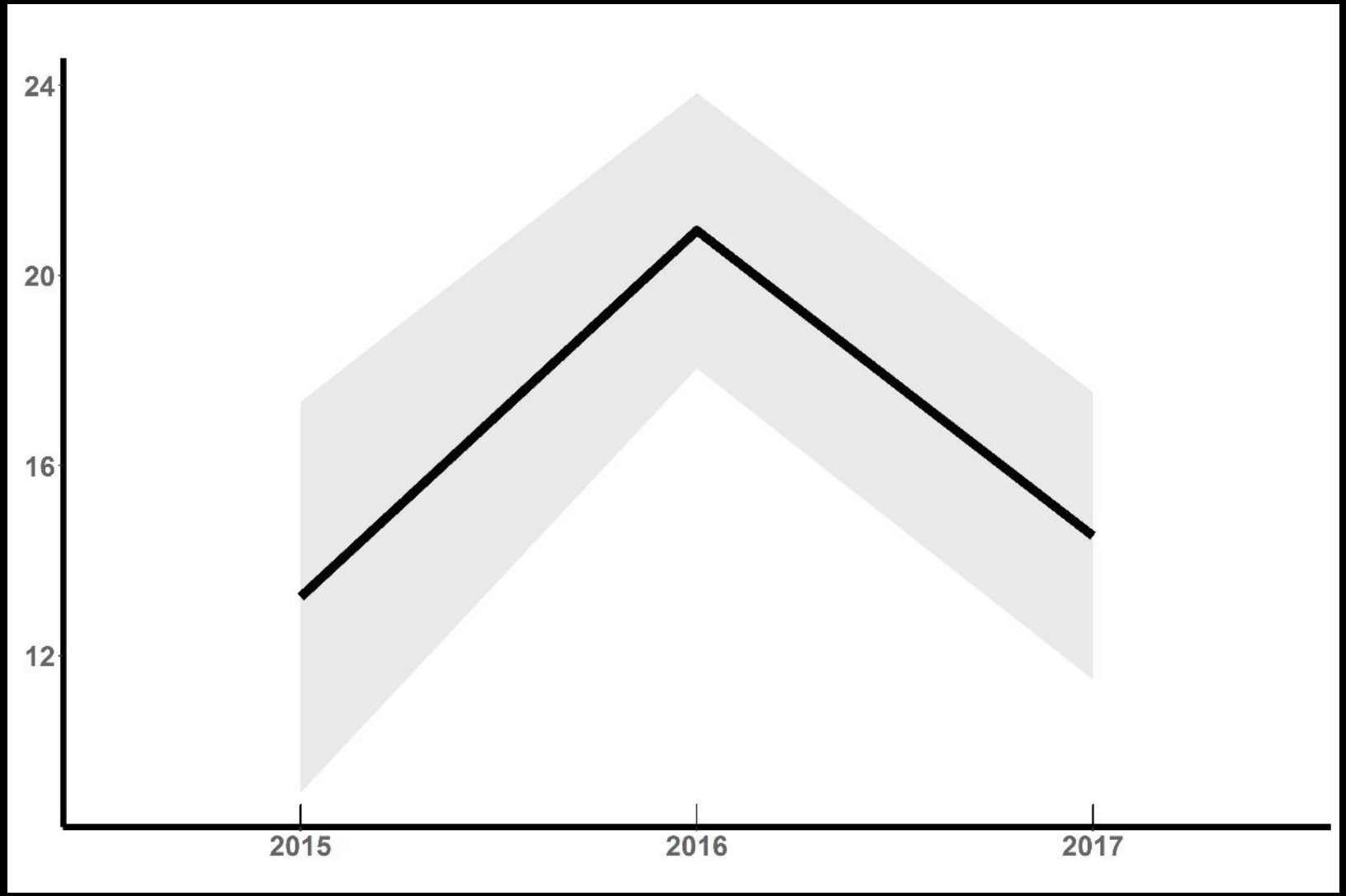
Plant Competition

Columbus Air Force Base 2016



Switchgrass Coverage

Average Switchgrass Coverage (%)



Year

Data Filtering and Analysis

Identified Species

No Flyovers/ Transients

≥ 25 detections

- **81 Total Species reduced to 52 Species**
- **477 point transects reduced to 475**
- **11,996 total birds reduced to 11,856**

Linear Mixed Models with AIC Model Selection

Total Abundance

Cumulative Hazard Score

(DeVault et al. 2011, 2018)

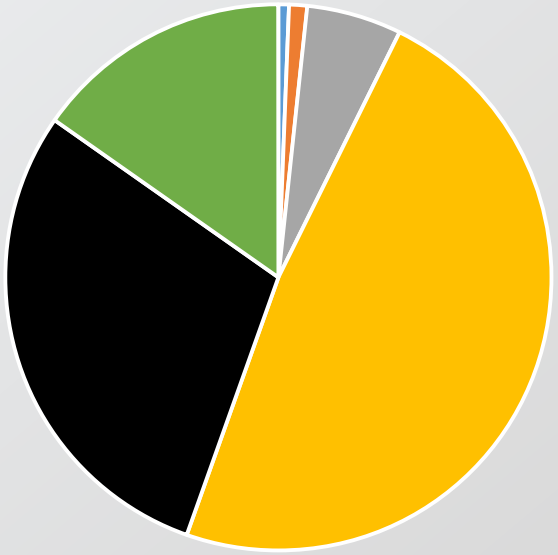
Hazard Category

(Dolbeer and Wright 2009)

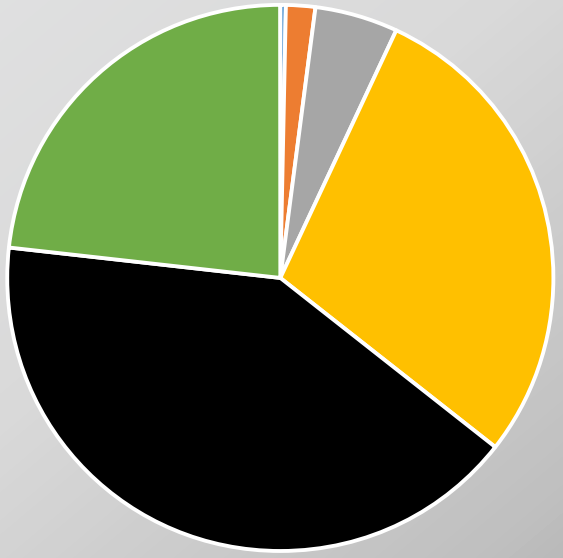
Hazard Categories

Year	Extremely High	Very High	High	Moderate	Low	Very Low
2015	1%	1%	6%	48%	29%	15%
2016	0%	2%	5%	29%	41%	23%
2017	0%	1%	3%	21%	48%	27%

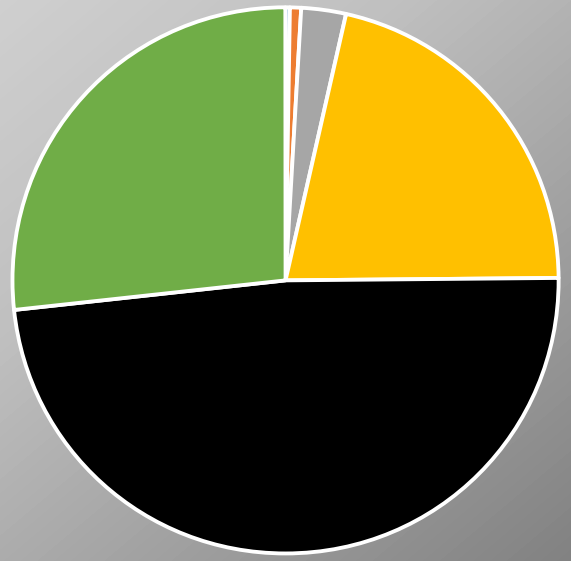
2015



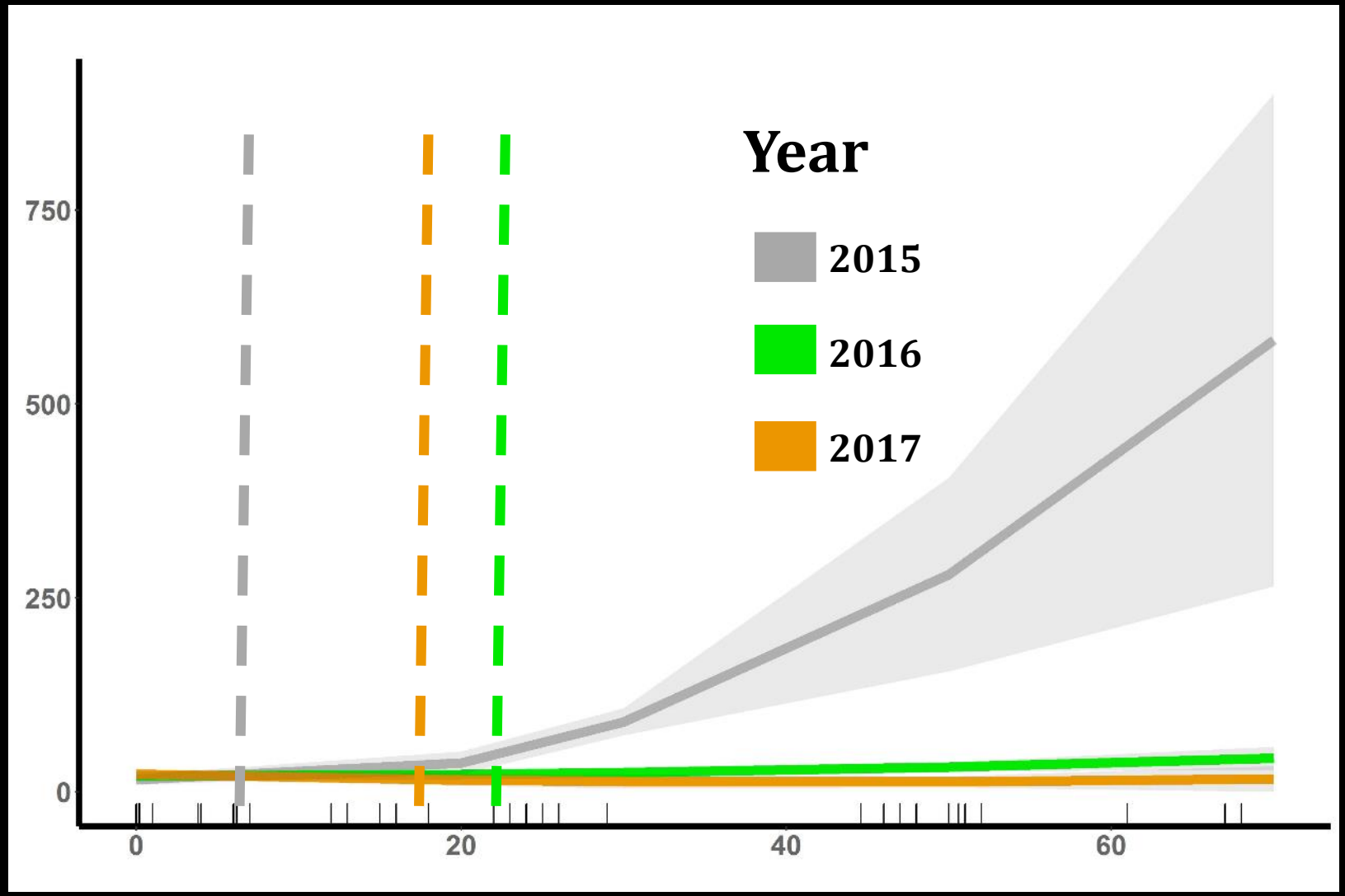
2016



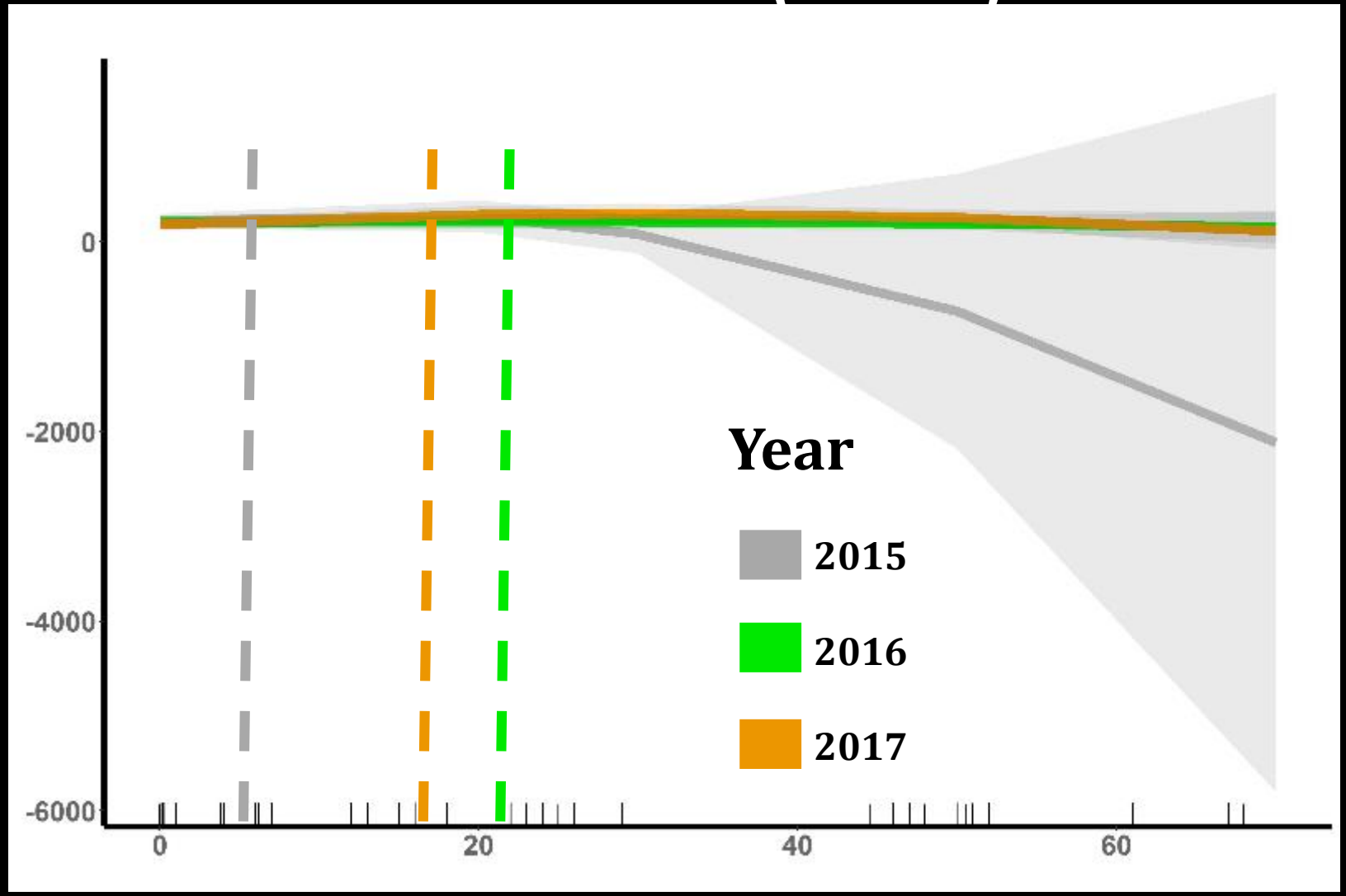
2017



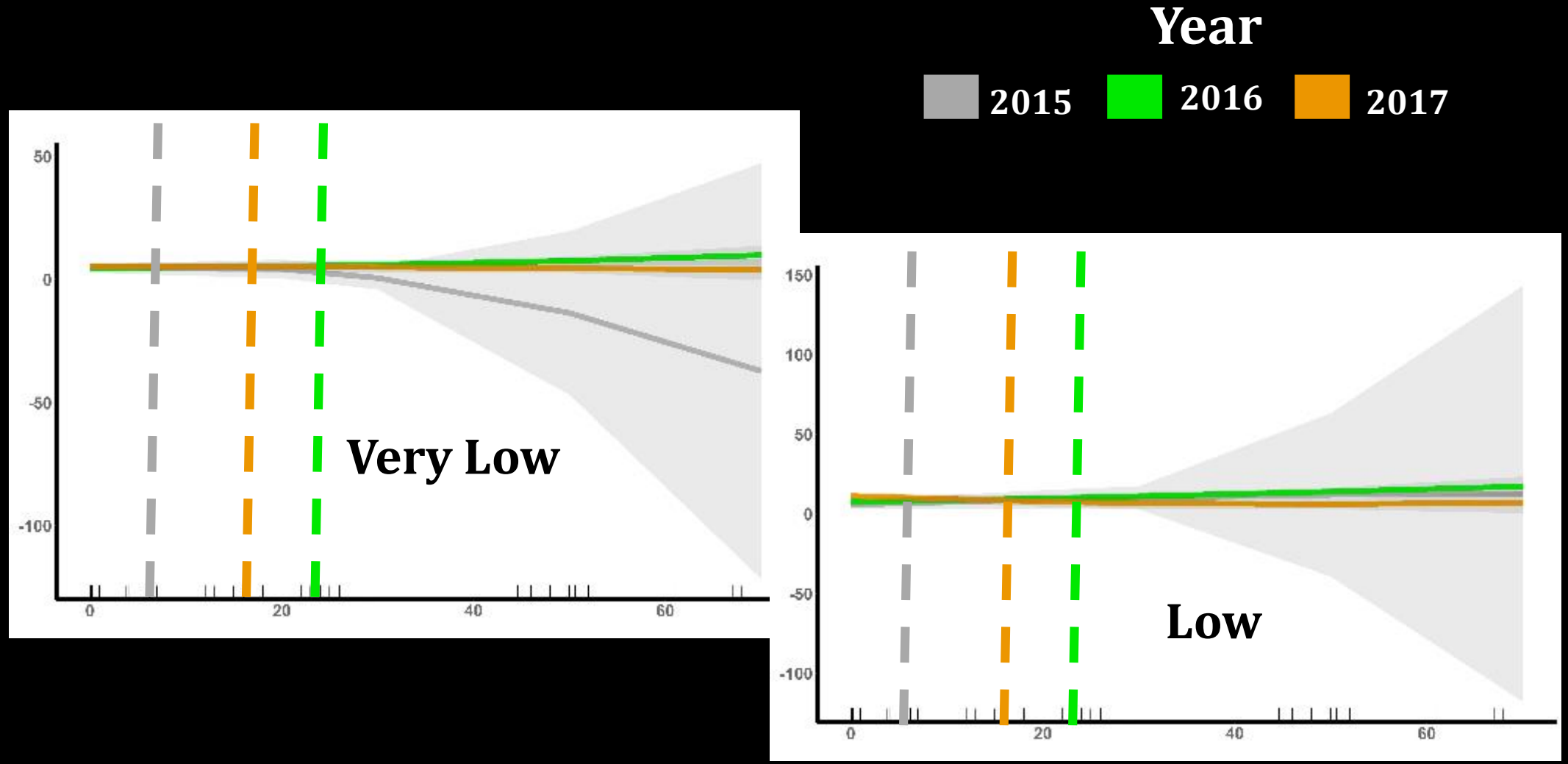
Total Abundance



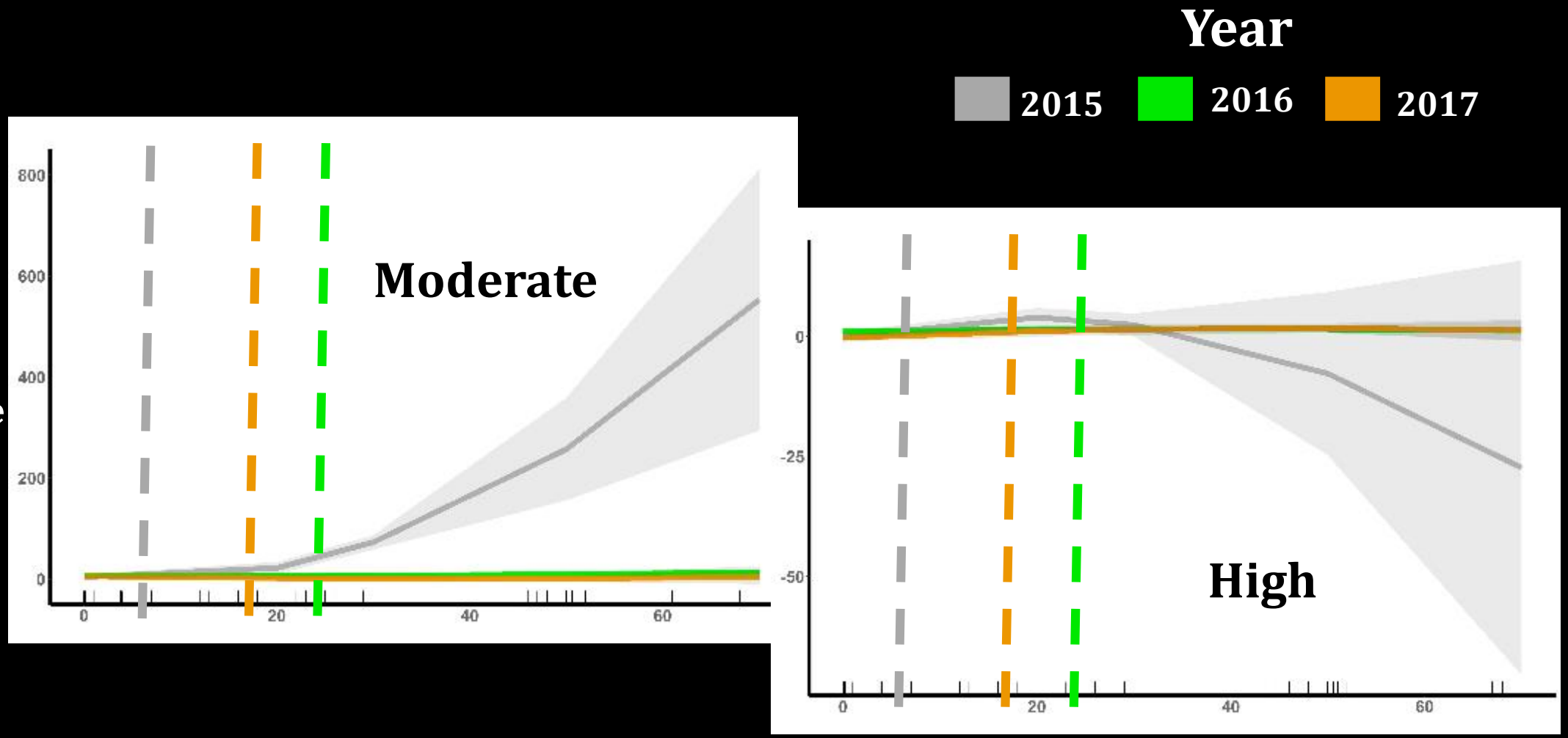
Cumulative Hazard Score (CHS)



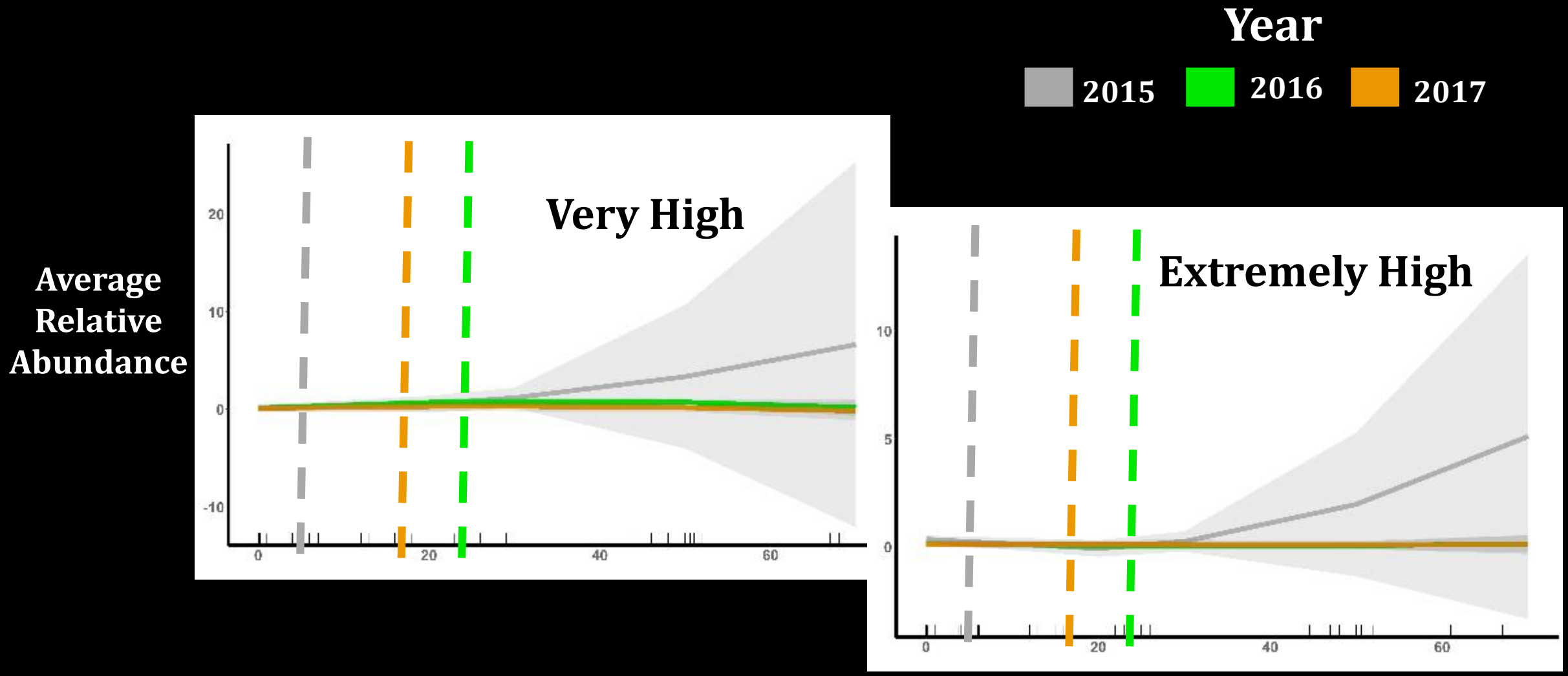
Lower-Level Hazard Categories



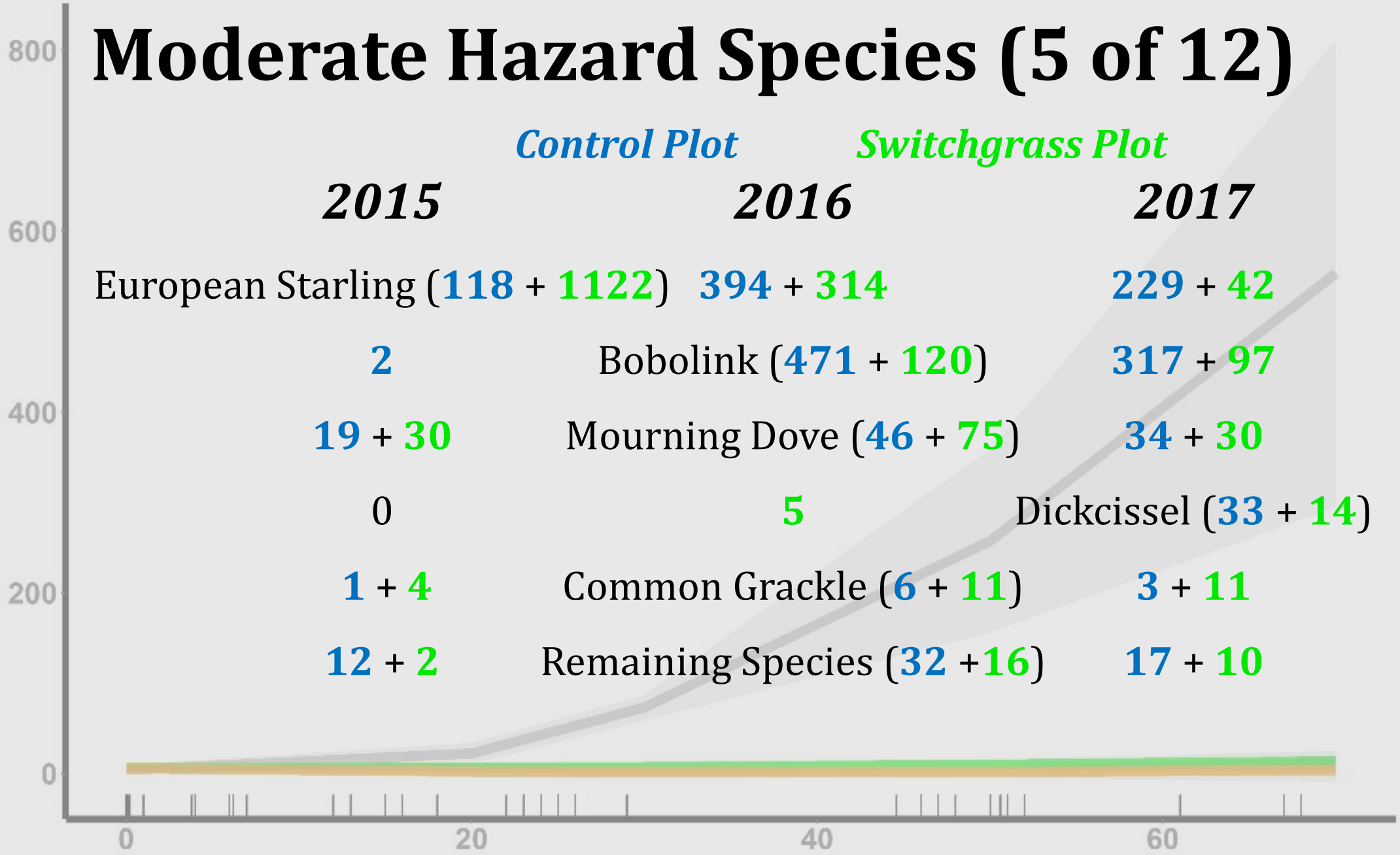
Medium-Level Categories



High-Level Hazard Categories

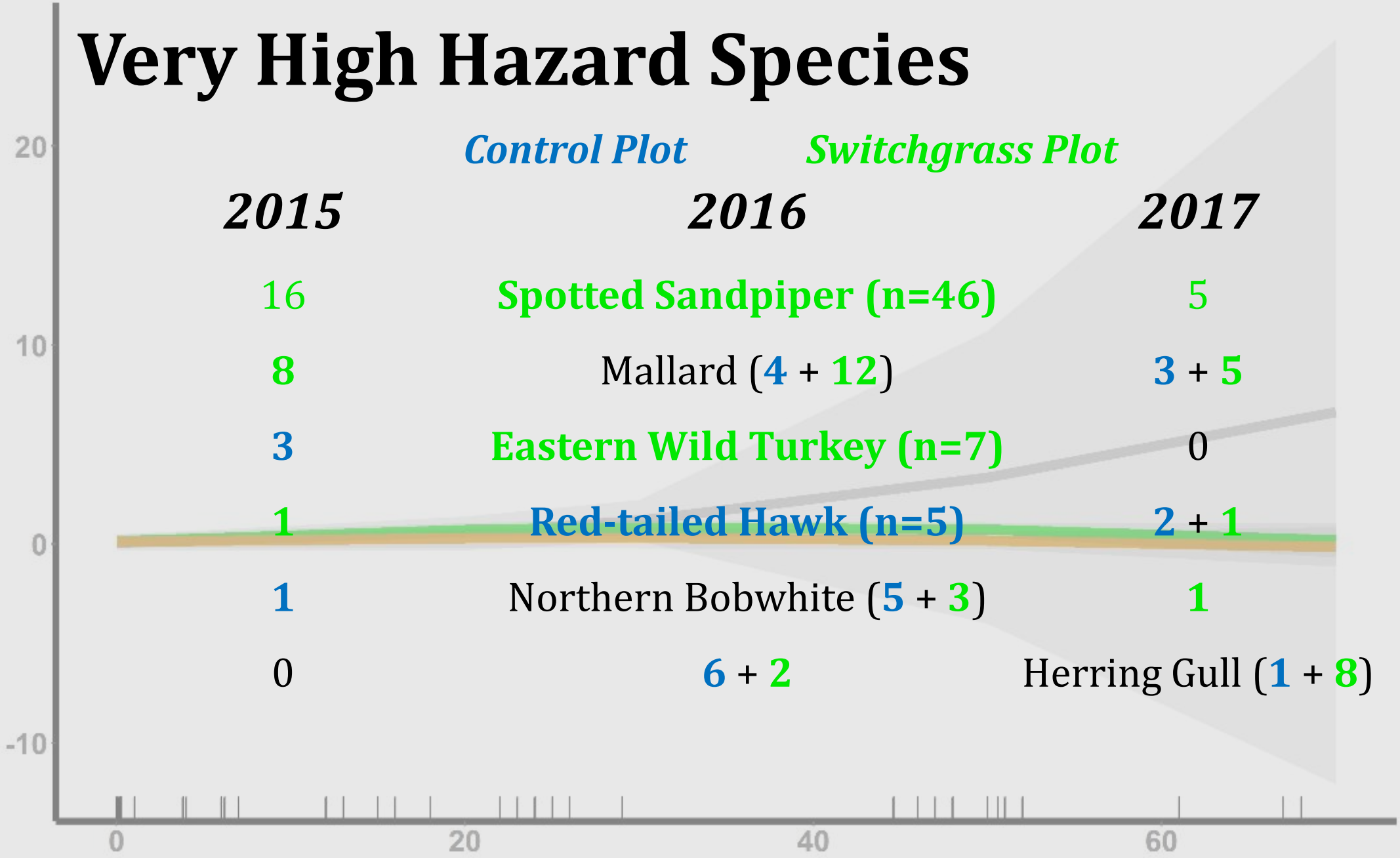


Moderate Hazard Species (5 of 12)



	Control Plot	*Switchgrass Plot*
	2015	***2016***	***2017***
European Starling (**118** + **1122**)	**394** + **314**	**229** + **42**
2	Bobolink (**471** + **120**)	**317** + **97**
19 + **30**	Mourning Dove (**46** + **75**)	**34** + **30**
0	**5**	Dickcissel (**33** + **14**)
1 + **4**	Common Grackle (**6** + **11**)	**3** + **11**
12 + **2**	Remaining Species (**32** +**16**)	**17** + **10**

Very High Hazard Species



Control Plot		*Switchgrass Plot*
2015	***2016***	***2017***
16	**Spotted Sandpiper (n=46)**	5
8	Mallard (**4** + **12**)	**3** + **5**
3	**Eastern Wild Turkey (n=7)**	0
1	**Red-tailed Hawk (n=5)**	**2** + **1**
1	Northern Bobwhite (**5** + **3**)	**1**
0	**6** + **2**	Herring Gull (**1** + **8**)

Extremely High Hazard Species

	Control Plot	*Switchgrass Plot*
2015	***2016***	***2017***
Canada Goose (*n*=12)	**4**	**2**
4 + **1**	Turkey Vulture (**10** + **3**)	**5** + **3**

Other Costs and Benefits

Management Cost *vs.* *Haying*

Wright-Patterson Air Force Base

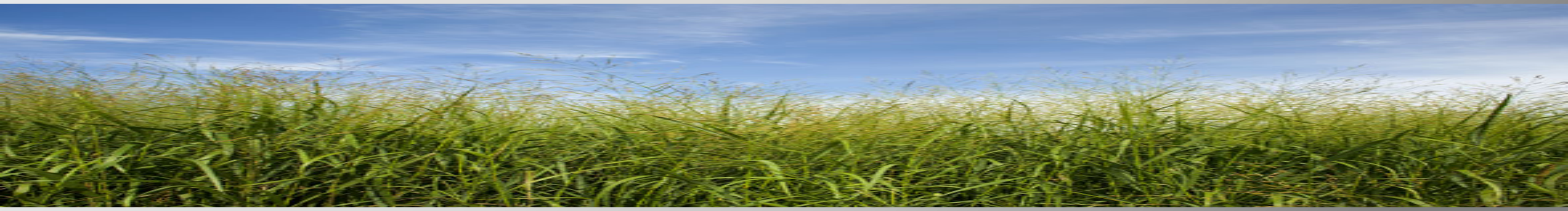
Switchgrass Seed ($3,200)	291 bales, both plots
Site Prep and Planting ($7,100)	80 X 88 X 244 cm (31.5” X 34.5” X 96”)
Mowing ($1,410)	
Competition Control ($5,510)	At $30 per bale: ~ $546 per ha (~$221 per acre)
Total: $17,220	**$8,736**

Across All Sites: Avg. $11,695.75

Range $7,800-17,220

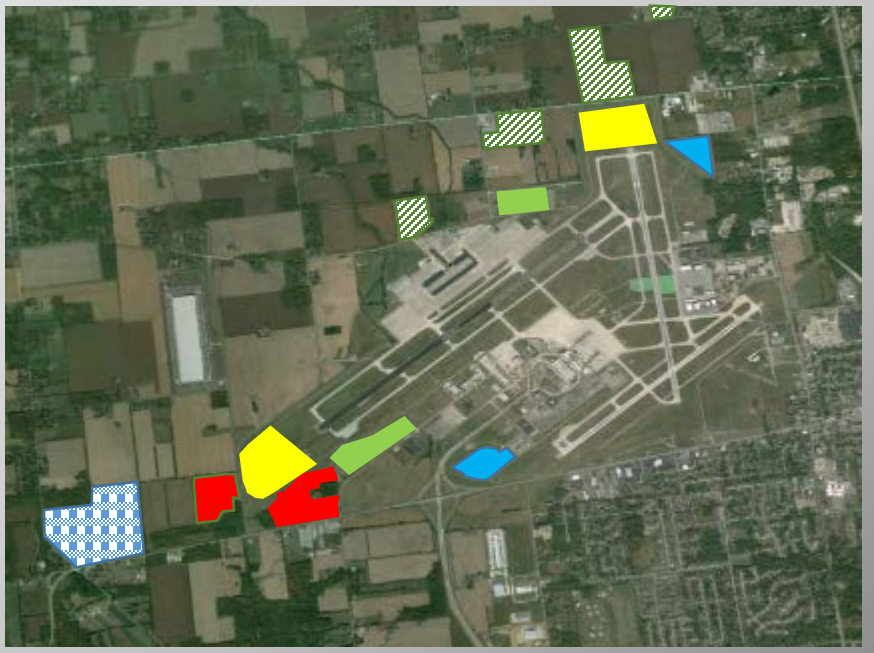
Conclusions

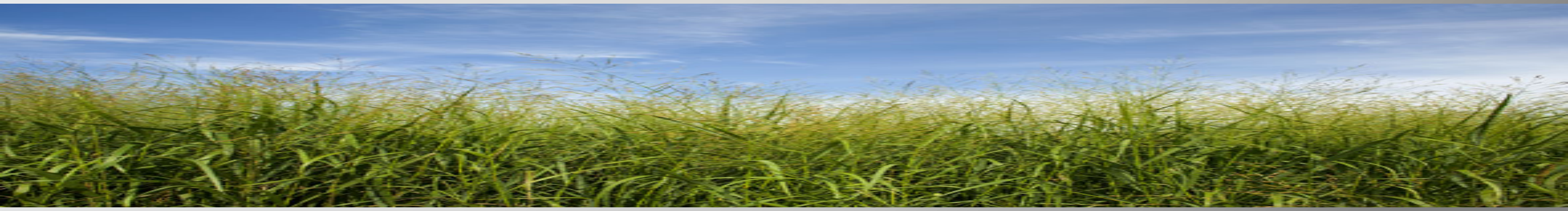
- Switchgrass establishment can cause high variability in bird responses
- Low mitigation potential during first 3 growing seasons
- Alternative income benefits could be realized by the 3rd growing season
- Long-term outlook is promising for maintained switchgrass monocultures but still unknown



Future Considerations

- Concomitant bird use comparisons among multiple land cover types
- Flock sizes and species-specific responses
- Non-breeding season birds and mammals
- Every airfield/airport is unique





Special Thanks

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Data collection would not be possible without the help and support of all airport and airfield installations and the airport biologists and technicians on the ground

Jeff Pelc, Gary Ludwig, John Hummel, Buck Jolley, Aaron Bowden, Paul Siegal, Brian Kirby, Sam Gibson, Lann Wilf

Questions

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