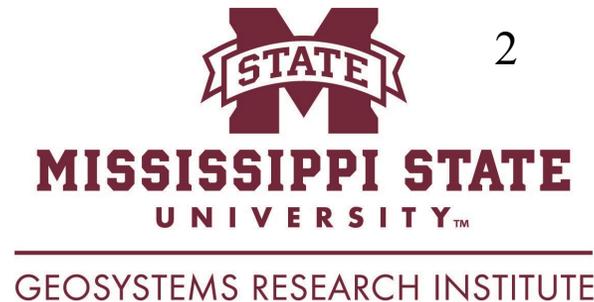


Controllable factors affecting accuracy of human identification of birds in images obtained during UAS surveys



Landon R. Jones¹, Jared A. Elmore¹, Santhana Krishnan Boopalan², Emma A. Schultz¹,
Kristine O. Evans¹, Morgan B. Pfeiffer³, Sathish Samiappan², Bradley F. Blackwell³, and Raymond B. Iglay¹



UAS or Drones





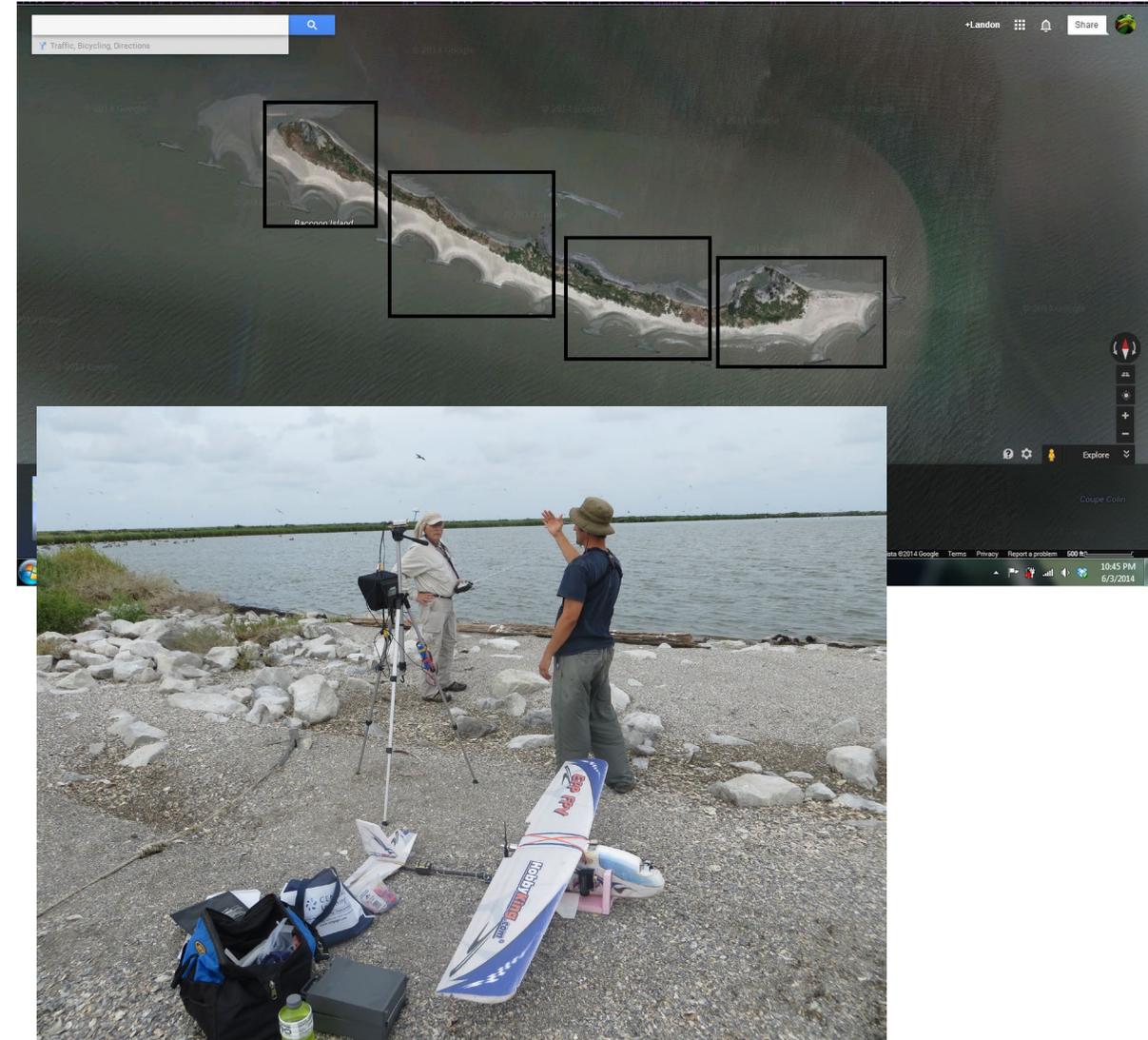
Many advantages



Most UAS applications are specific



What are best practices for surveying wildlife with drones?



What variables affect animal identification and counts by human observers?



What variables affect animal identification and counts by human observers?



How should we fly UAS to best identify and count wildlife species?



How should we fly UAS to best identify and count wildlife species?



Variables controlled by the pilot:

- Altitude
- Camera angle
- Time of day

Altitude, Ground Sampling Distance

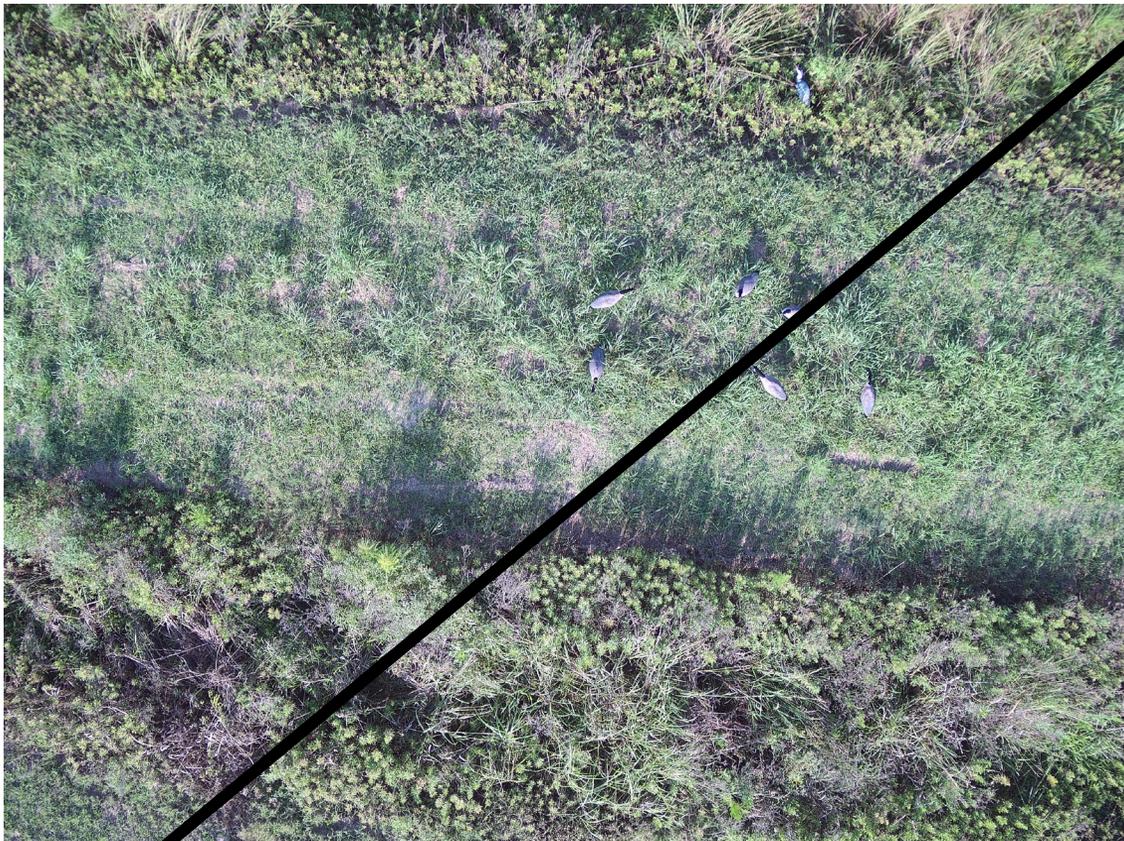


50 feet (15m)



200 feet (61m)

Altitude (GSD)

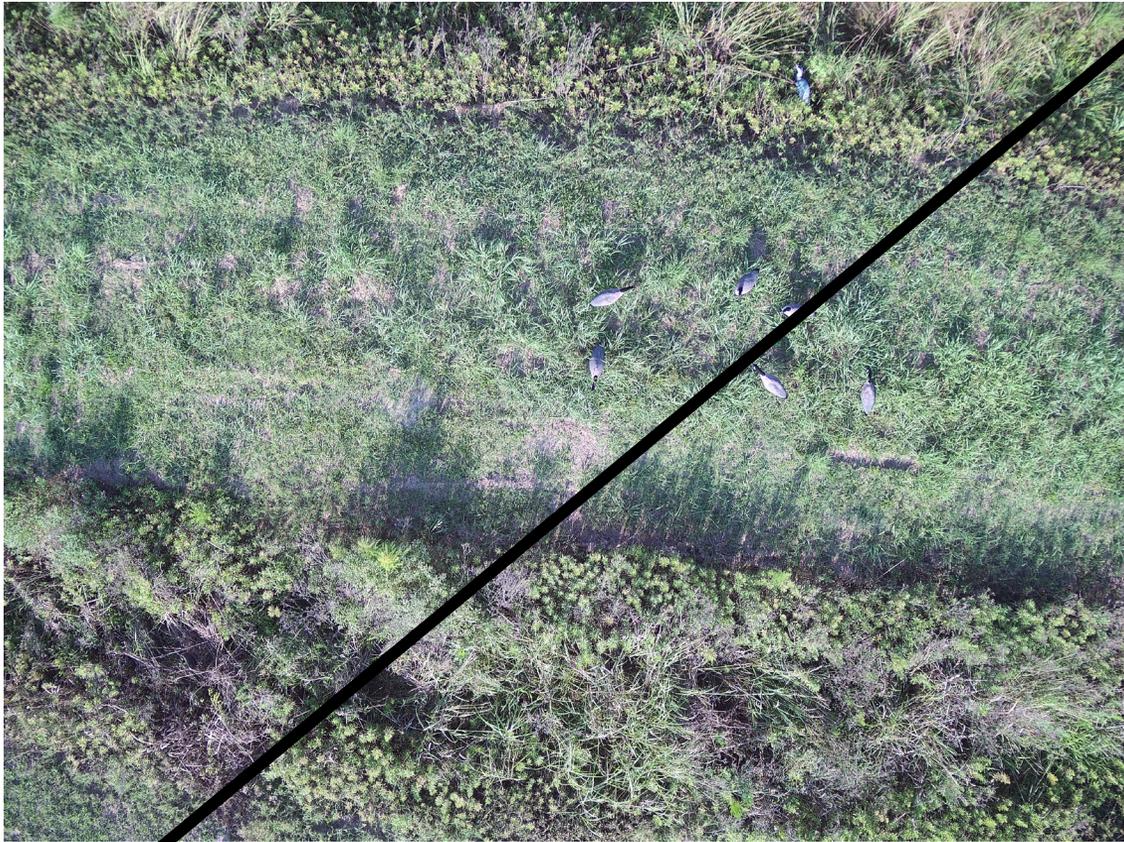


50 feet (15 m)



200 feet (61 m)

Altitude (GSD)



50 feet (15 m)



200 feet (61 m)

Camera angle



45°



90°

Time of Day



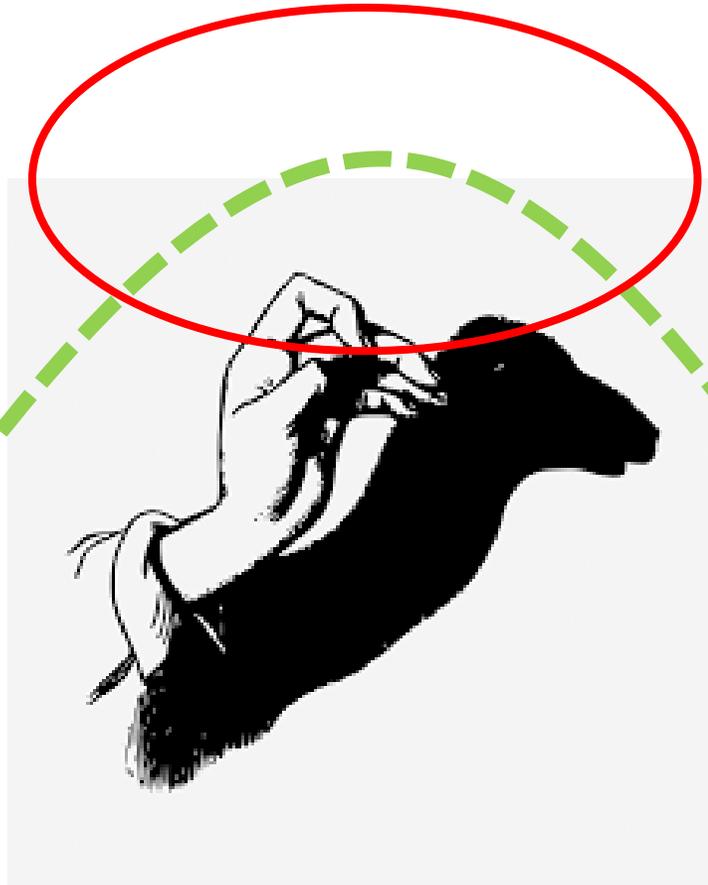
Time of Day



Time of Day



Time of Day



Time of Day



Decoy Species



Methods: field site



Methods: UAS



DJI M200, XT2 RGB camera



Methods: Variables

Controllable UAS factors

- 4 altitudes
 - 50 feet (15m)
 - 100 feet (30 m)
 - 150 feet (46 m)
 - 200 feet (61 m)
- 2 camera angles
 - 45°, 90°
- 3 times of day (shadows)
 - Morning
 - Midday
 - Afternoon



Methods: Human Observers

DotDotGoose [v 1.5.2] - Center for Biodiversity and Conservation (http://cbc.amnh.org)

Survey Id: decoy_UAS_params_key_300dpi

Hide Image Data / Custom Fields

Classes

Class	Color
coyote	Black
crow	Red
deer	Blue
dove	Green
goose	Cyan
heron	Purple
owl	Orange
pigeon	Pink

Delete Add

Summary

Image	Count
> Slide123.JPG	
> Slide124.JPG	
> Slide125.JPG	
> Slide126.JPG	
> Slide127.JPG	
> Slide128.JPG	
> Slide129.JPG	
> Slide13.JPG	
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> Slide132.JPG	
> Slide133.JPG	
> Slide134.JPG	
> Slide135.JPG	
> Slide136.JPG	
▼ Slide137.JPG	

15 Point Radius Display

200 Grid Size Display

Load Save

Import Reset

Counts Points Chips

10 wildlife ID expert graders



Image Data

X:

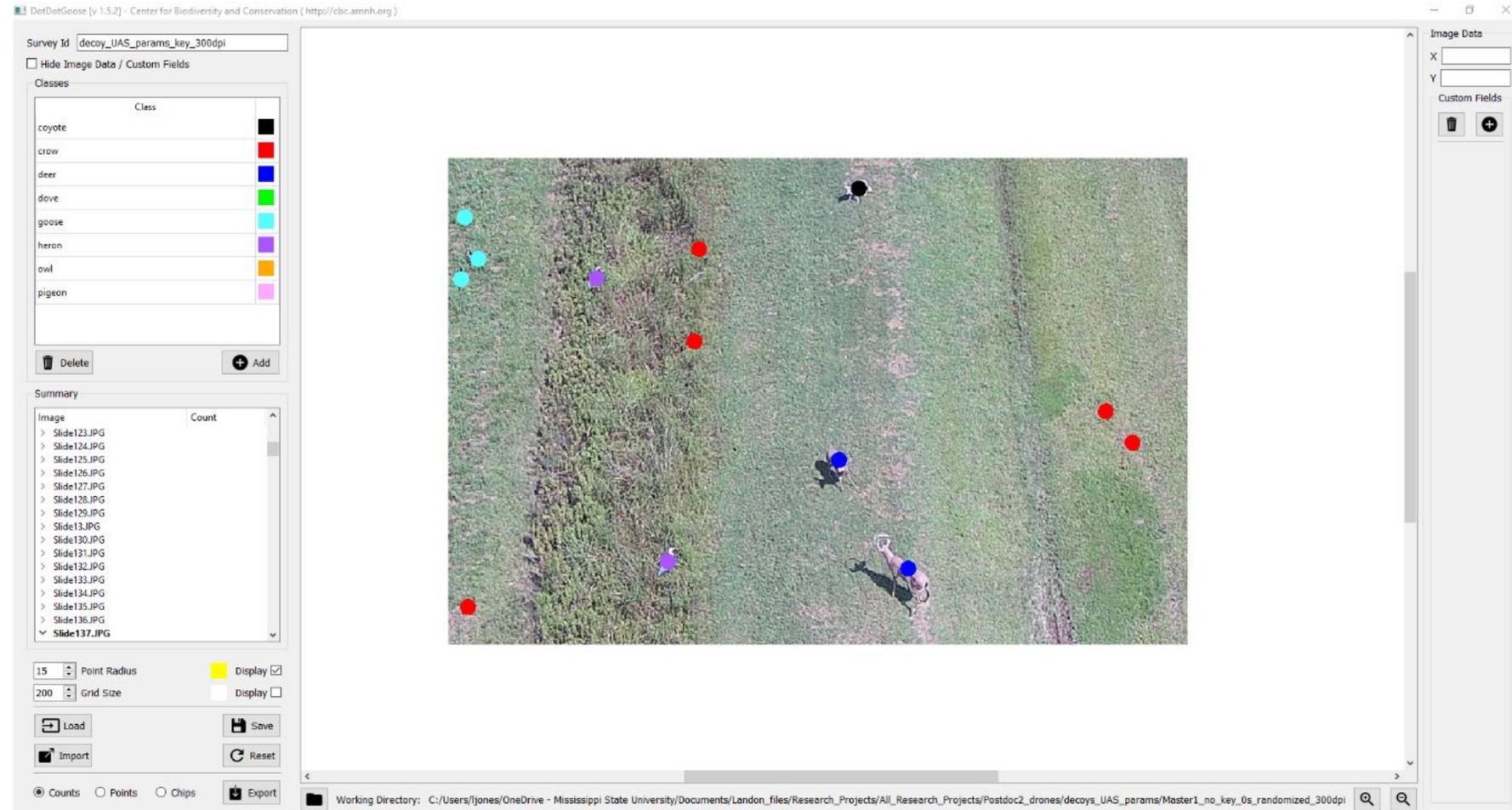
Y:

Custom Fields

Working Directory: C:/Users/fjones/OneDrive - Mississippi State University/Documents/Landon_files/Research_Projects/All_Research_Projects/Postdoc2_drones/decoys_UAS_params/Master1_no_key_0s_randomized_300dpi

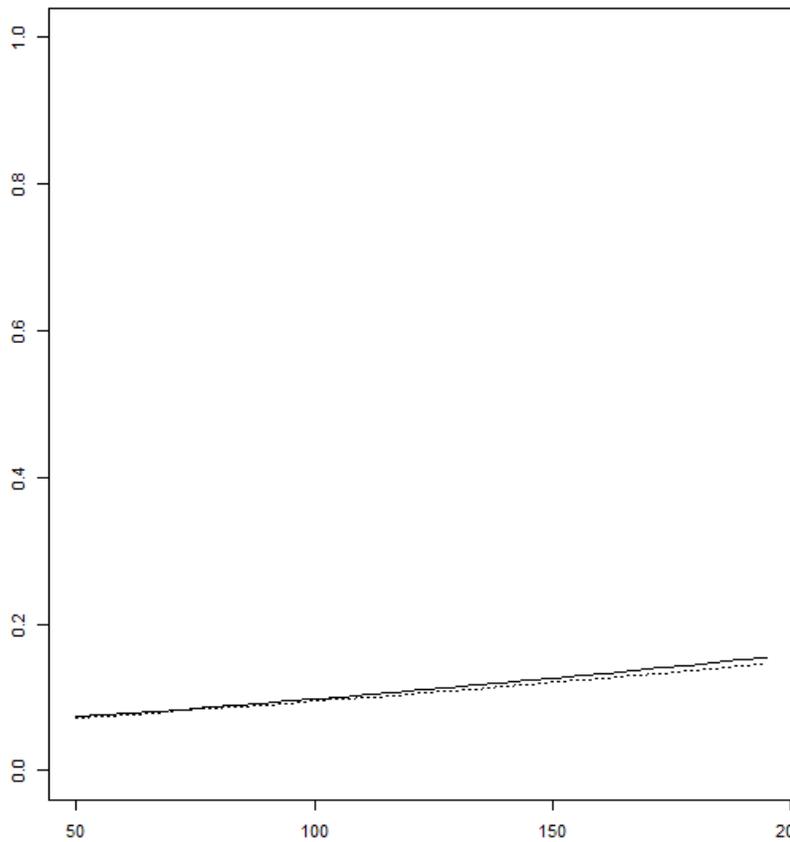
Methods: Human Observers

- Statistics
 - Inaccuracy for each photo
 - Variables
 - Altitude
 - Camera angle
 - Time of day
 - GLMM
 - Observer as a random effect
- Species patterns
 - Confused
 - Missed
 - Added

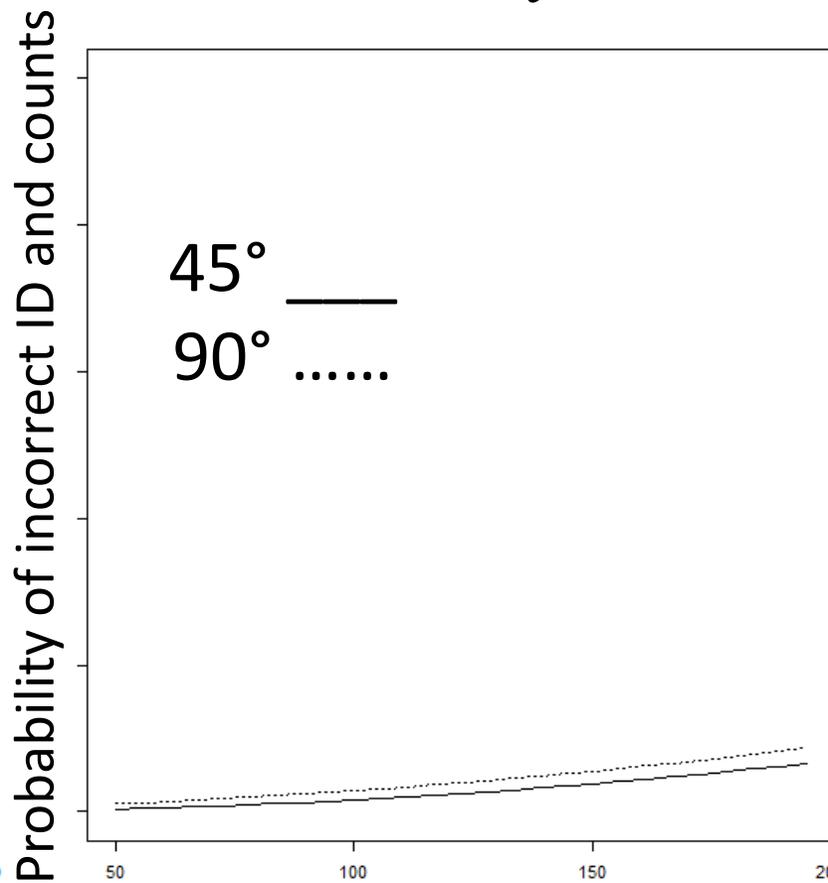


Results: 3-way interaction

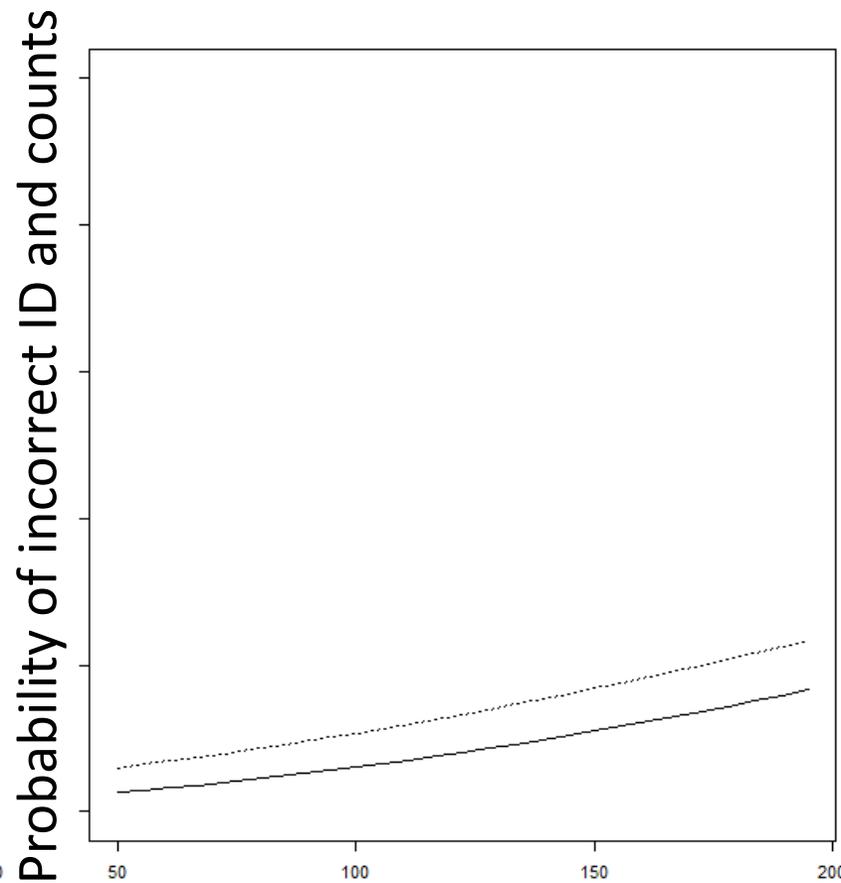
Morning



Midday



Afternoon



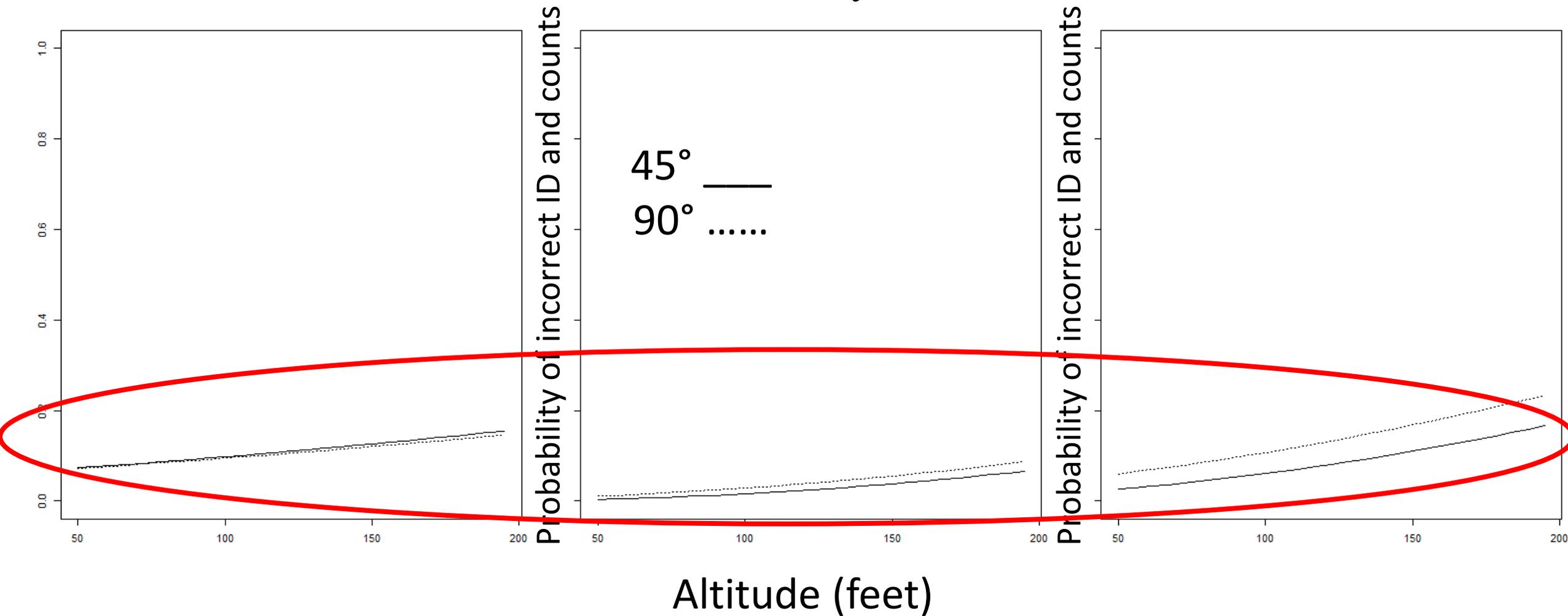
Altitude (feet)

Results: altitude

Morning

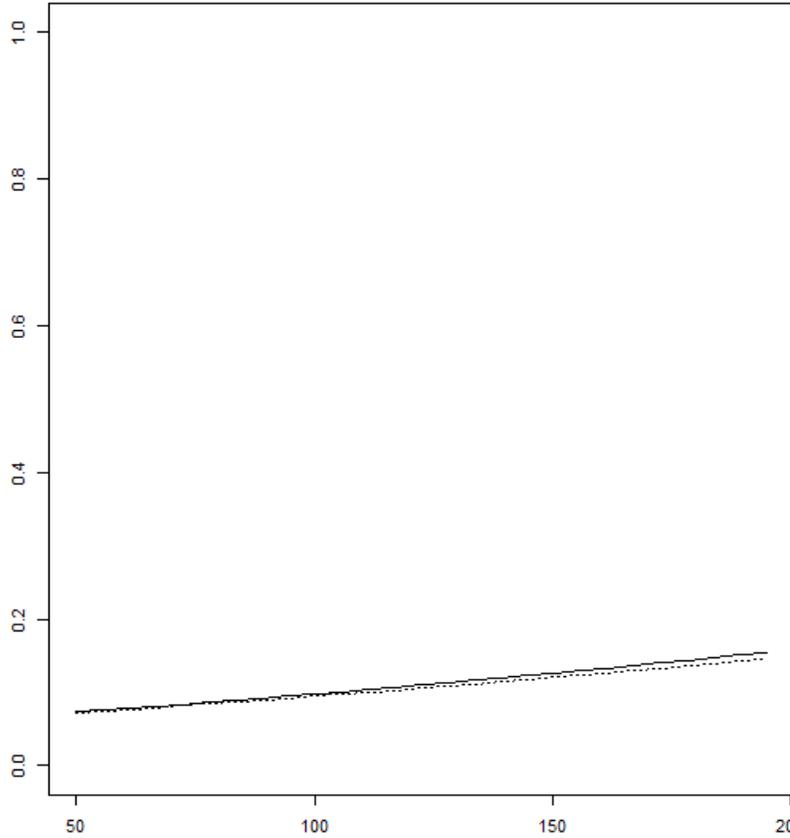
Midday

Afternoon

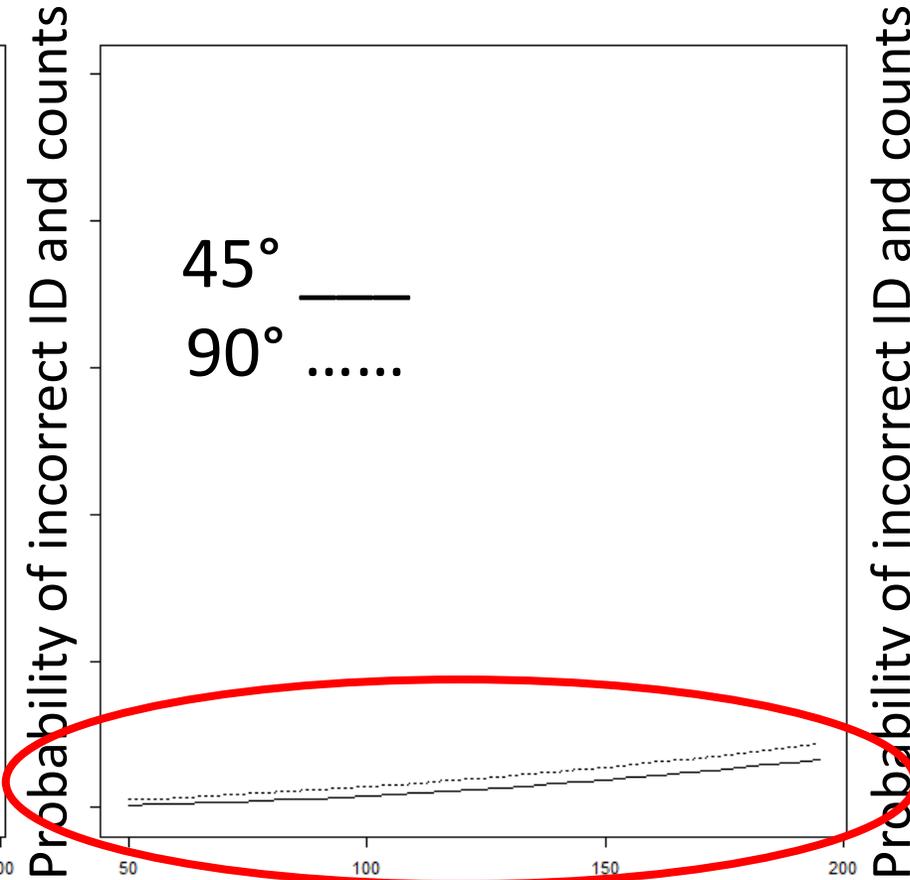


Results: time of day

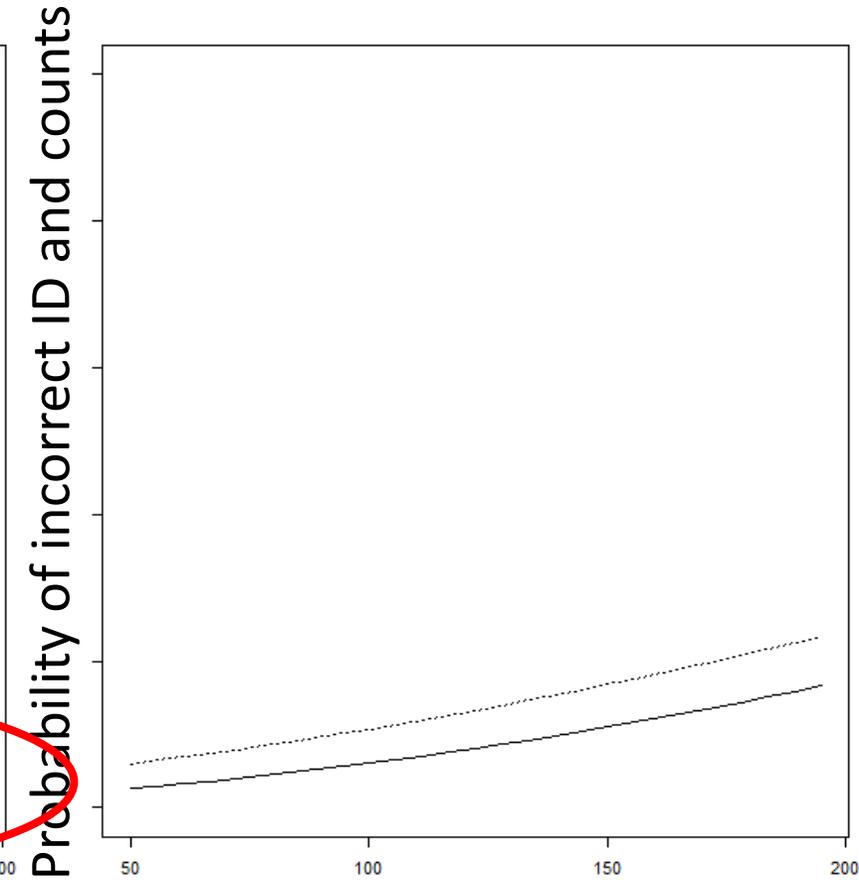
Morning



Midday



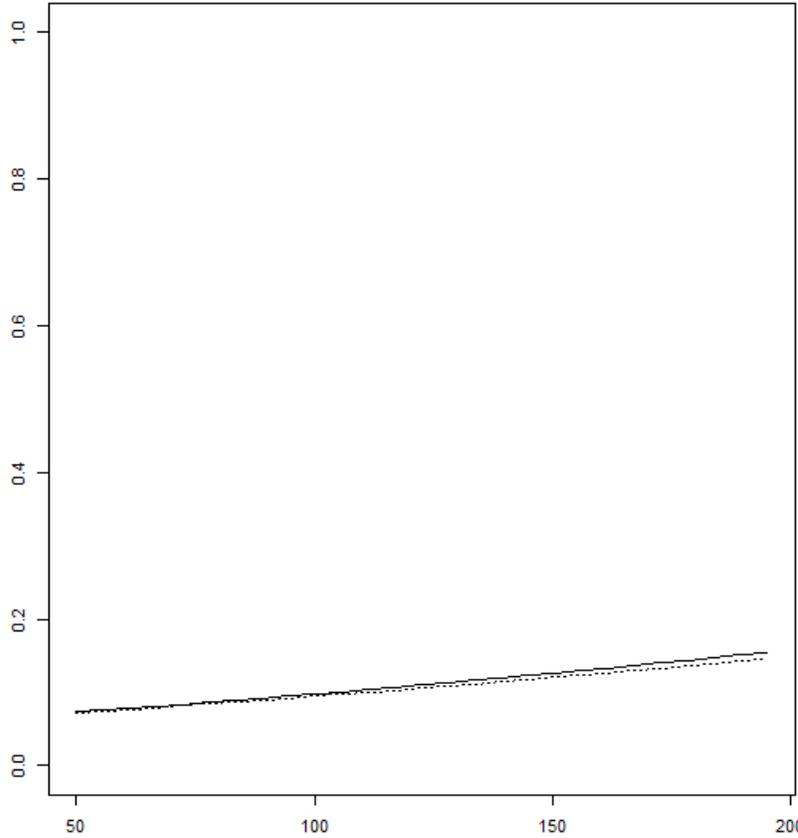
Afternoon



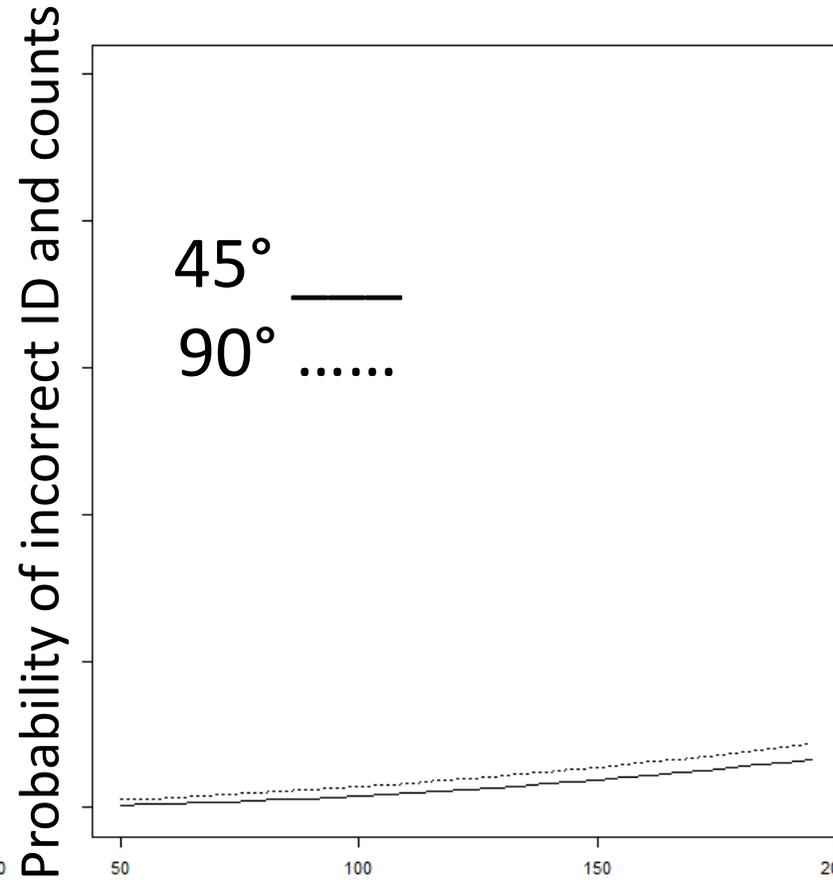
Altitude (feet)

Results: camera angle

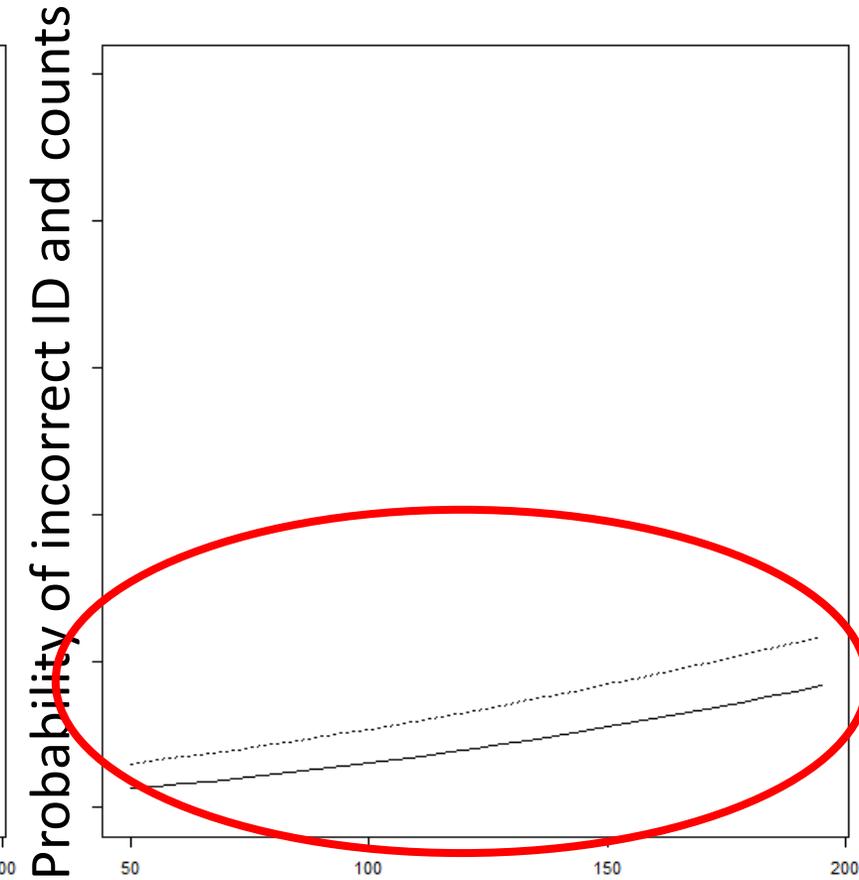
Morning



Midday



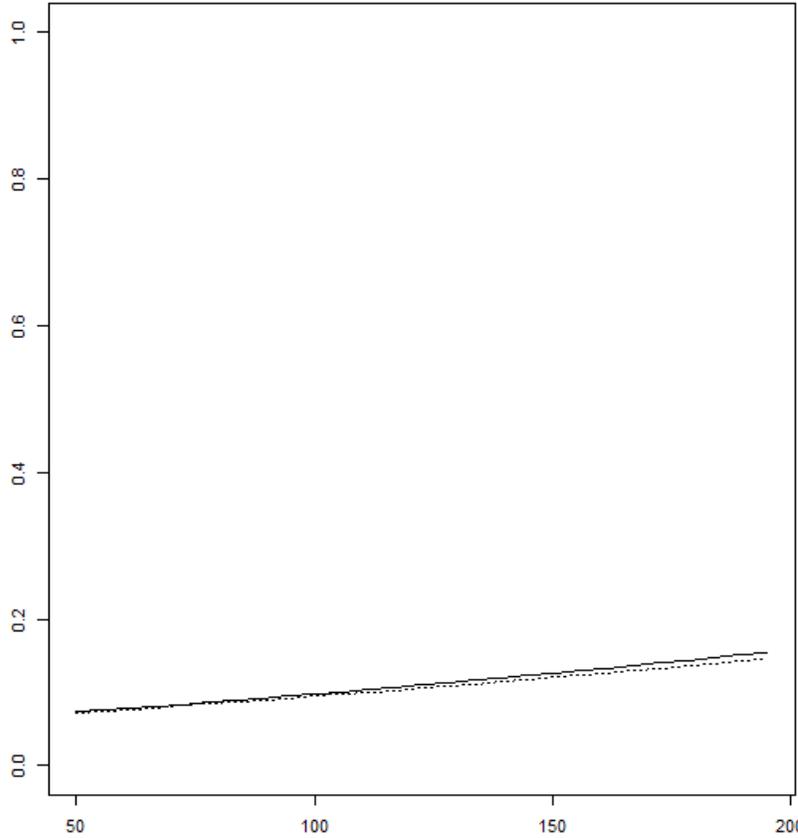
Afternoon



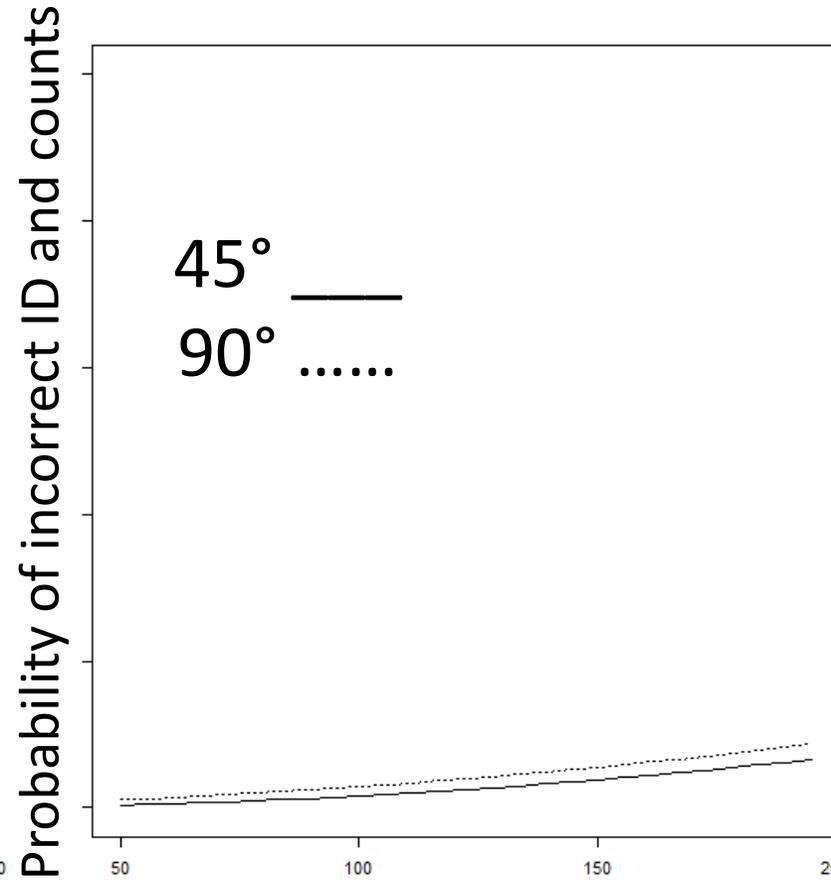
Altitude (feet)

Results: camera angle

Morning



Midday

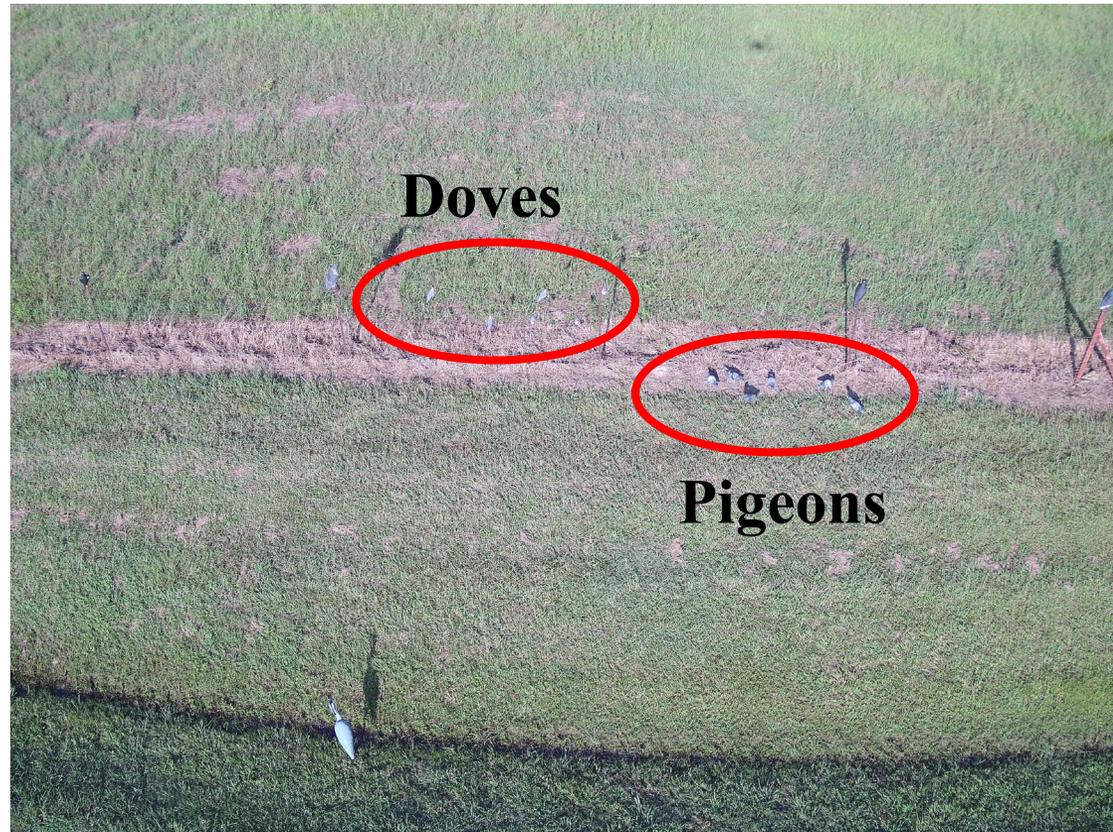
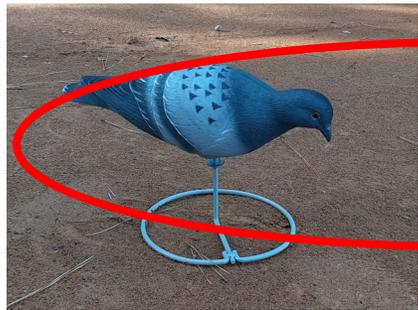


Afternoon



Altitude (feet)

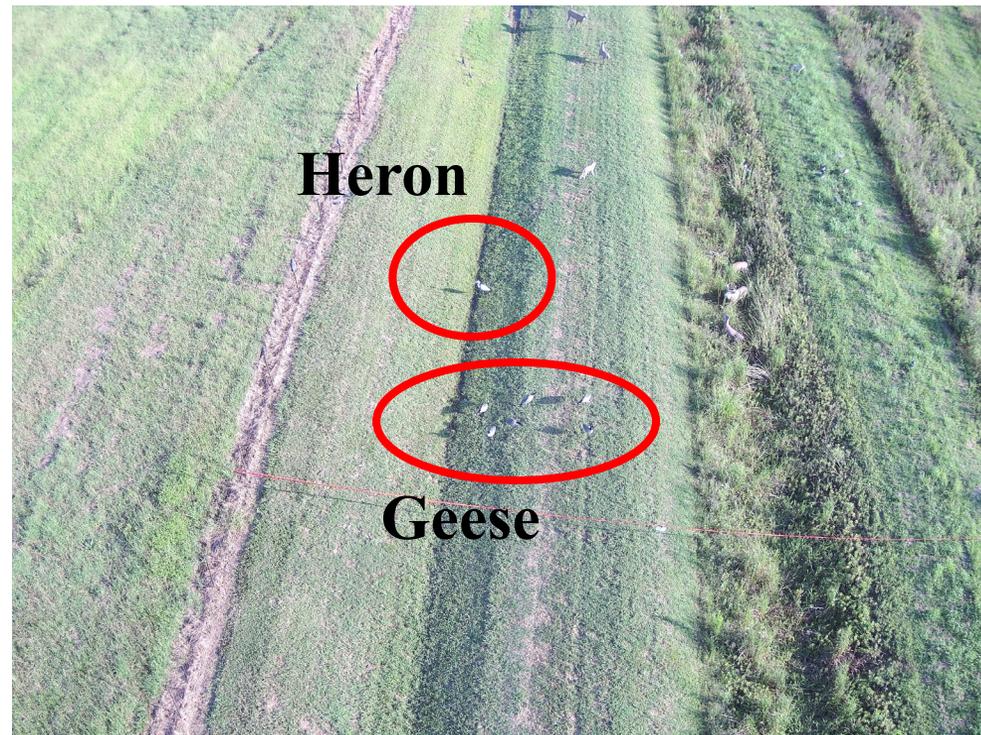
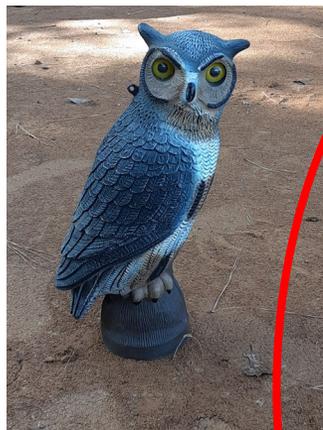
Results: Species Patterns



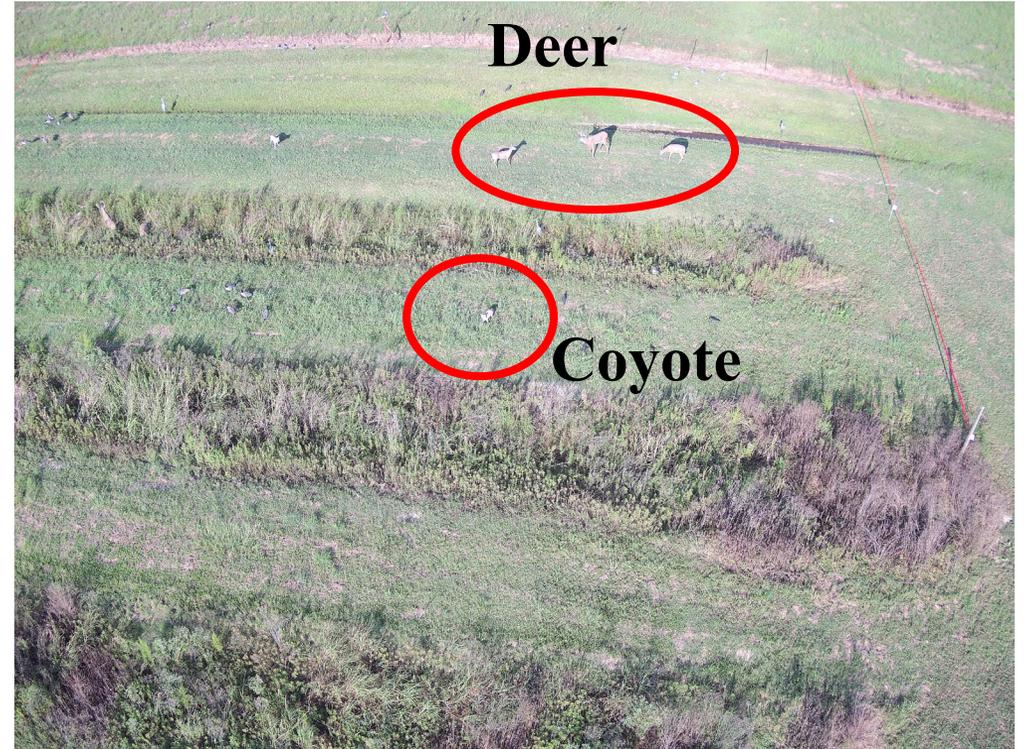
Results: Species Patterns



Results: Species Patterns



Results: Species Patterns



Recommendations: Altitude



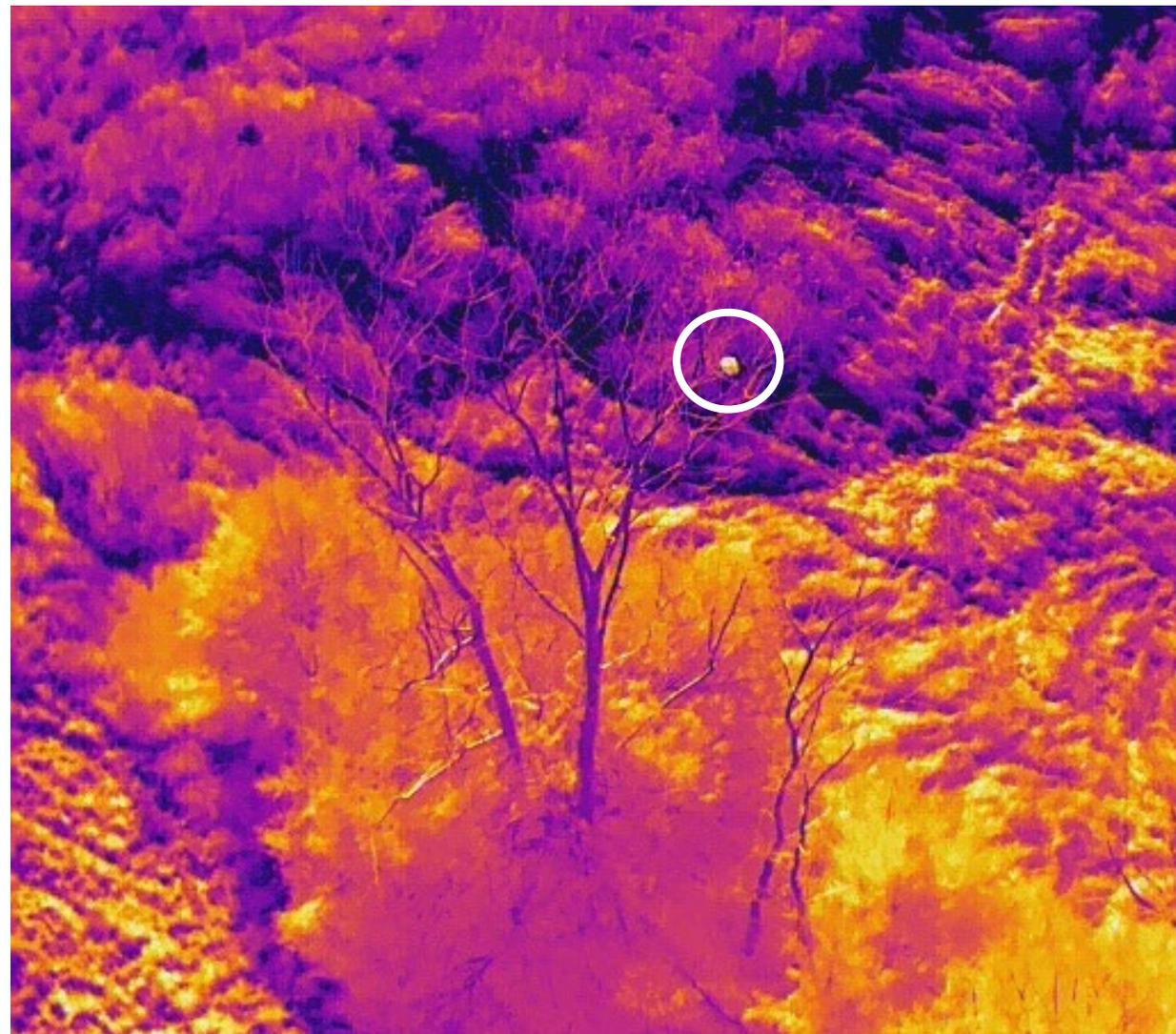
Recommendations: Time of day



Recommendations: Camera angle



Next Steps



Acknowledgements & Questions



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GEOSYSTEMS RESEARCH INSTITUTE