

Understanding and preventing animal-vehicle collisions through ecological research at the SRS



UNIVERSITY OF
GEORGIA

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Animal-vehicle Collisions

- North American mammals: 4-fold increase over last 50 years; 12% of all known mortality currently
- Reptiles and amphibians: >90% of all vertebrates killed by automobiles in some locations
- Birds: 200 million individuals annually in USA
- Threats to terrestrial mammal and bird species of conservation concern

White-tailed deer

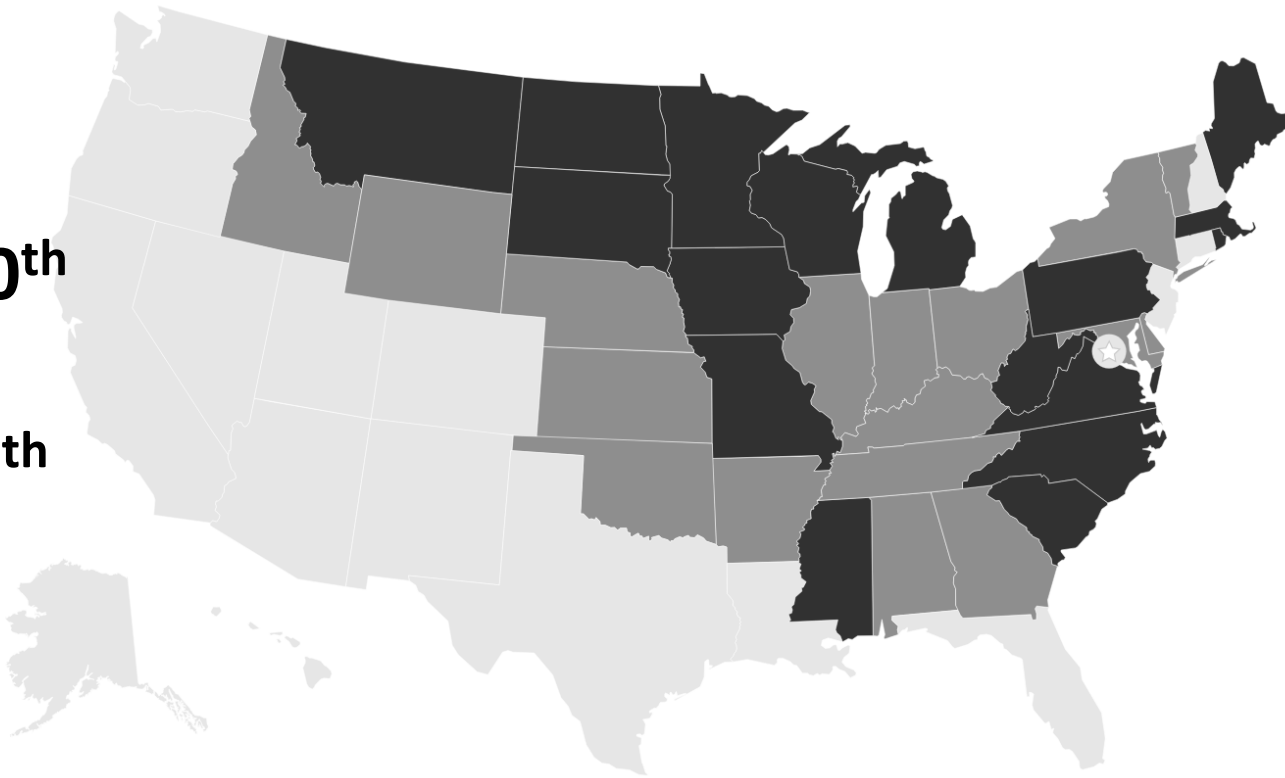


- ~1.25 million deer-vehicle collisions in the USA annually
 - 3,500 every day, or more than two collisions every minute!
- ~\$4 billion in damages annually
- National average cost per claim ~\$4,000 (State Farm)

Deer-vehicle Collisions in the US

GA: 20th

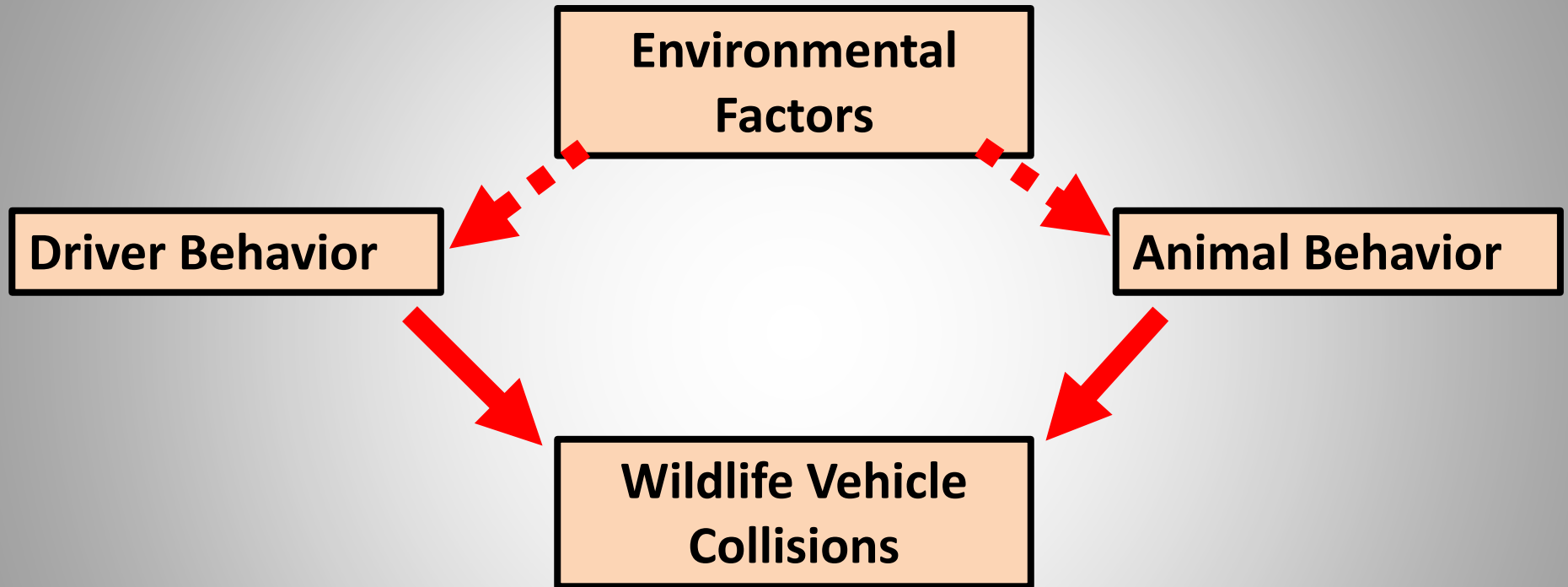
SC: 13th



Wild pigs

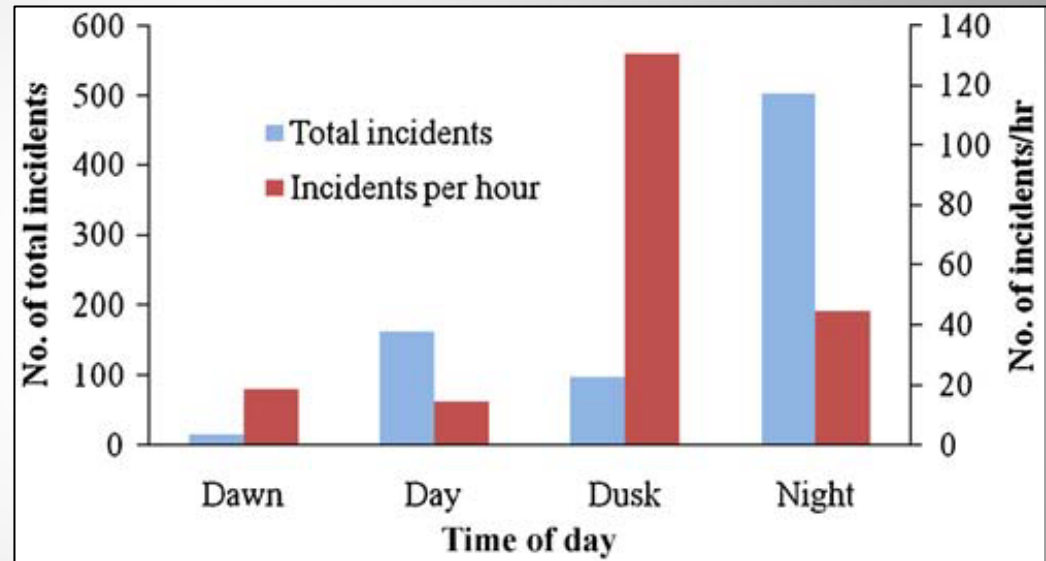
- Emerging issue, especially in SE USA
- \$36 million in damage in the USA annually
- At SRS, several dozen pig collisions each year
- Wild pigs are harder to see at night than deer
 - Dark color
 - No eye shine





Why do most collisions occur at night?

- Deer and pigs are most active at dawn, dusk, and night
- Humans are less able to avoid collisions in dark conditions
- Vehicle headlights are designed for human vision
- Deer and pigs have dark-adapted eyes



Recent research at SRS

1. Nighttime driver detection of free-ranging wildlife at the SRS
2. How does vehicle lighting reduce the likelihood of a collision with deer and pigs?



Study 1 Objectives

1. Quantify driver detection ability of wildlife
 - a) Free-ranging wildlife
 - b) Opportunistic sampling
2. Evaluate headlight intensity
 - a) Low vs. high beam



Study Site



- Savannah River Site
- 75-km driving route
- 4,000- 5,000 deer

Methods

Research Participants

- Volunteer based

Drive at Night

- Informed the driver
- 75-km route
- ~30 mins after sunset
- 2018 Ford F-150

Driving Route



Methods: FLIR Camera

Forward Looking Infrared (FLIR) Camera



CH 01



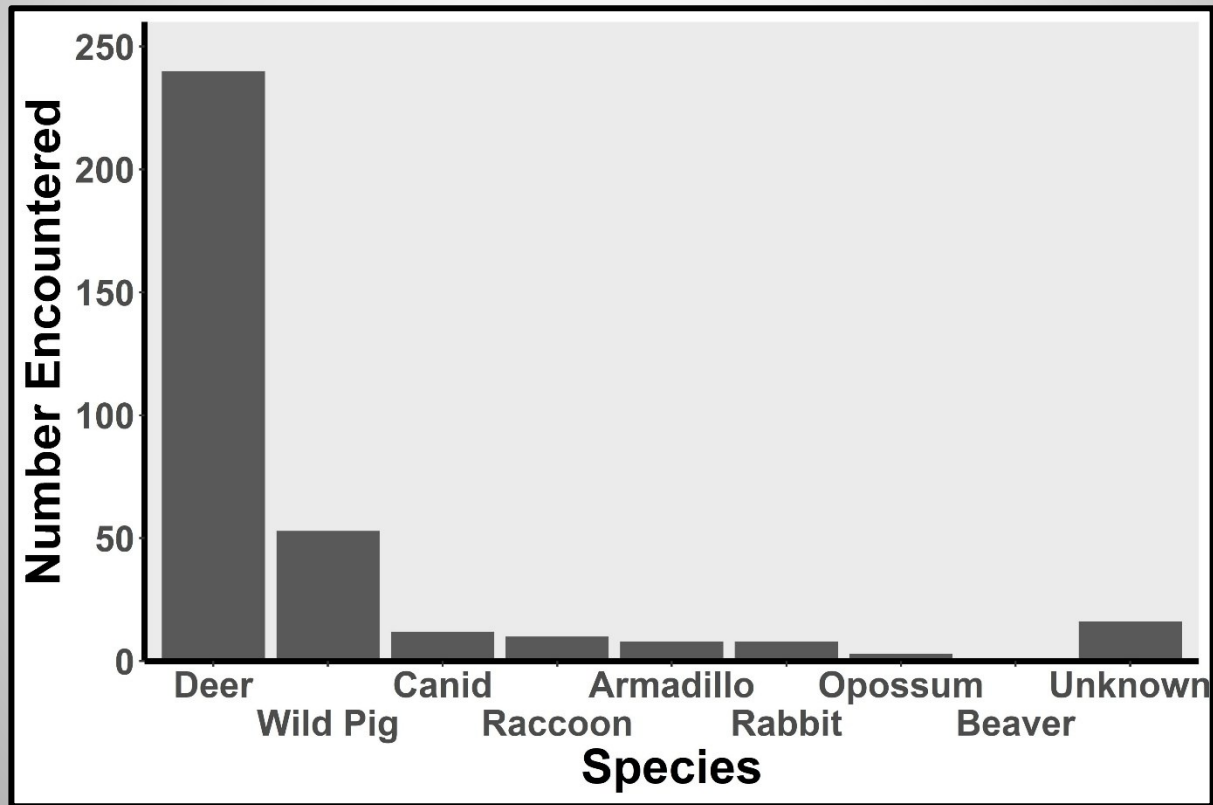
Results: Overview

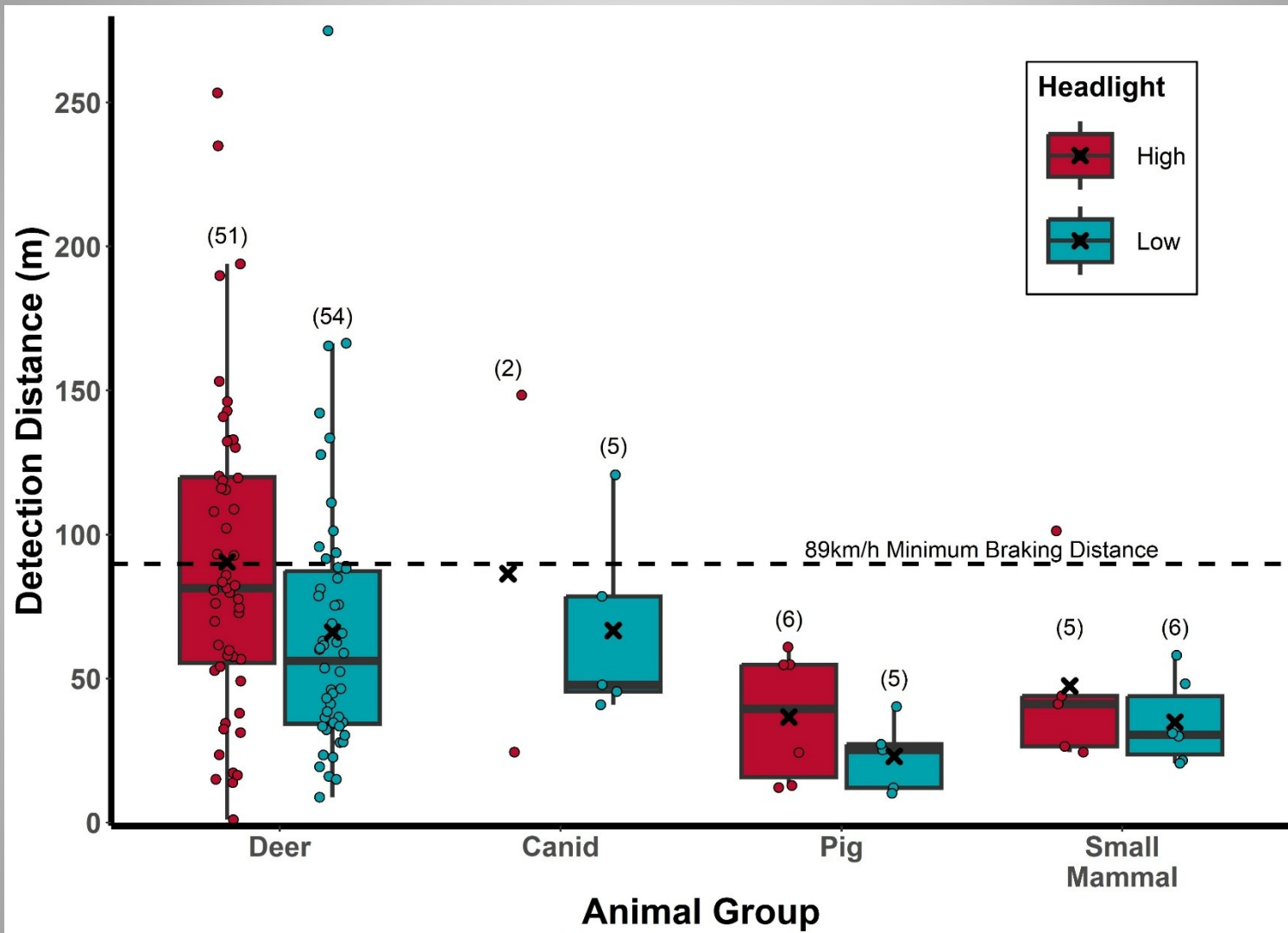
Data Overview

- 24 volunteers
- 33 drives
- 2,475 km
- 240 deer encounters
 - 7.3 per drive
 - 1 per 10.3 km

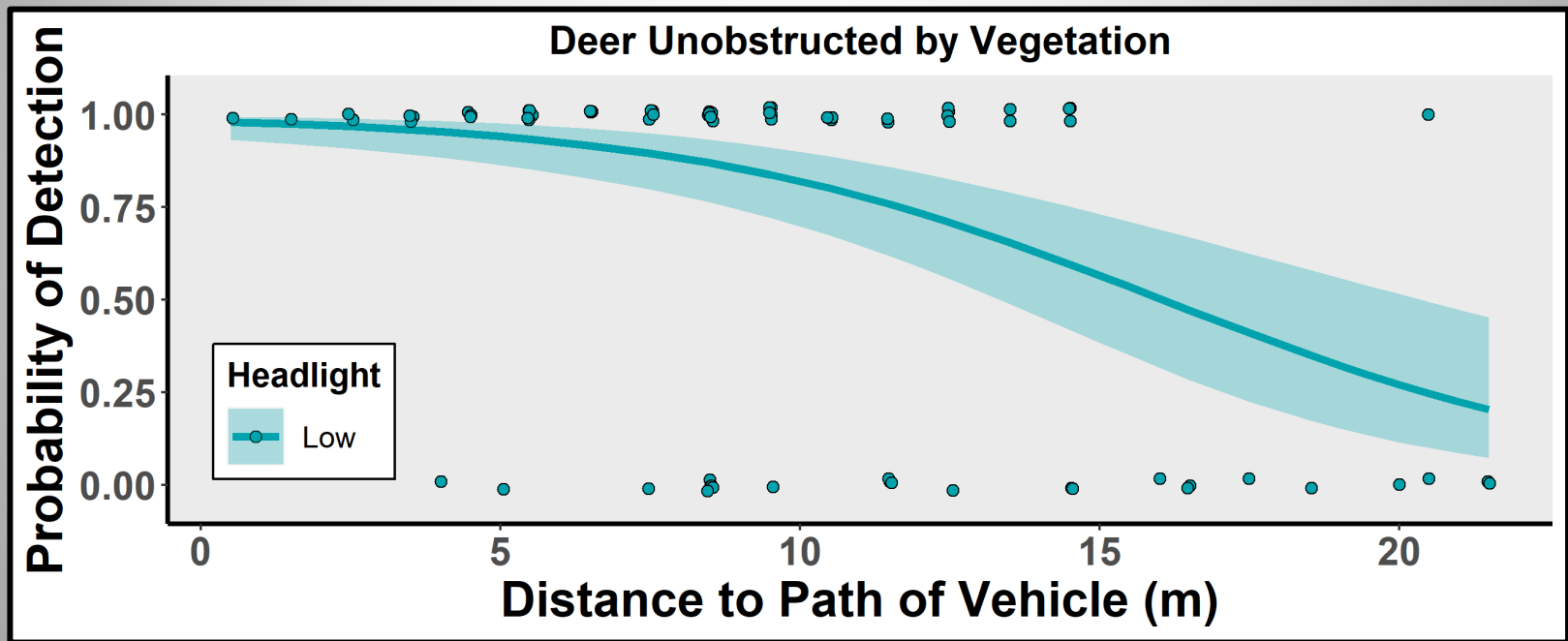


Results: Species Overview

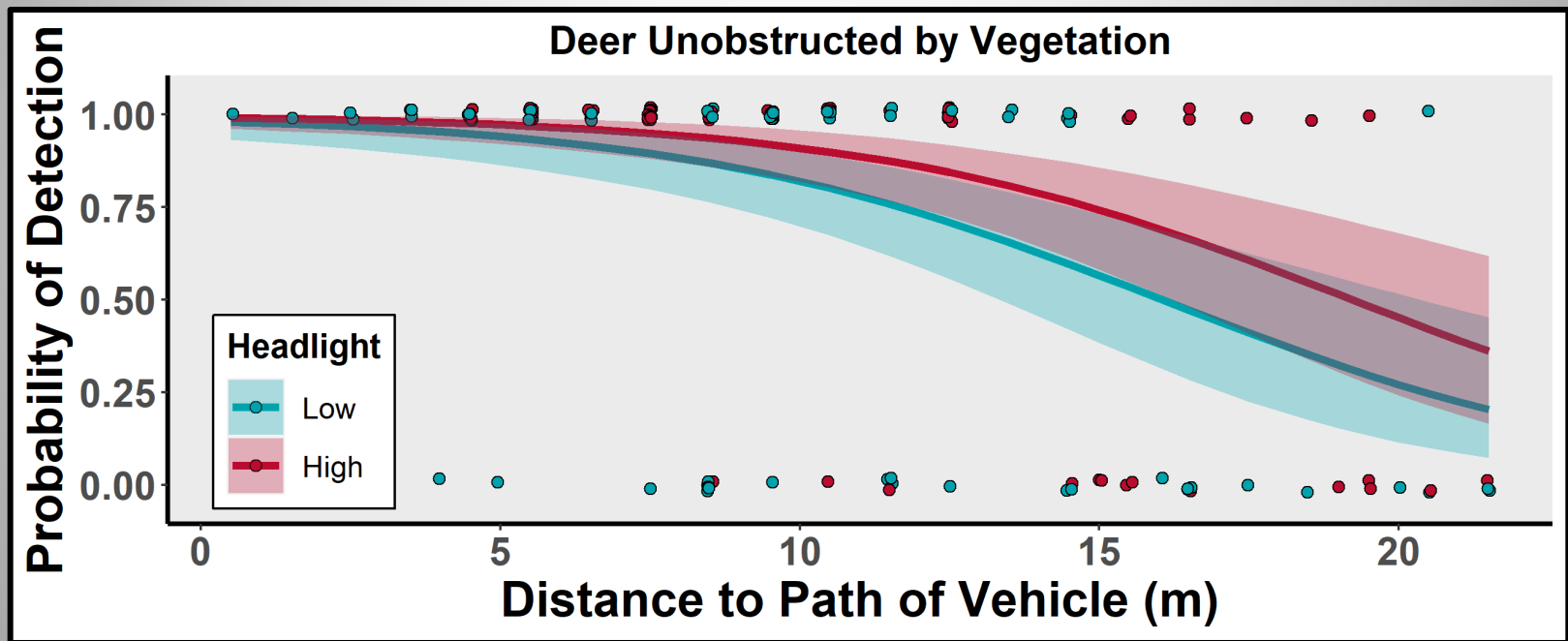




Deer Detection Probability

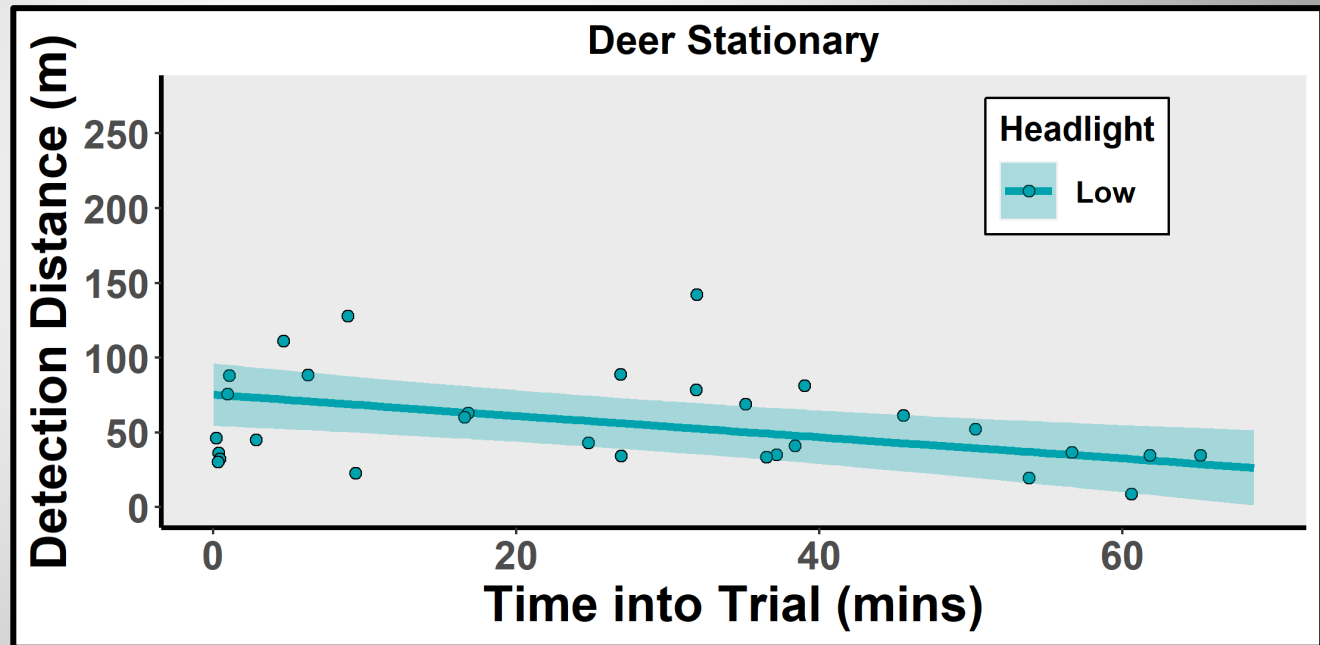


Deer Detection Probability



Deer Detection Distance

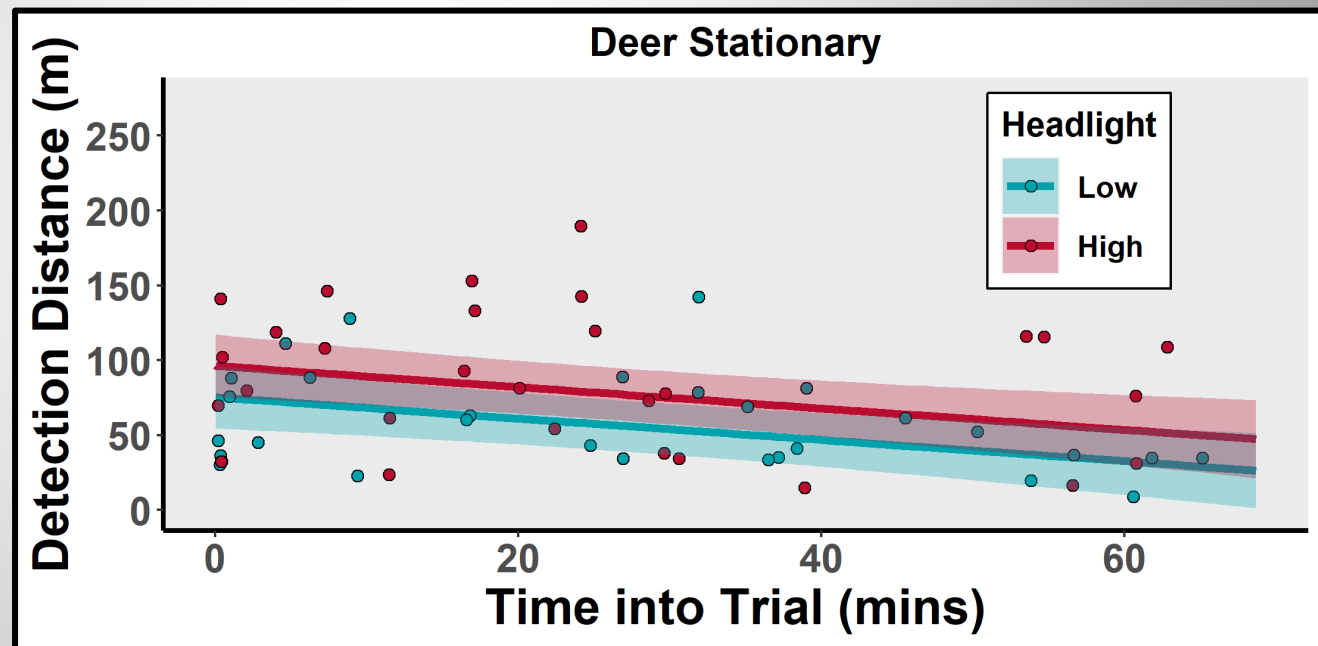
- Start of study (0 mins)
 - Low-beams: 75m
- End of study (60 mins)
 - Low-beams: 33m



Pakula et al. 2023

Deer Detection Distance

- Start of study (0 mins)
 - Low-beams: 75m
 - High-beams: 96m
- End of study (60 mins)
 - Low-beams: 33m
 - High-beams: 54m
- High beams = 21.4m ↑



Pakula et al. 2023

Study 1 Conclusions

- Use high-beam headlights
- Limit time driving at night

Study 2 Objectives

1. Describe wildlife behavior during real vehicle encounters
 - a) Deer
 - b) Wild pigs

2. Evaluate vehicle lighting impacts on wildlife behavior
 - a) Halogen vs. LED
 - b) Rear-facing lightbar

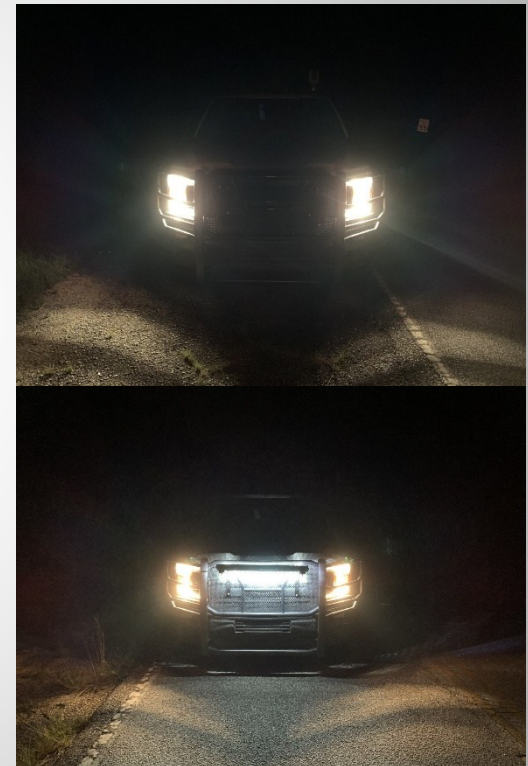


- Headlights provide a smaller looming image
- Deer might not associate headlights with danger



- Mitigation methods designed to reduce DVCs in low-light conditions are needed

Vehicle lighting





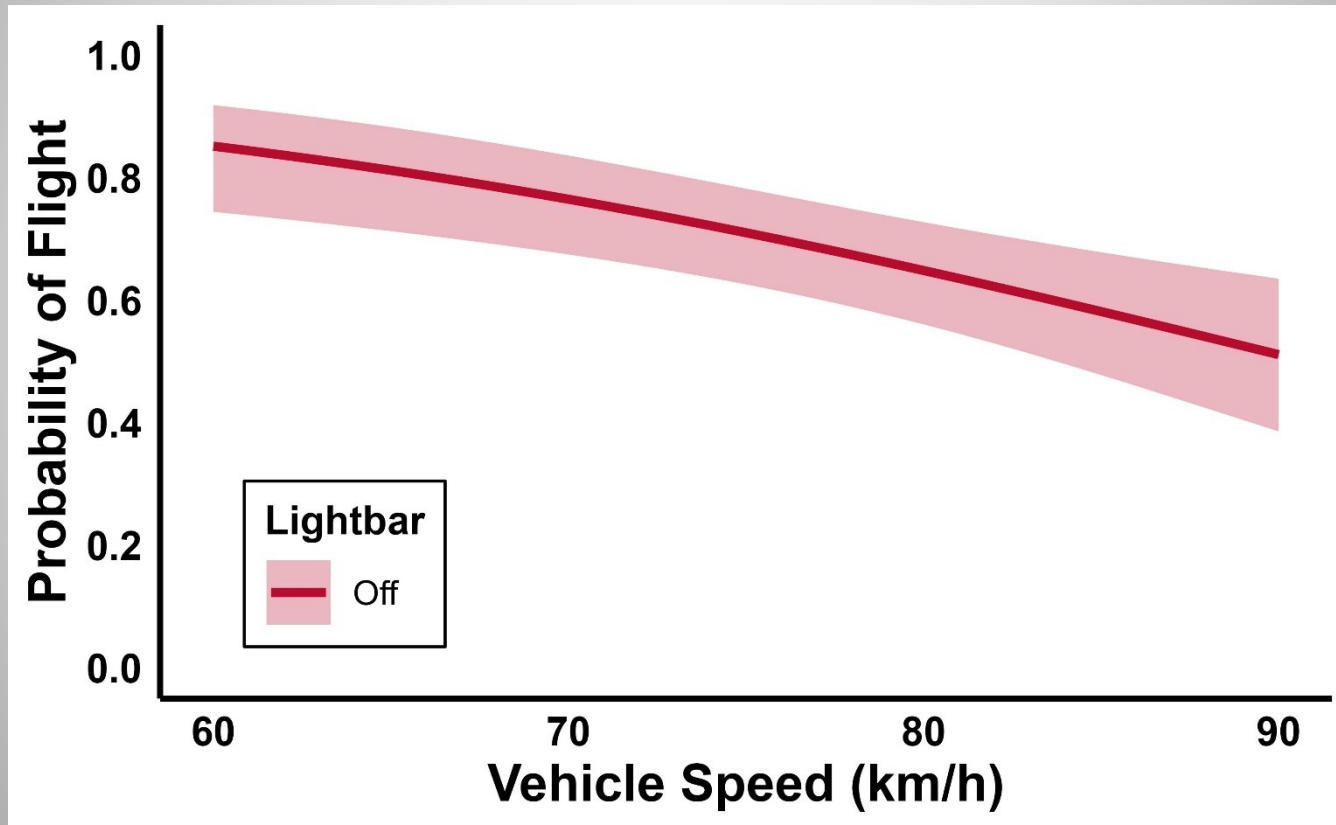
Deer Responses



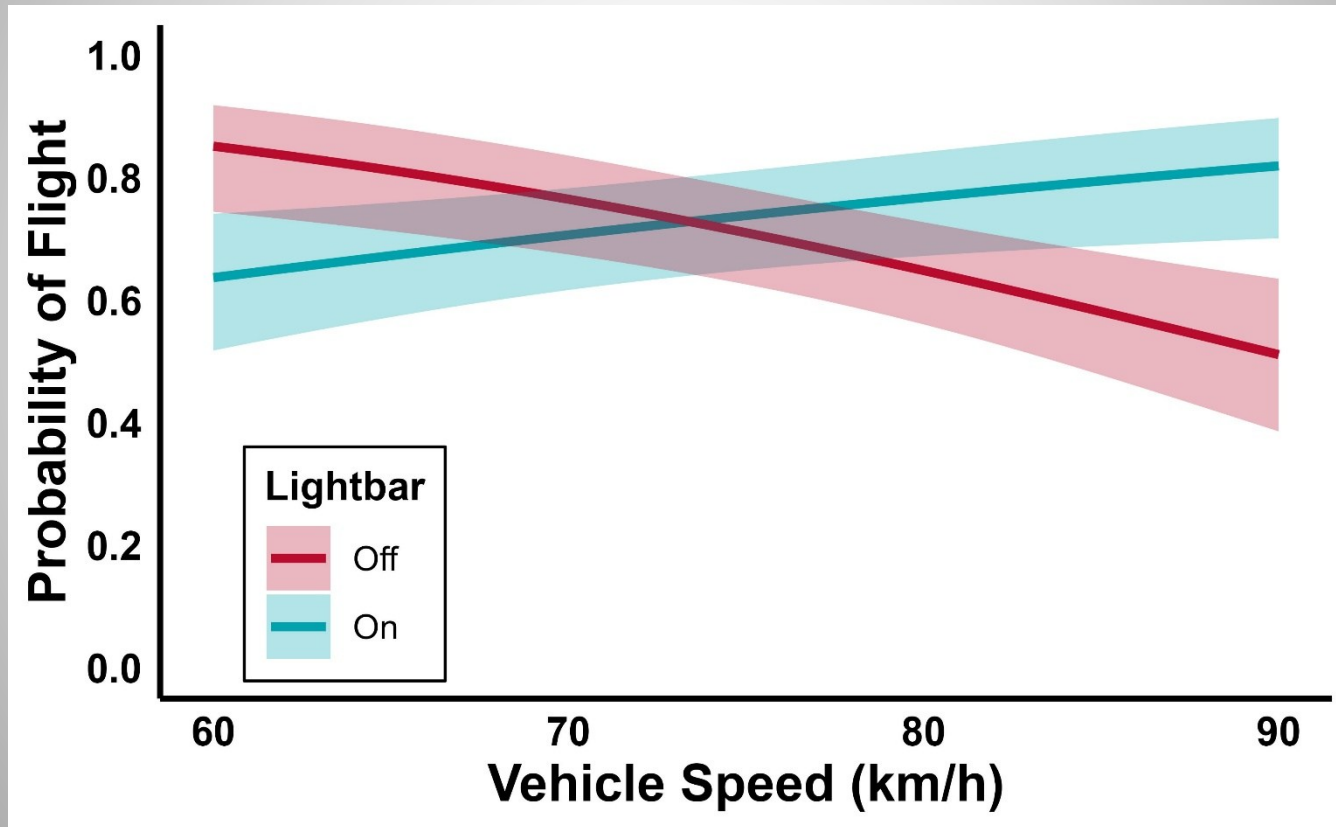
Wild Pig Responses



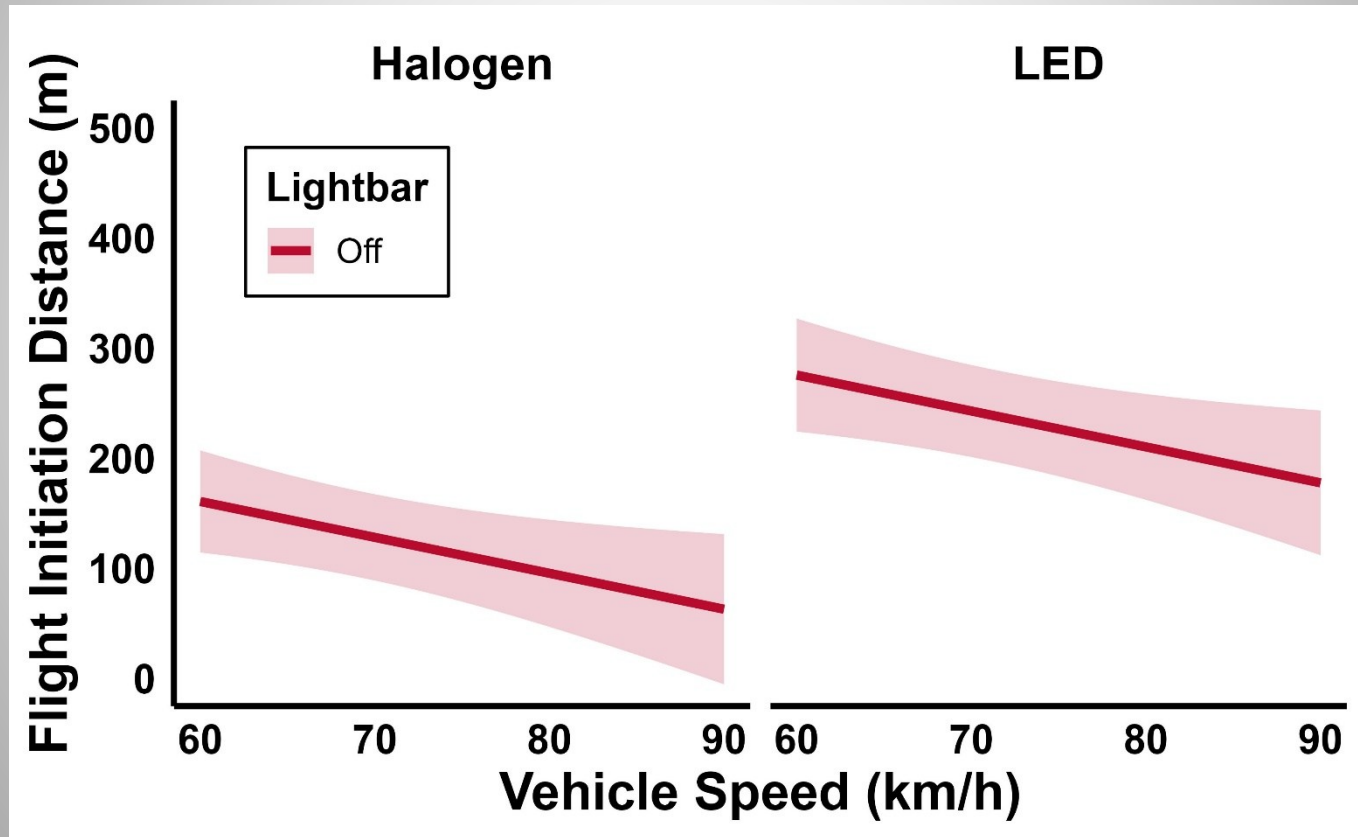
Flight Probability



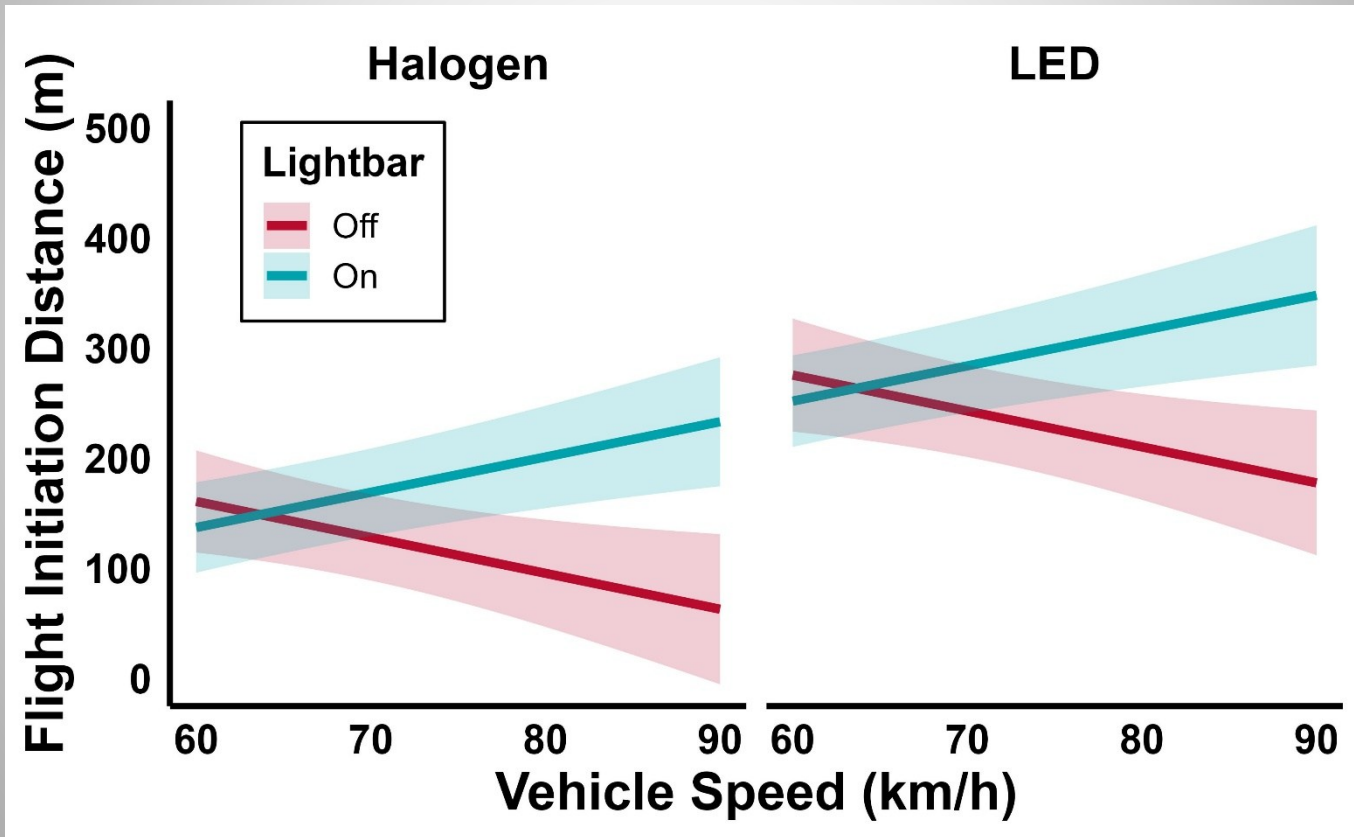
Flight Probability



Flight Initiation Distance



Flight Initiation Distance



Summary

Lightbar



- Increased flight at faster speeds
- Reduced dangerous encounter as faster speeds



- Increased flight distance at faster speeds

LED Headlights



- Increased flight distance

Acknowledgements



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