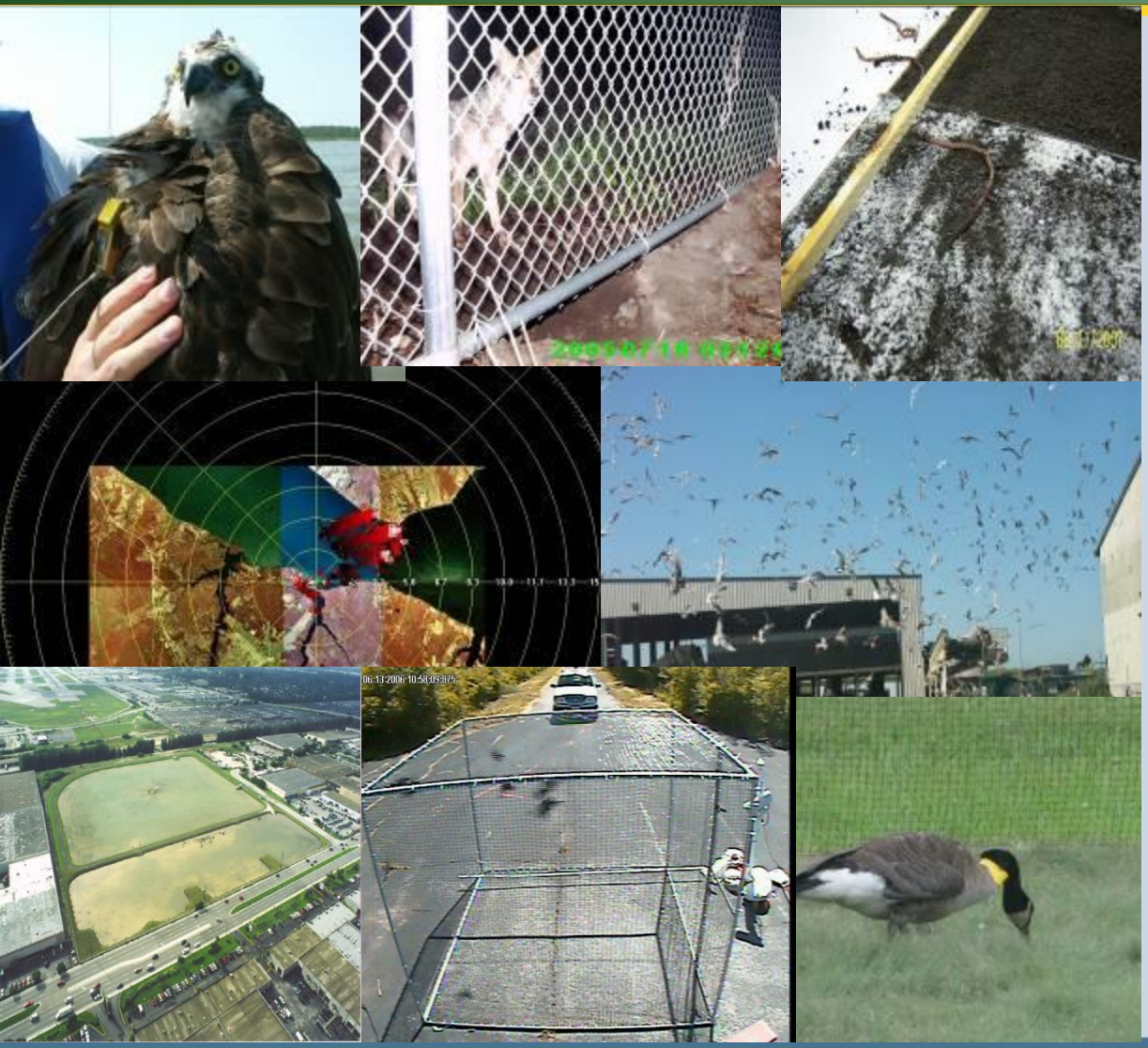
A Summary of Research to Prevent Wildlife-Aircraft Collisions

Travis L. DeVault, PhD
USDA, APHIS, WS, National Wildlife Research Center
Sandusky, Ohio, USA

Broad Research Topics



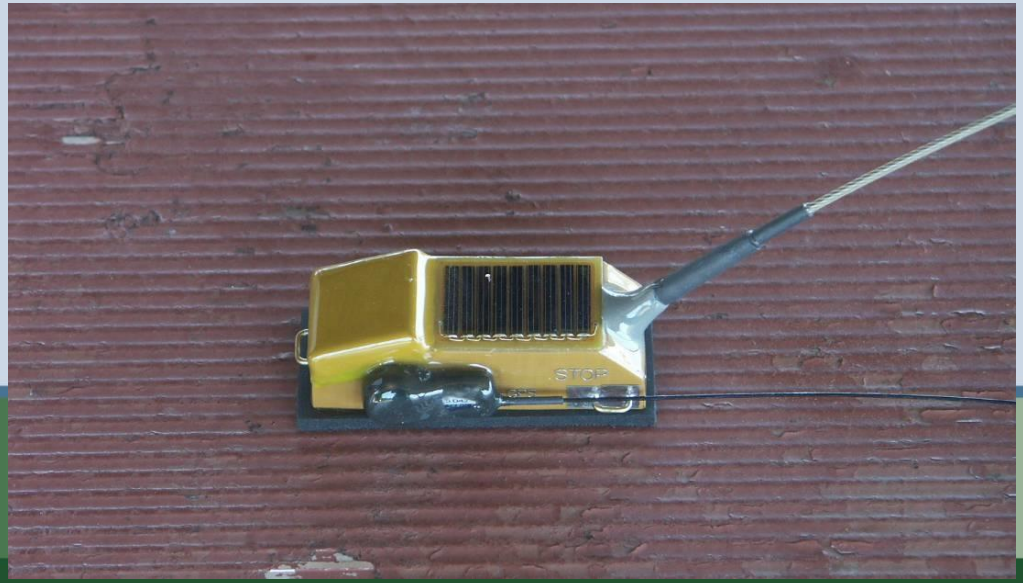
- **Habitat use and foraging strategies** of hazardous wildlife
- **Developing methods and tools** to reduce wildlife food, water, and cover attractants
- **Research in basic wildlife biology and ecology** to develop and enhance nonlethal control methods

Specific Topics

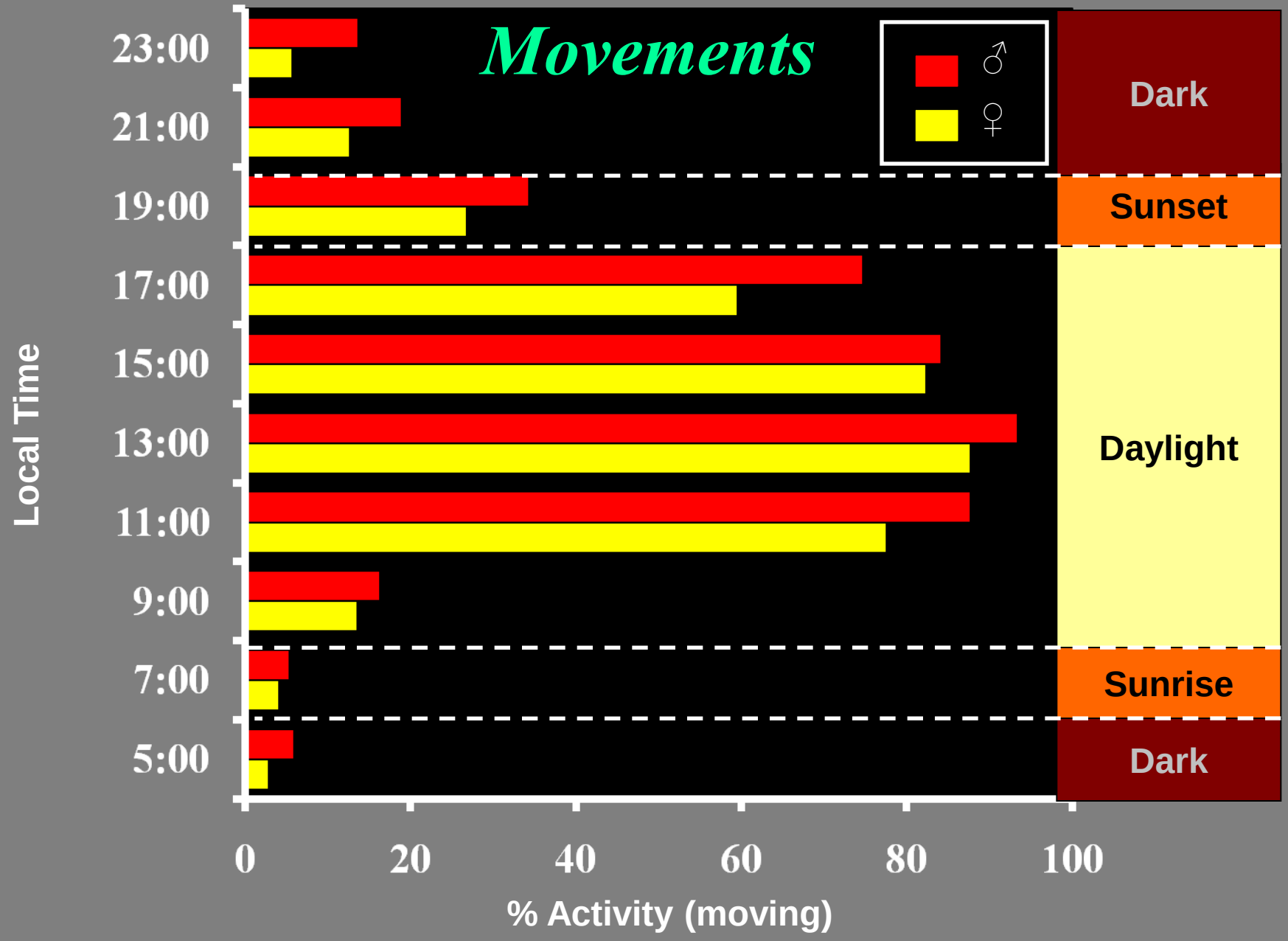
- Satellite tracking of hazardous birds
- Alternative land covers on and near airports
- Evaluation of an Acoustic Hailing Device
- Using GIS to explore the effects of landscape structure on bird strikes
- Development of aircraft lighting

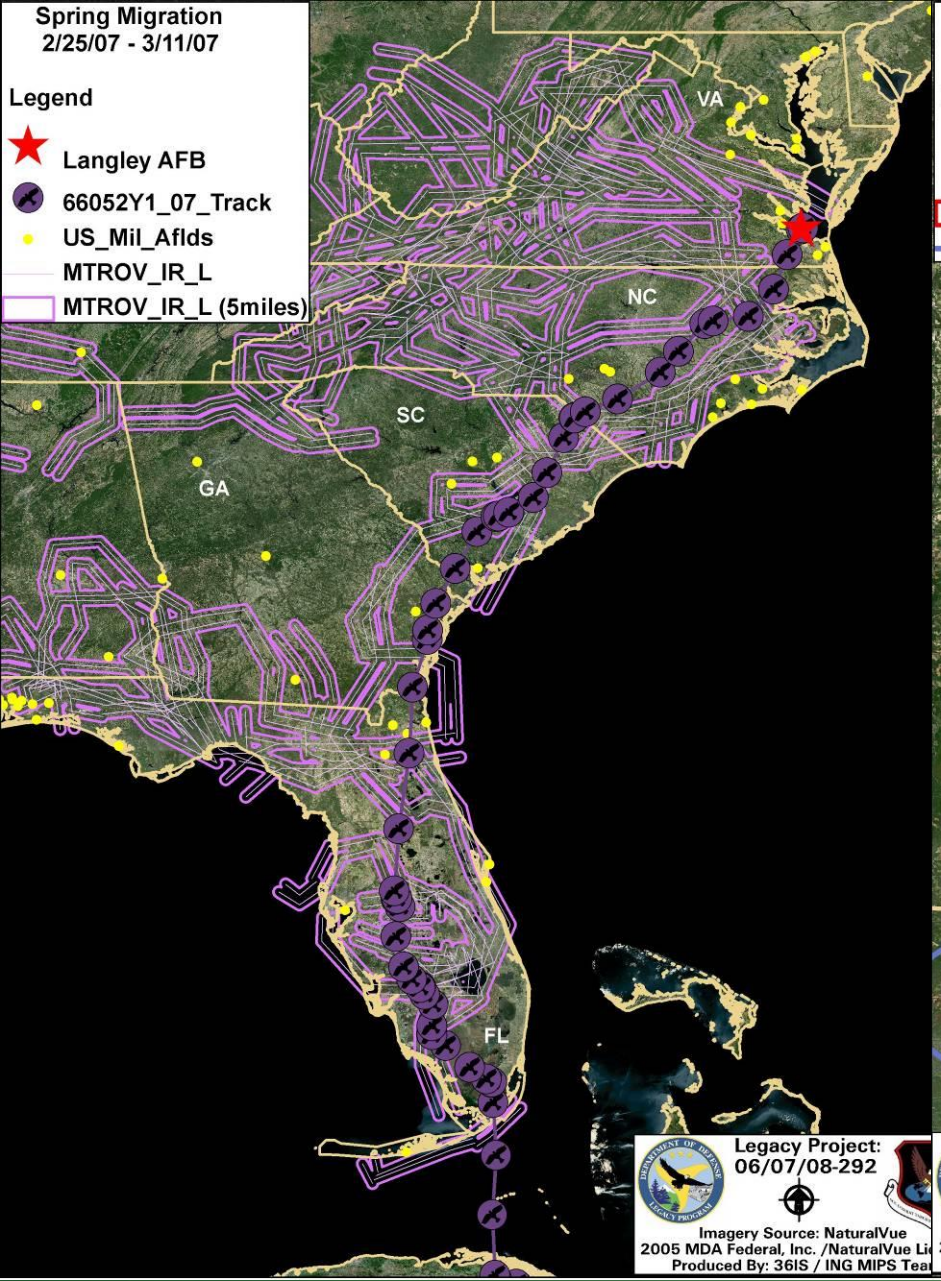
Satellite Tracking of Hazardous Birds

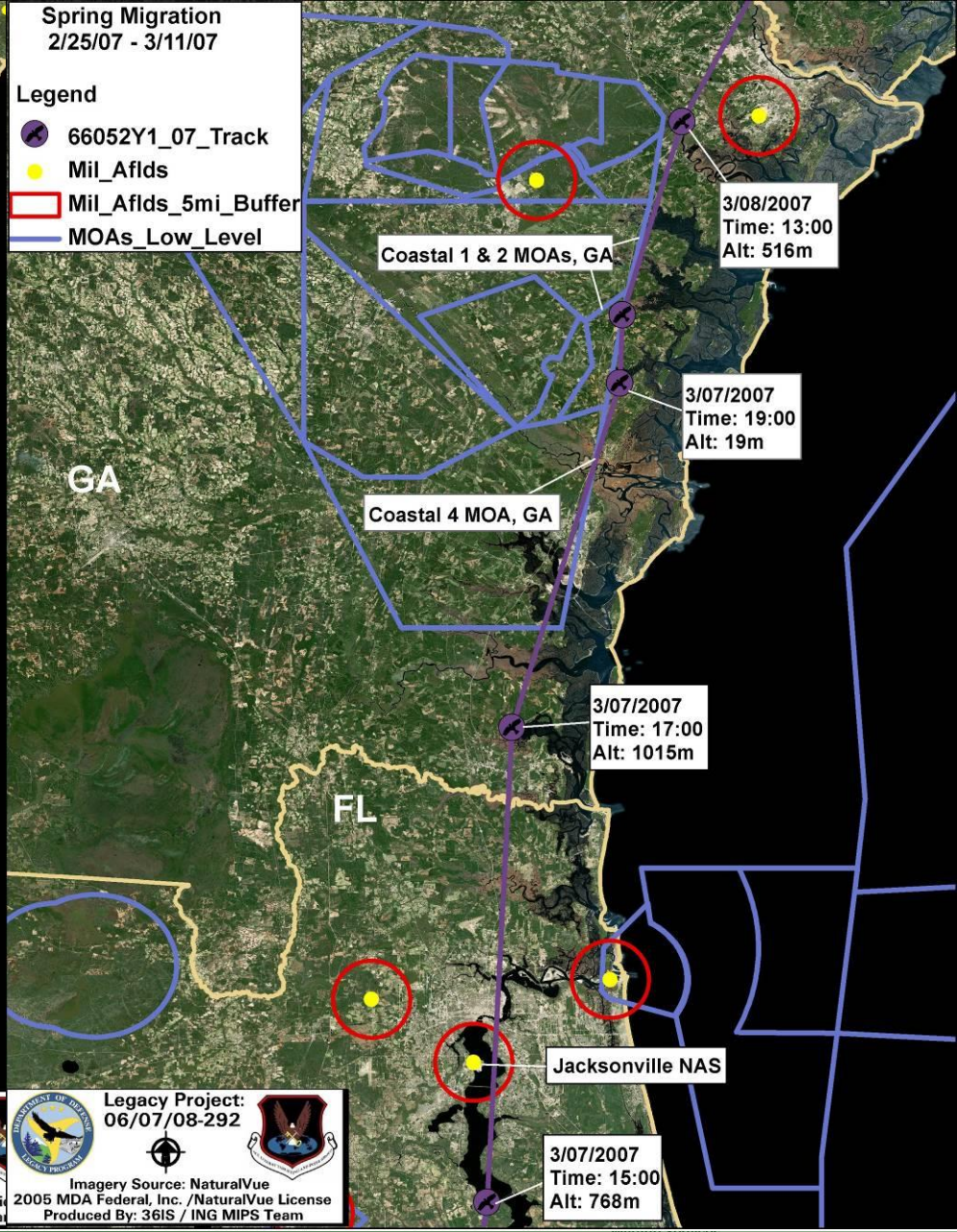
- Osprey
- Bald eagle
- Canada goose
- Red-tailed hawk
- Ring-billed gull



Identify Areas of Overlap in Airspace Use


Movements
♂
♀
Dark
Sunset
Daylight
Sunrise
Dark
23:00
21:00
19:00
17:00
15:00
13:00
11:00
9:00
7:00
5:00
Local Time
0
20
40
60
80
100
% Activity (moving)





United States Department of Agriculture
Animal and Plant Health Inspection Service

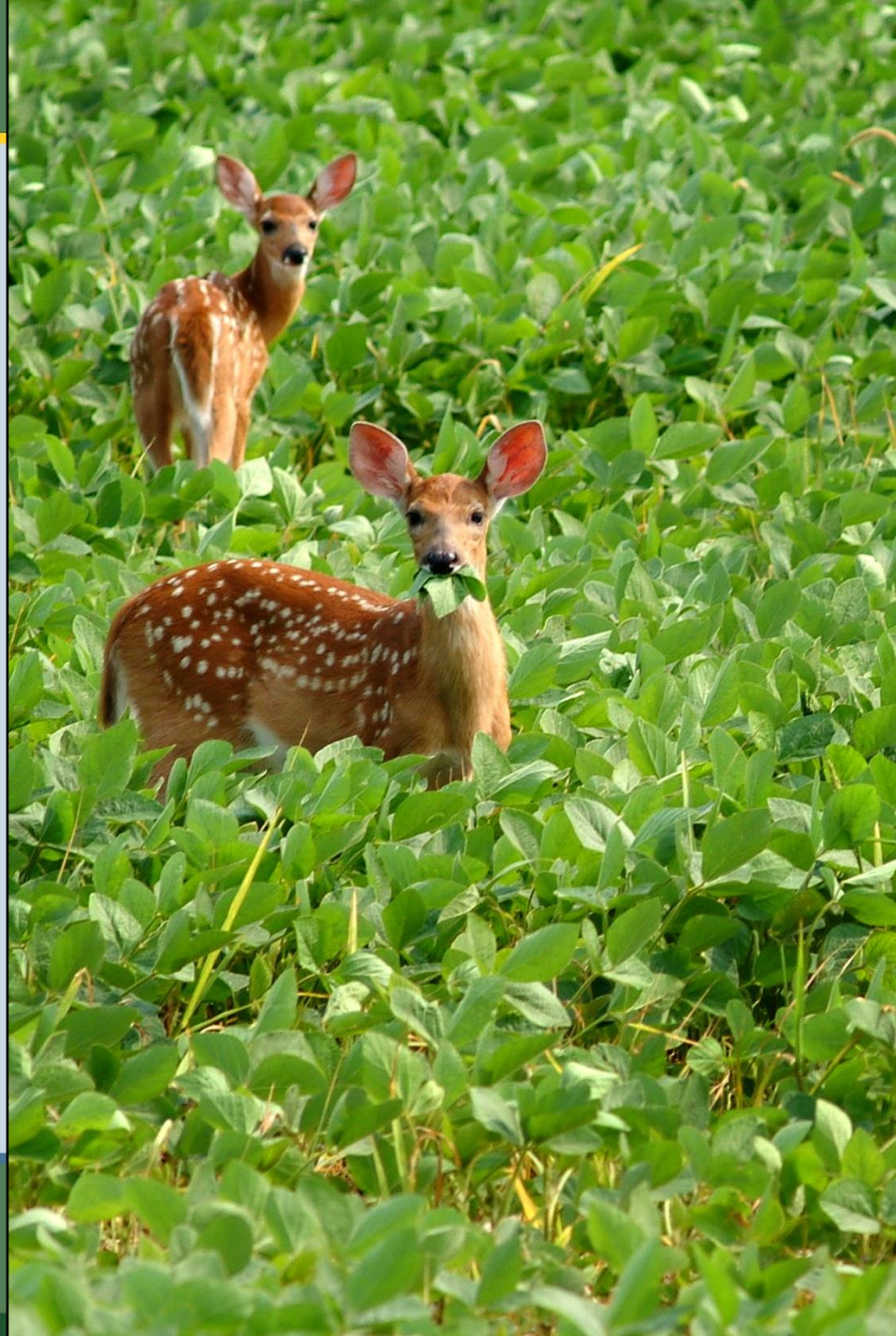
Wildlife Services
NWRC
National Wildlife Research Center

Alternative Land Covers on and near Airports

>3,306 km^2 of airport grasslands at airports in USA

What are the other options?

- Non-harvested herbaceous ground covers
- Agriculture
- Solar arrays
- Other alternative energy production (biofuels)

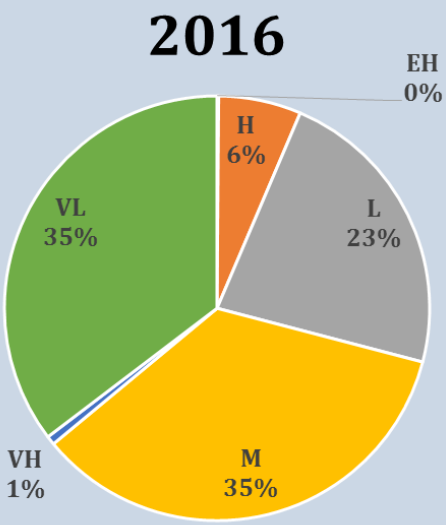


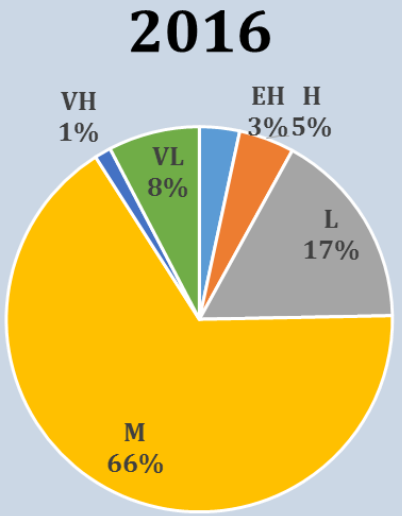
Monoculture Switchgrass

- Plants are perennial
- Require only one or two cuttings per year
- Grow well on marginal soils
- Burgeoning market for these crops

Preliminary Results

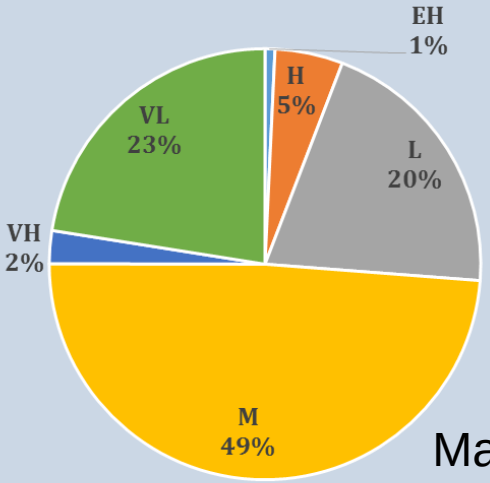
Controls



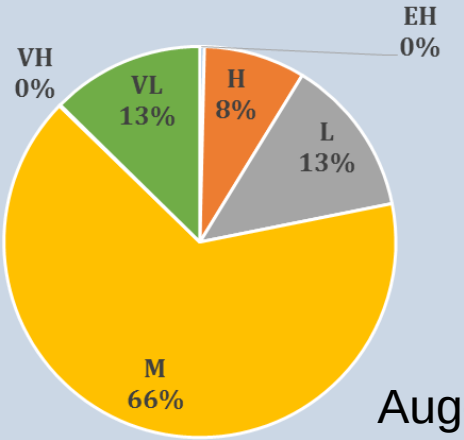


Bird Hazard Categories*
Extremely High (EH)
Very High (VH)
High (H)
Medium (M)
Low (L)
Very Low (VL)

Switchgrass

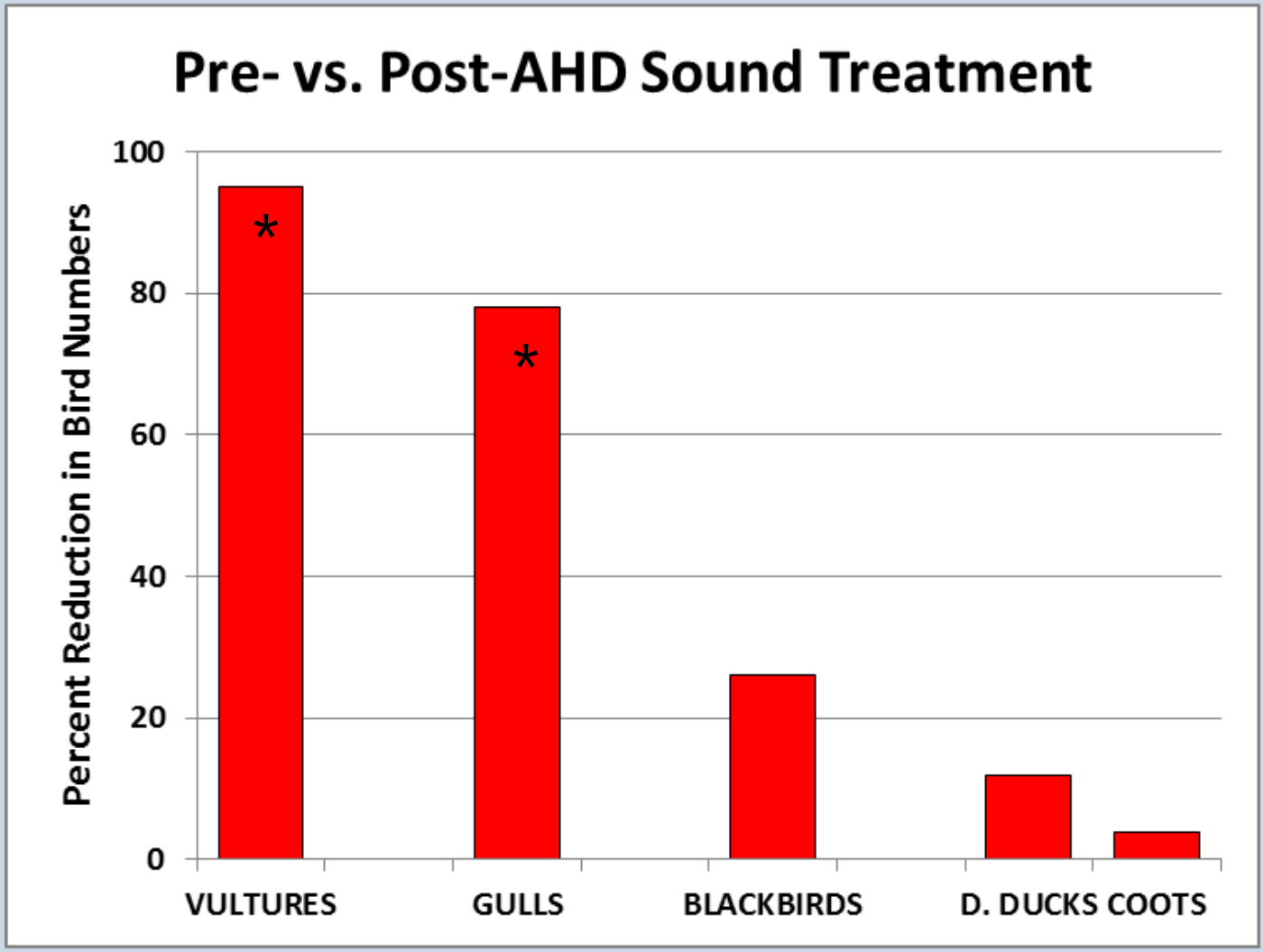


May-Jul



Aug-Apr

Acoustic Hailing Devices


Pre- vs. Post-AHD Sound Treatment
Percent Reduction in Bird Numbers
100
80
60
40
20
0
*
*
VULTURES
GULLS
BLACKBIRDS
D. DUCKS COOTS

GIS and Landscape Structure

Study Question

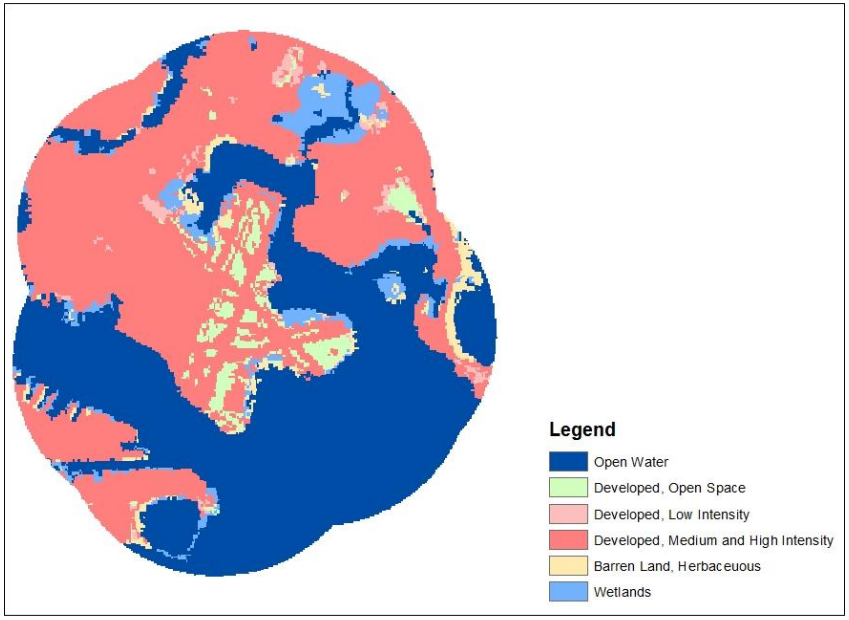
- What landscape patterns and interactions influence damaging bird strikes?
  - To what extent from an airport should the landscape be managed?

Potential Predictor Variables

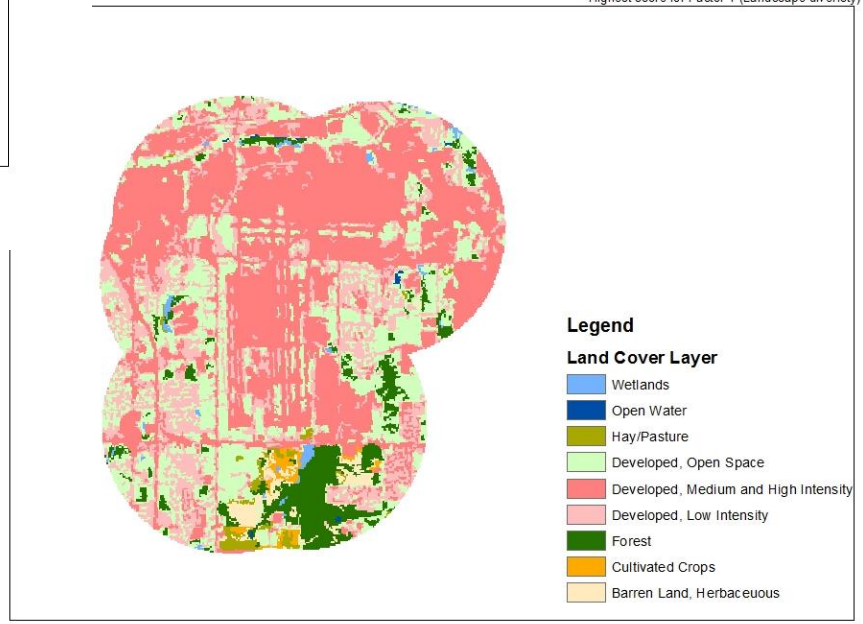
- Aquatic habitat (3, 13 km)
  - Number of open water patches
  - Mean patch area
  - Mean Euclidean distance to other water patch
- Row crop production (3, 13 km)
  - Number of patches
  - Mean patch area
  - Total edge
  - Diversity
  - Mean Euclidean distance to other patch
- Turf Grass/Developed Open Space (3, 13 km)
  - Mean patch area
  - Number of patches
  - Mean Euclidean distance to other patch
- Landscape heterogeneity (3, 13 km)
  - Modified Simpson's Diversity Index
  - Dispersion/Connectivity Index
- Wildlife Attractants (3, 13 km)
  - Distance to nearest Waste Transfer Facility
  - Distance to nearest *large* Protected Area
  - Distance to nearest roost
  - Mature tree index (> DBH)
  - Area of flat 'loafing' roofs

Preliminary Result—High Landscape Diversity Leads to More Damaging Strikes

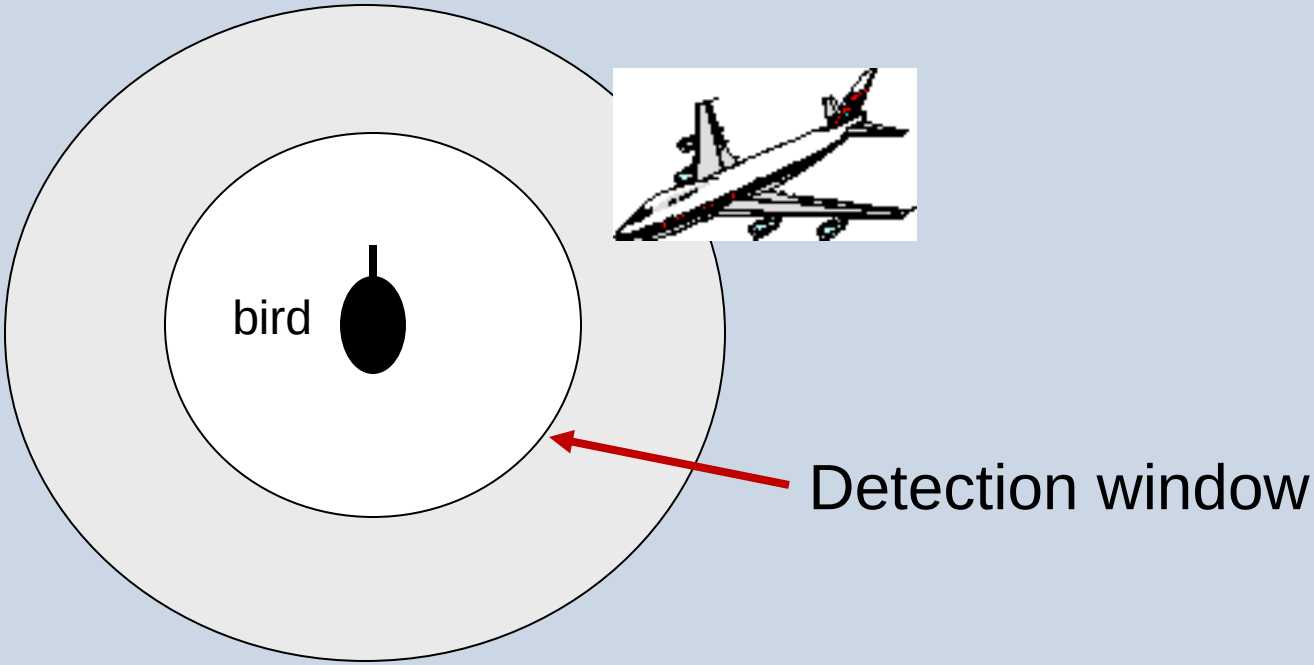
Lowest score for Factor 1 (Landscape Diveristy)



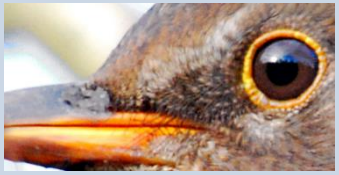
Highest score for Factor 1 (Landscape diveristy)

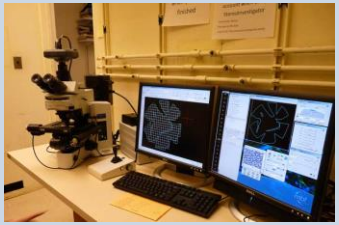


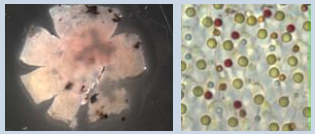
Aircraft Lighting

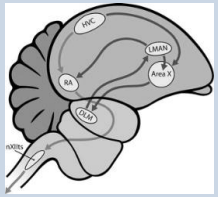


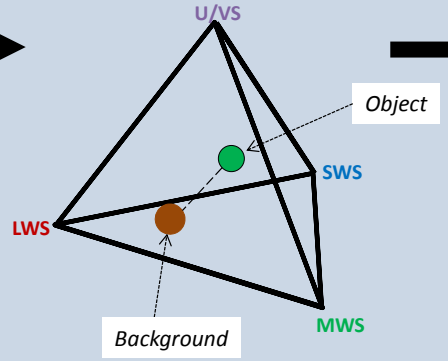
Research Approach











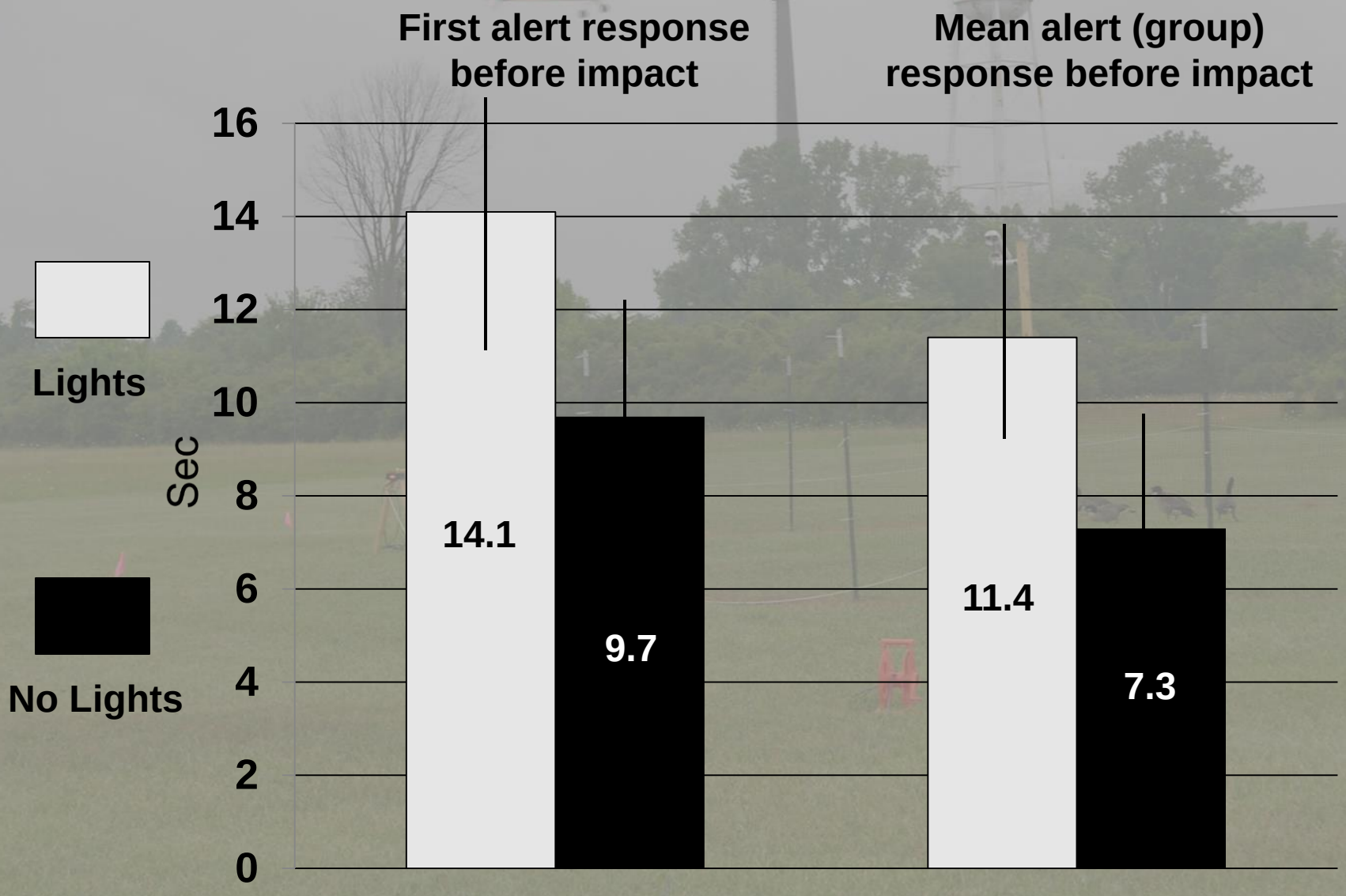
- **Visual field configuration**
- **Visual acuity**
- **Temporal visual resolution**
- **Sensitivity of photoreceptors**

- **Increase conspicuousness of stimuli from the target species' visual perspective**

- **Visual attention**
- **Detection time**
- **Escape time**

Visual physiology → Perceptual modeling → Behavior experiments

Canada Goose – R/C aircraft results



Travis.L.DeVault@aphis.usda.gov

(419) 625-0242