USDA Airport Wildlife Management And Research To Reduce Wildlife-aircraft Strike Risk

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Approach

- Organizational structure and charge
- Overview of the breadth and focus of the WS AWHP
- Research charge
  - Goal/objectives
  - Areas
  - application
- Looking ahead

USDA WS
Provide Federal leadership and expertise to resolve wildlife conflicts to allow people & wildlife to coexist.

USDA

Reduce Damaging Bird Strikes & Increase Airfield Safety

Civil Airports
Military Airports
Aviation Industry

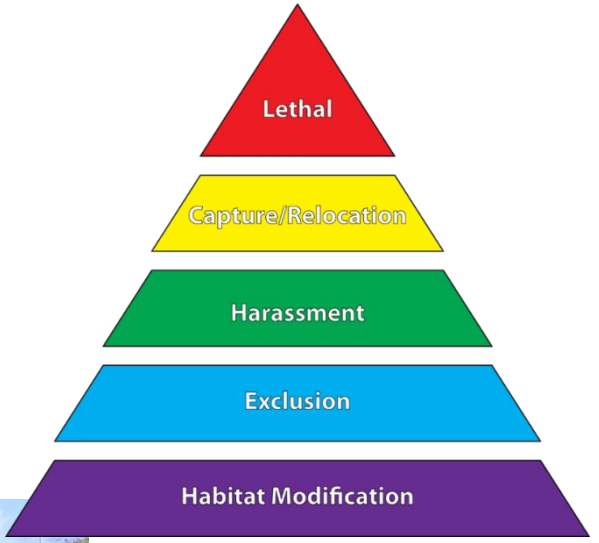
NASAO
National Association of State Aviation Officials

Wildlife Services background

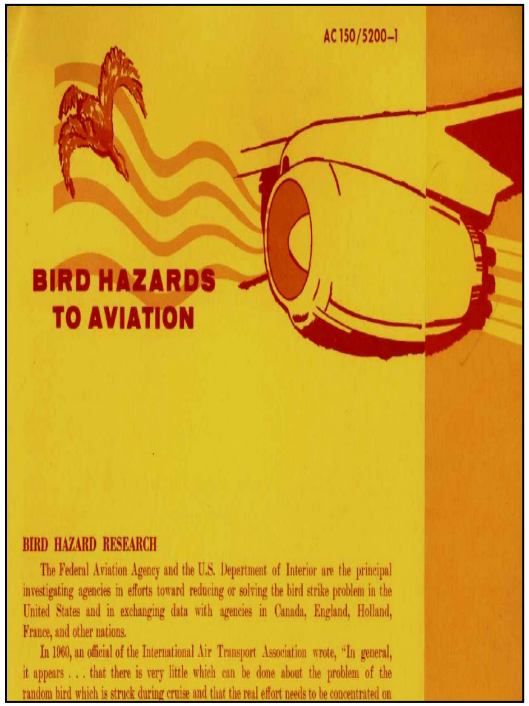
C. Hart Merriam

- Origins in 1885 / ‘86 National Biological Survey
- Extensive work on rodent and predator control to assist agriculture and livestock production
- National Wildlife Research Center origins
- U.S. Fish and Wildlife Service origins
- **Natural Resources are part of the conservation heritage of the United States and are a resource held in the public trust**

Integrated Wildlife Damage Management

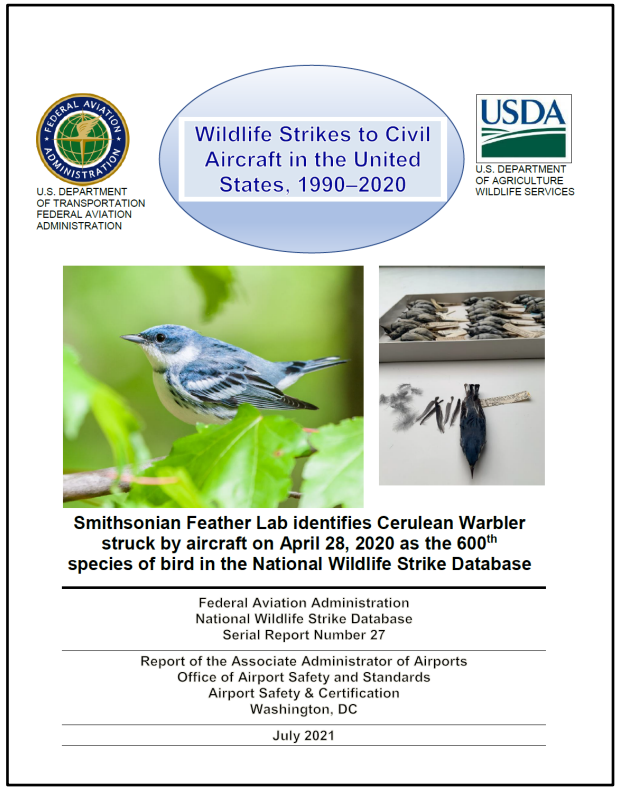


USDA Wildlife Services and airport assistance – 1950's through today

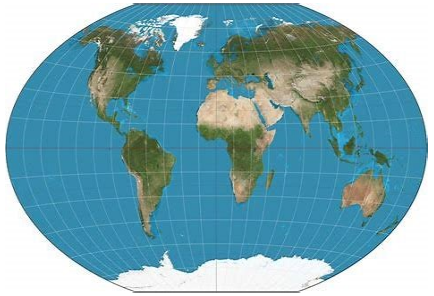


"ADC is responsible for assisting the Federal Aviation Administration, other Federal agencies requiring assistance and State and local airport authorities in resolving hazards to aircraft and passengers created by the presence of large mammals and migratory birds and the control of small mammals disrupting airport safety systems."

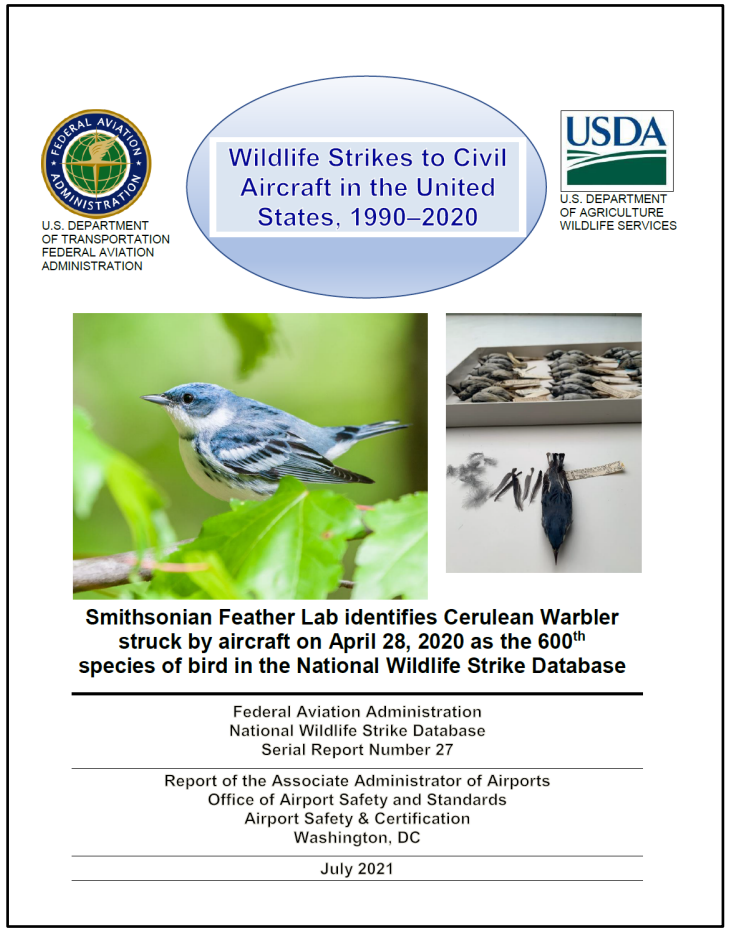
1986 transfer MOU between DOI & USDA



1965 - First FAA airport advisory circular notes the FAA & DOI as lead U.S. agencies dealing with the bird strike issue (the DOI program would later come to be known as Wildlife Services)



FAA National Wildlife Strike Database



Helicopter Association International

Smithsonian Institution

Pratt & Whitney Dependable Engines

RADIA

Alaska Airlines

amazon Prime Air

USC Viterbi Aviation Safety & Security Program

Boeing

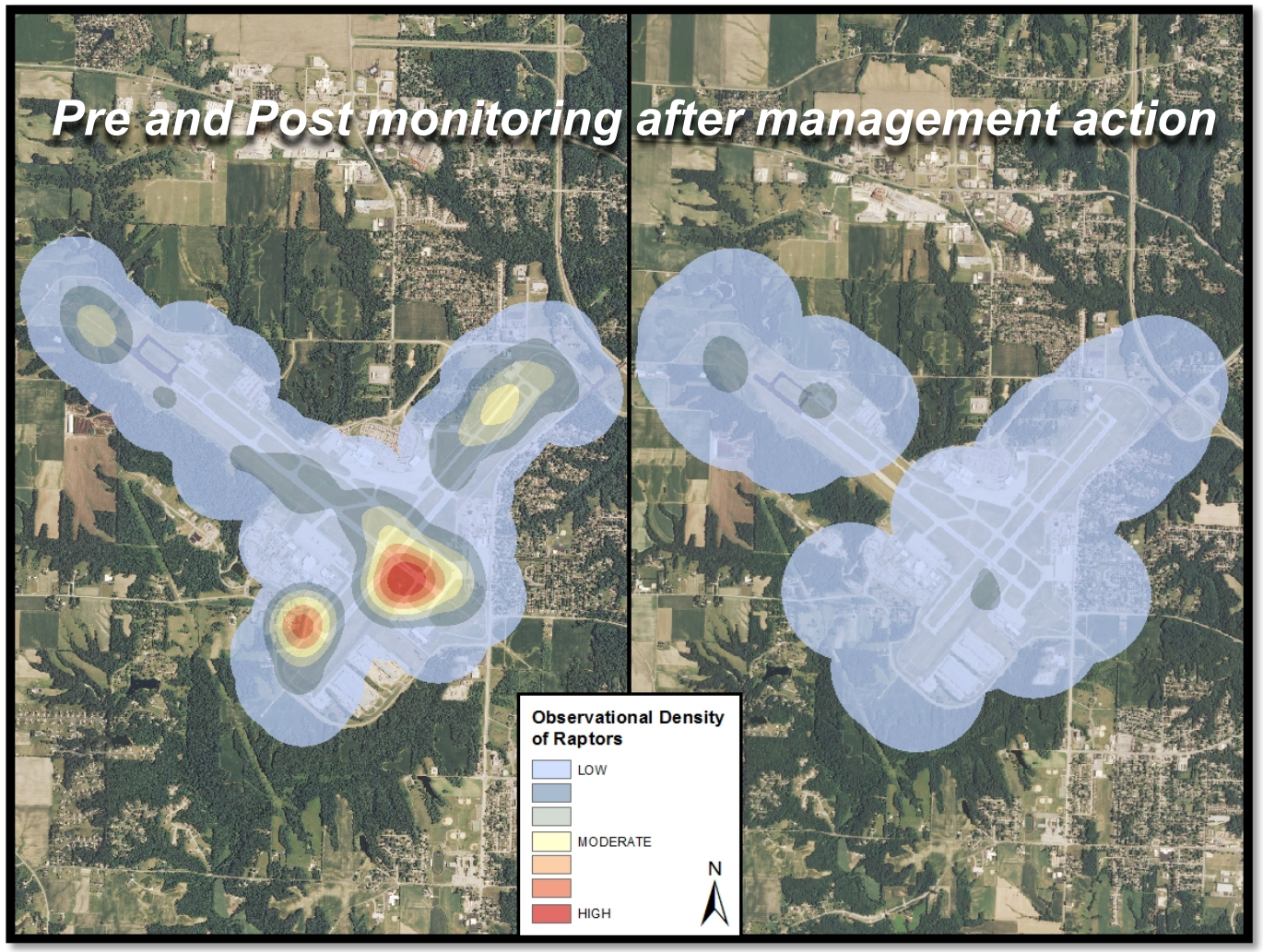
Federal Aviation Administration

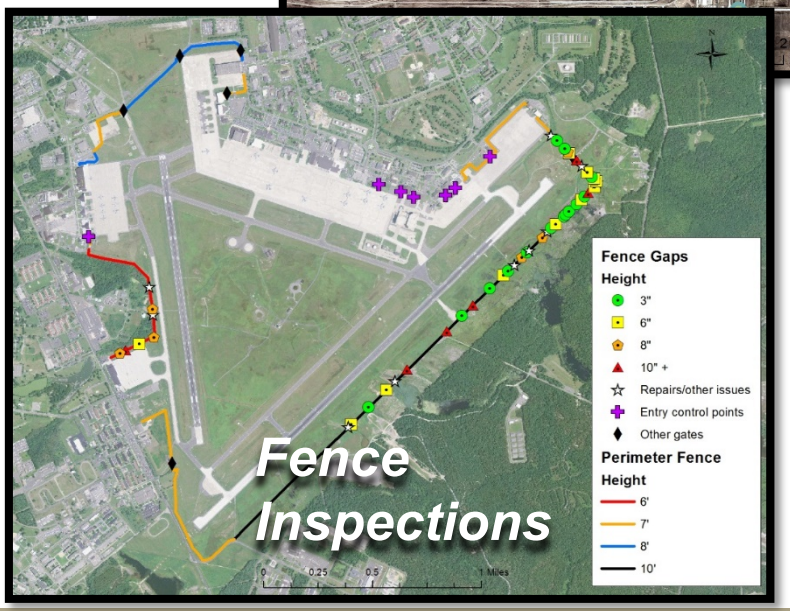
USDA
United States Department of Agriculture

FY 2020 activities

776 total airports
73% of all Part 139 airports
138 military airbases
259 General Aviation airports
3,883 airport personnel trained
299 staff-years of service
36.8 Million in cooperative funding

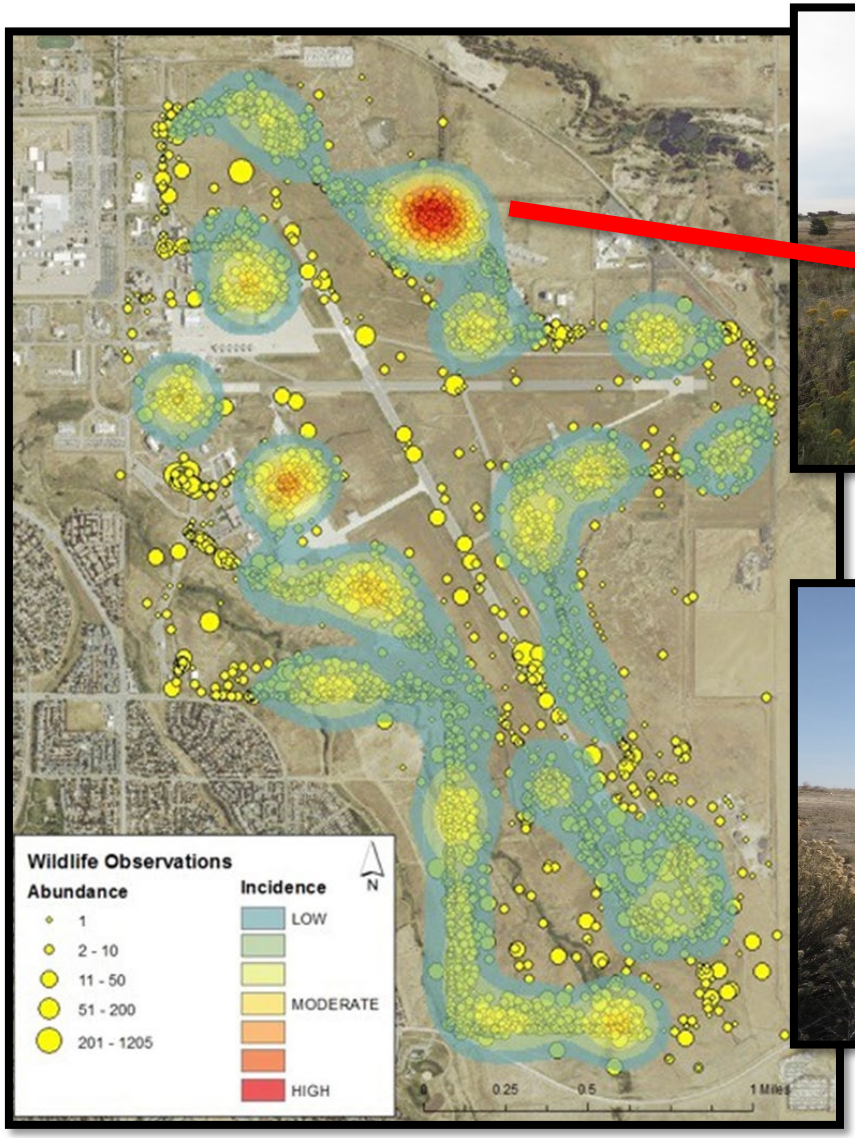
Mapping spatial data to support recommendations





esri

Risk to aviation operations
Species risk modeling
Return on Investment



Wildlife Society Bulletin 42(1):94–101; 2018; DOI: 10.1002/wsb.859

Original Article

Estimating Interspecific Economic Risk of Bird Strikes With Aircraft

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Wildlife Services, National Wildlife Research Center

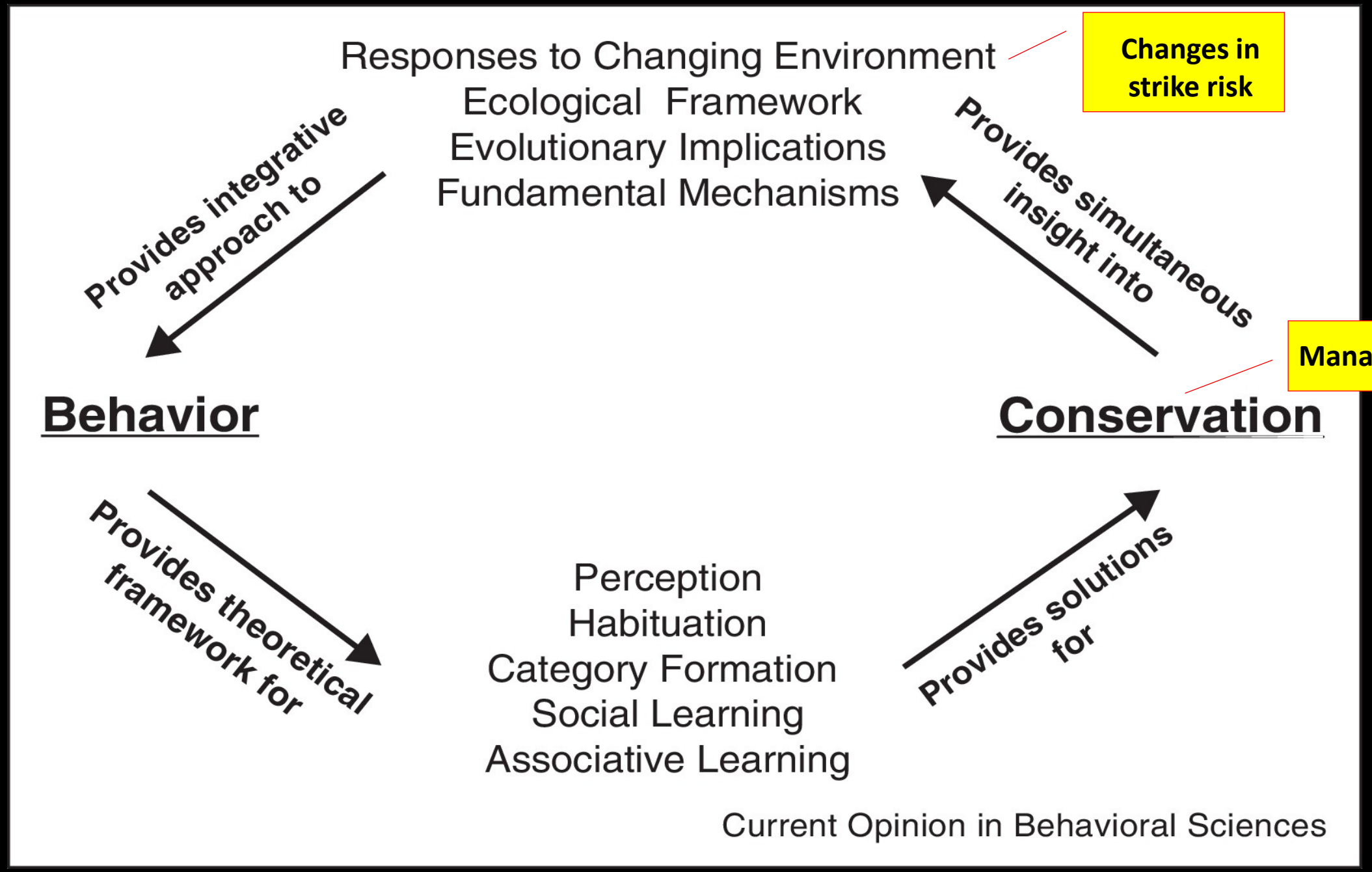
Ohio Field Station

Project Title: Understanding And Exploiting Wildlife Behavior To Mitigate Wildlife Collisions With Aircraft, Other Vehicles, And Structures

https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nwrc/sa_research/CT-Research-by-Topic?p=Aviation_Safety

Research Goal

Generate and disseminate ecological information related to wildlife collisions with vehicles and structures, particularly civil and military aircraft.



Roth and Krochmal. 2015. Cognition-centered conservation as a means of advancing integrative animal behavior. Current Opinion in Behavioral Sciences 6:1-6.

Animal Sensory Ecology

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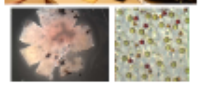
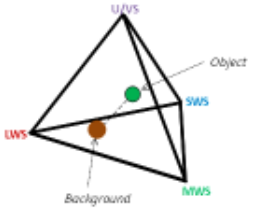
Overall research approach





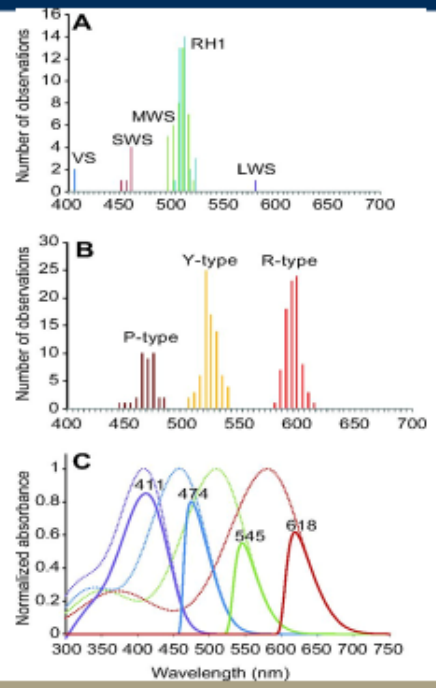
- Visual field configuration
- Visual acuity
- Temporal visual resolution
- Sensitivity of photoreceptors

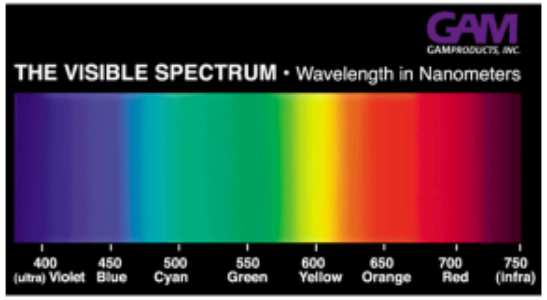
- Increase conspicuousness of stimuli from the target species' visual perspective

- Visual attention
- Detection time
- Escape time

Visual physiology → Perceptual modeling → Behavior experiments

USDA
United States Department of Agriculture





Moore, B. A., P. Baumhardt, M. Doppler, J. Randolet, B. F. Blackwell, T. L. DeVault, E. R. Loew, and E. Fernández-Juricic. 2012. Oblique color vision in an open-habitat bird: spectral sensitivity, photoreceptor distribution, and behavioral implications. J. Experimental Biology 215:3442–3452.

Wildlife Services
Protecting People • Protecting Agriculture • Protecting Wildlife

Risk perception

- Detection
- Processing of salient cues
  - Period of low-quality assessment
  - Heightened alert
  - Period of high-quality assessment
- Flight

Role of avian sensory ecology in reducing strike rates?

Can we enhance avian detection and avoidance of aircraft?


DJI Inspire 2


Falco


3DR Solo


Robofalcon (ornithopter)

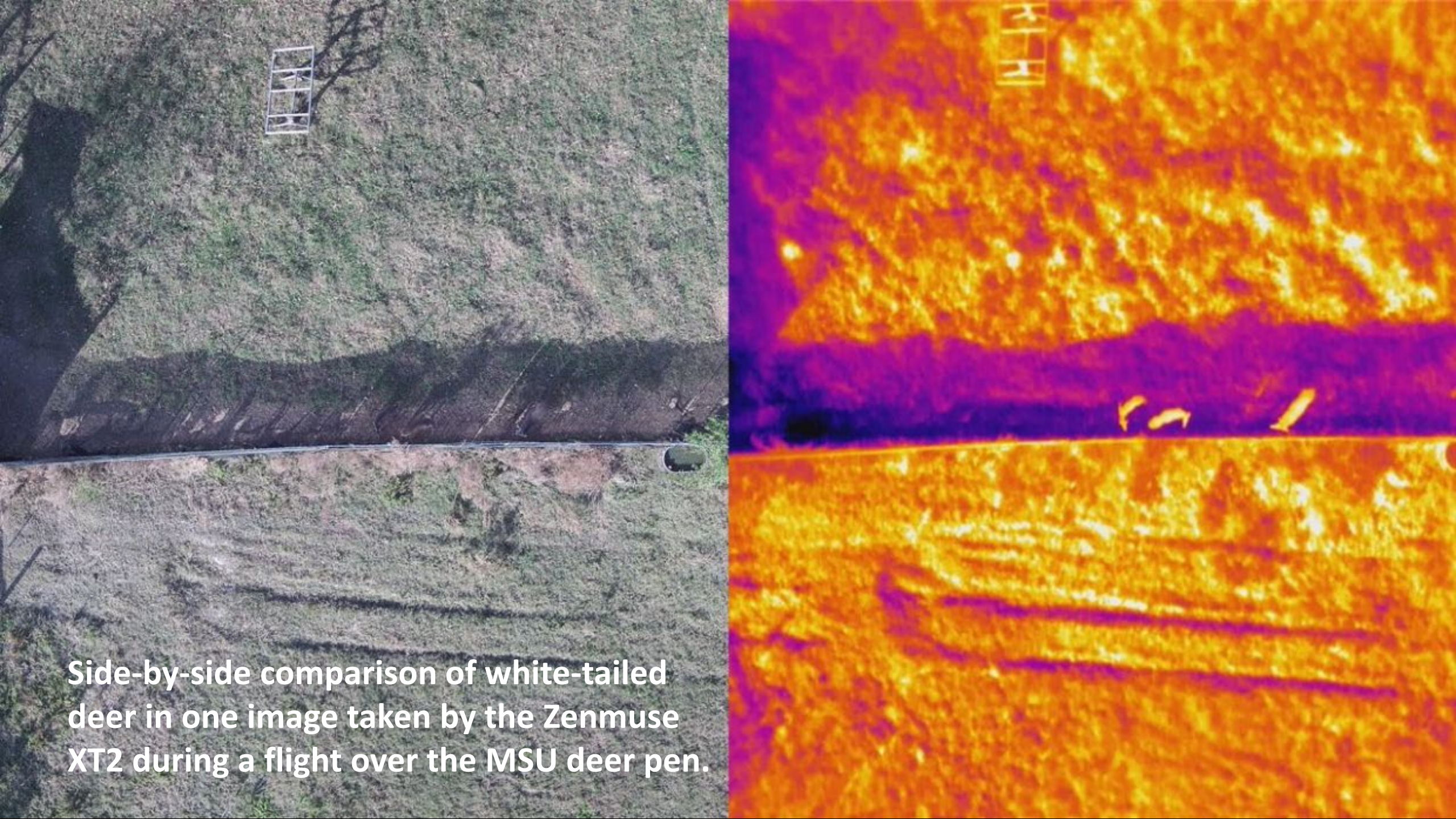
sUAS Research

Questions remain as to how sUAS applications in hazing and survey contexts can be adapted to animal behavioral responses to aircraft approach.

Table 2 Response of mixed flocks of waterfowl to UAVs of different shapes flying overhead at various altitudes. For fixed wing UAVs the lower altitudes (15 m) represent take-off where the UAV was launched directly towards the birds before gaining height. NR (green squares) = No discernible response, V (yellow squares) = Vigilance response detected, F (red squares) = Flight response. Cells are marked "N/A" where a given UAV did not fly over birds at that altitude.

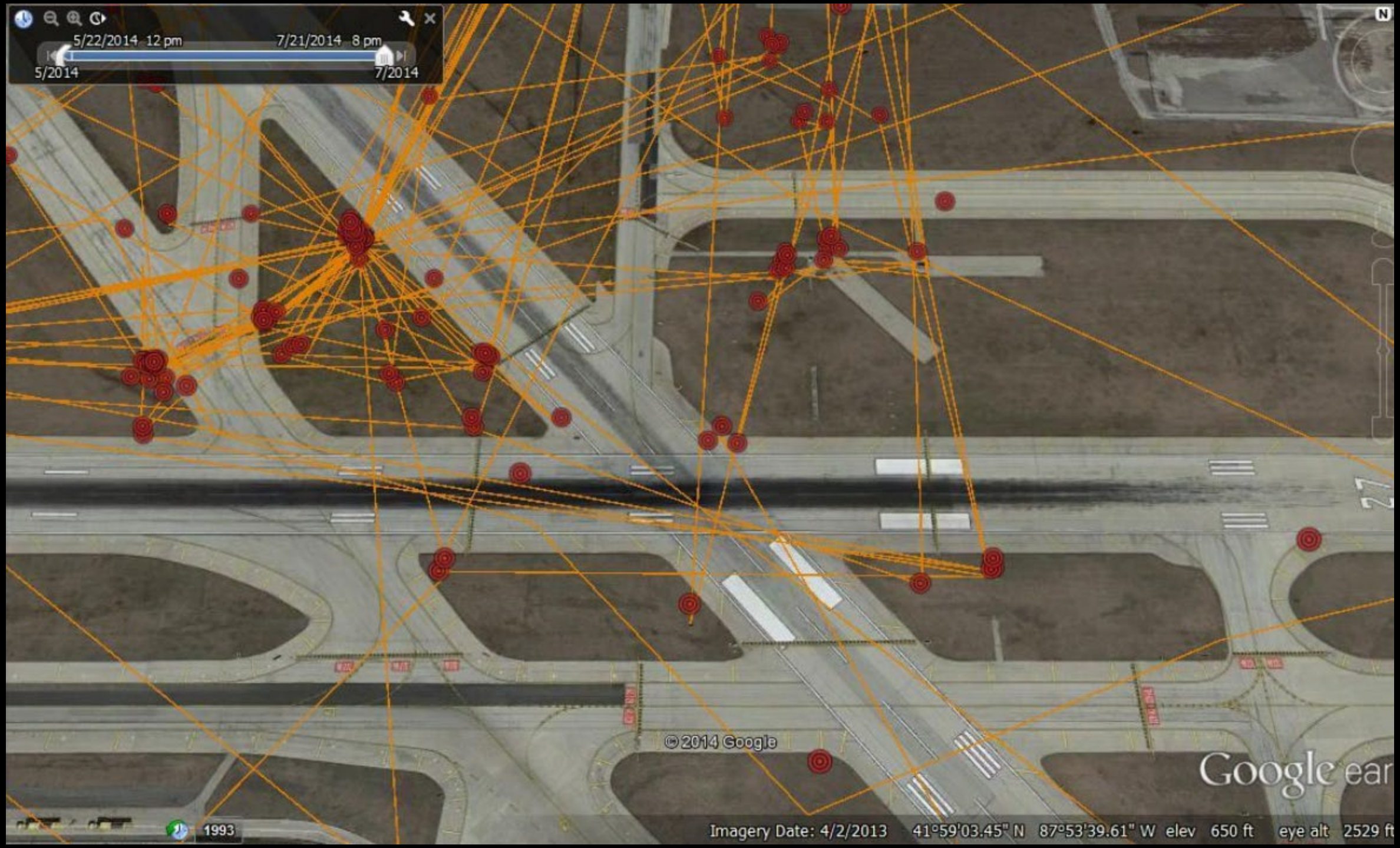
UAV	Shape	Altitude Above Water						
		100 m	90 m	80 m	70 m	60 m	50 m	15 m (take-off)
UAVER Avian-P		NR	NR	NR	NR	V	N/A	F
Skylark II		NR	NR	NR	NR	V	NA	F
Drone Metrex Topodrone-100		NR	NR	F	F	F	N/A	F
DJI Phantom		N/A	N/A	N/A	N/A	N/A	V	V
FoxTech Kraken-130		NR	NR	NR	NR	NR	V	N/A

McEvoy et al. (2016), *PeerJ*, DOI 10.7717/peerj.1831



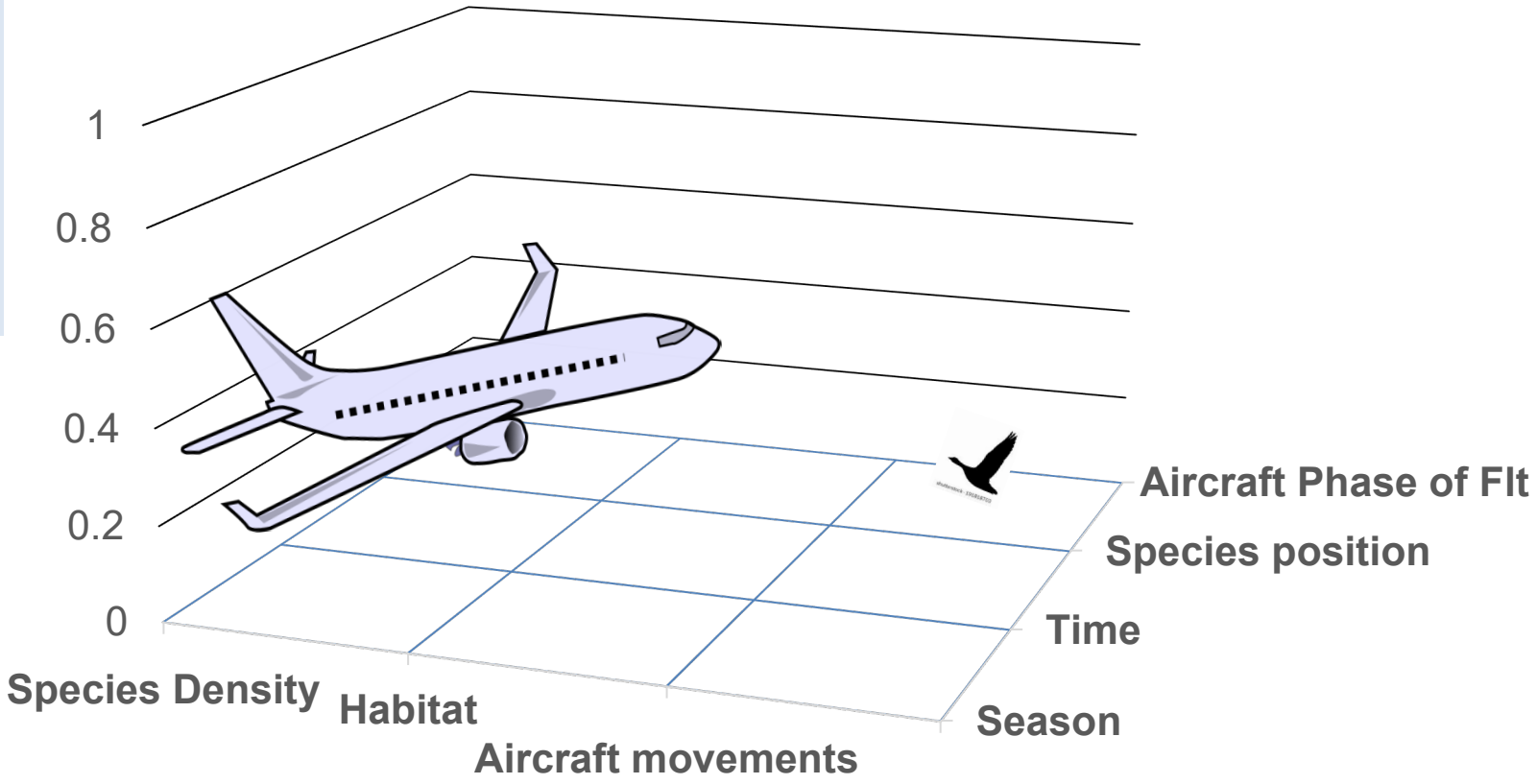
Side-by-side comparison of white-tailed deer in one image taken by the Zenmuse XT2 during a flight over the MSU deer pen.

Bird Movements/raptor translocation

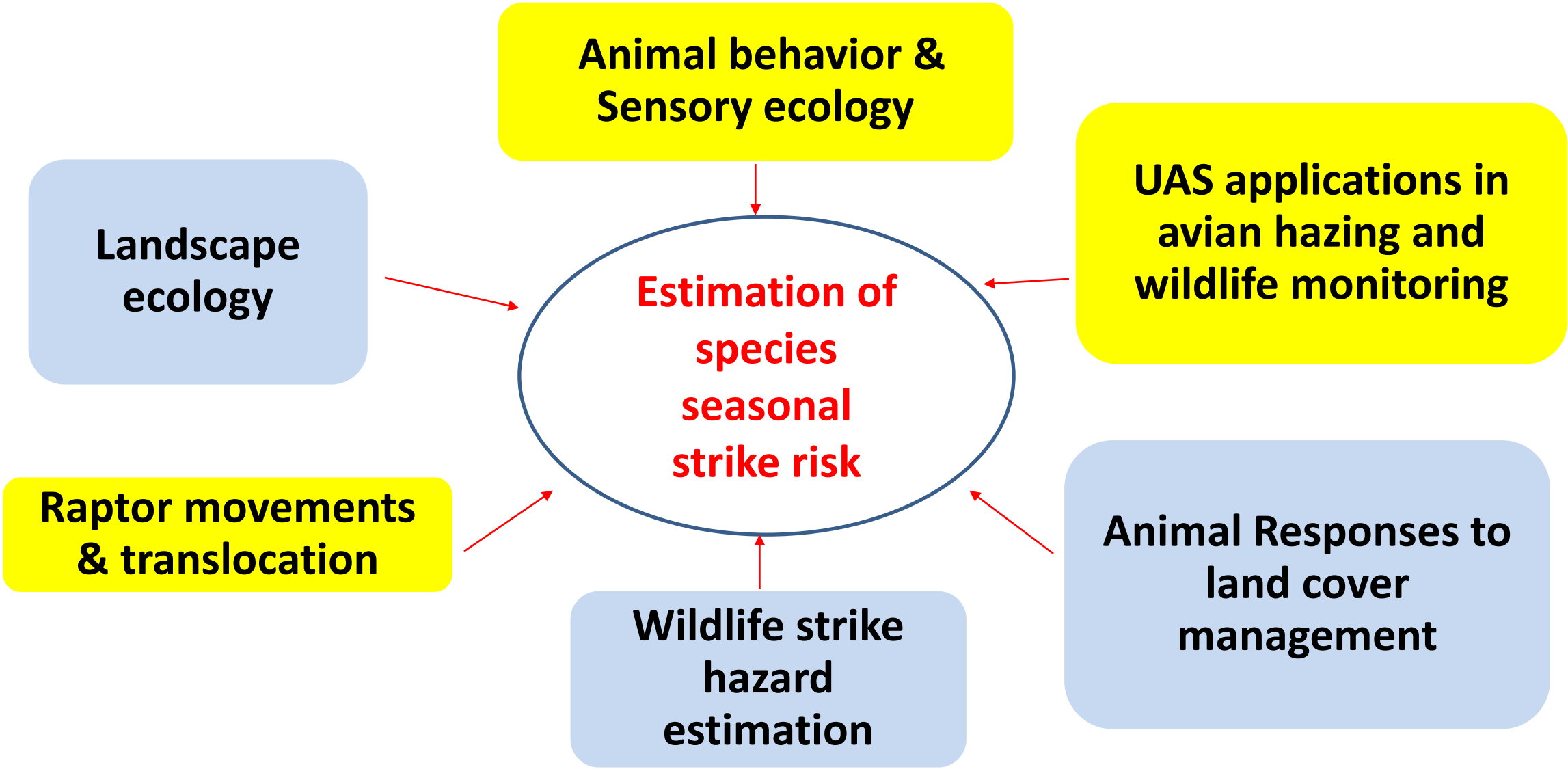

5/22/2014 12 pm
7/21/2014 8 pm
5/2014
7/2014
© 2014 Google
Google ear
1993
Imagery Date: 4/2/2013 41°59'03.45" N 87°53'39.61" W elev 650 ft eye alt 2529 ft

Components of Strike Risk

The effectiveness of WS management and research is measured, ultimately, via strike risk.



Looking ahead


Animal behavior & Sensory ecology
Landscape ecology
UAS applications in avian hazing and wildlife monitoring
Estimation of species seasonal strike risk
Raptor movements & translocation
Animal Responses to land cover management
Wildlife strike hazard estimation

Collaborations

Questions?