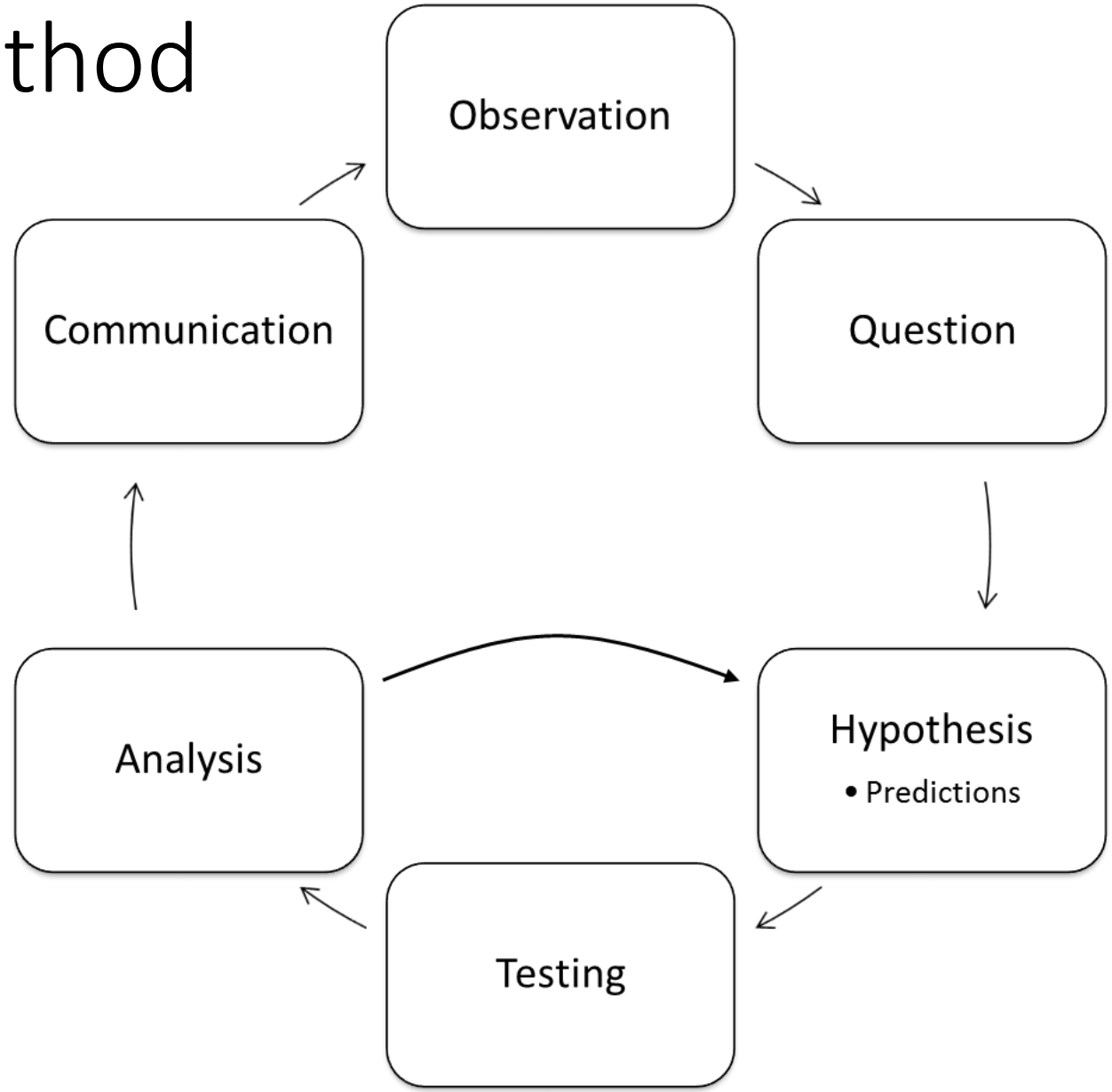
NREM/BIOL 4464 (Ornithology) – Guest Lecture

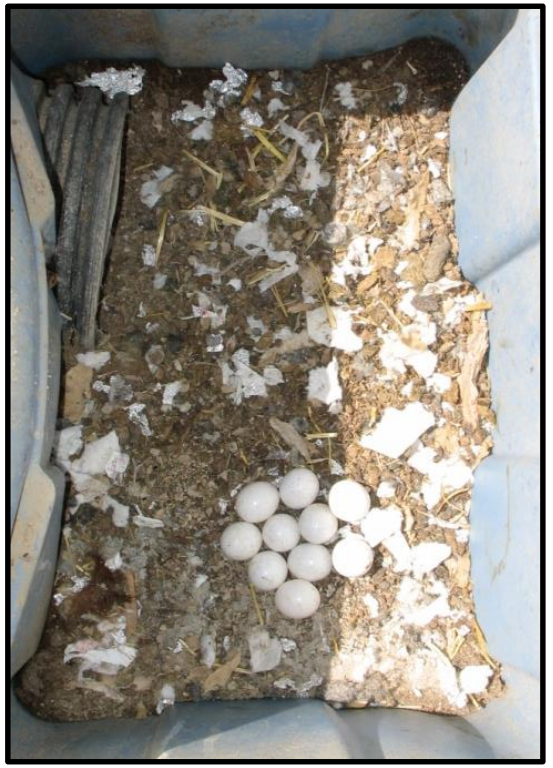
Corey Riding

8 March 2017

Scientific Method



Bird Nests



Burrowing Owl Observations

- Small, migratory.
- Opportunistic hunters.
- Often have fleas.
- Nest underground.
- Bring materials (often dung) to burrow.

Martin (1973)

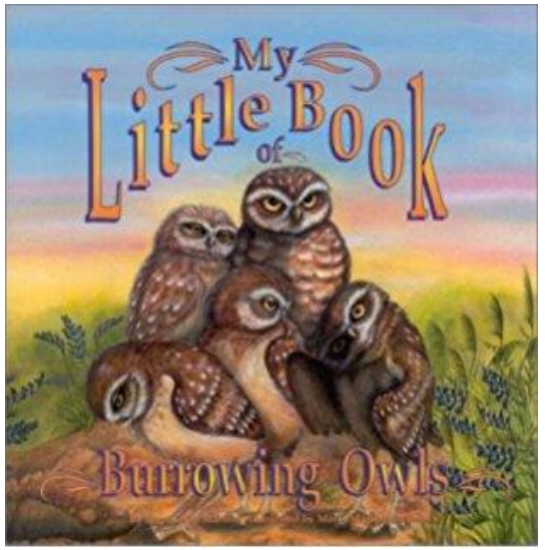
- One of the first biologists to make substantial observations of burrowing owls.
- Notable observation: they collect livestock dung to place in and around burrow.
- Question: Why? What's the purpose of the dung?
- Hypothesis: Dung masks odors associated with nest.
  - More difficult for scent-oriented predators to detect.
  - Martin never tested it…

Green & Anthony (1989)

- Hypothesis: dung masks scents from predators.
  - Prediction: Nests without dung are more likely to be depredated.

- Test: observe predator activity at burrows with and without dung.

- Analysis: 2 of 15 (13%) depredated nests had dung, and 23 of 32 (72%) non-depredated nests had dung.



Further Testing

Brady (2004)

- Hypotheses:
  1. Mask scents.
  2. Create optimal microclimate.
  3. Reduce ectoparasites.
- Only microclimate hypothesis supported.

Levey et al. (2004)

- Hypotheses:
  1. Mask scents.
  2. Attracts prey (dung beetles).
- Only prey attraction hypothesis supported.

Smith & Conway (2007)

- Hypotheses:
  1. Mask scents.
  2. Attracts prey (dung beetles).
  3. Attract mates.
  4. Indicate occupation.
- Prey attraction (and maybe occupation) supported.

Controversy? … Not really.

Scent-masking hypothesis has no real support.

- Possible sampling errors in Green & Anthony.
- Other hypotheses still tenable.

Now what?

More observations:

- Owls do not clean material after use.
- Often reuse burrows for nesting.
- Ectoparasites may live in old material (happens in other species' nests).

Old Nest Material

Does it affect reuse or breeding parameters?

- Thompson and Neill (1991)
- Davis et al. (1994)
- Olsson and Allander (1995)
- Gowaty and Plissner (1997)
- Stanback and Dervan (2001)
- Stanback and Rockwell (2003)
- Mazgajski (2003)
- Mazgajski (2007)
- García-Navas et al. (2008)
- Fast et al. (2010)

Riding (2015)

Hypotheses:

- Owls more likely to use burrows with dung.
- Owls more likely to get fleas when reusing burrows.

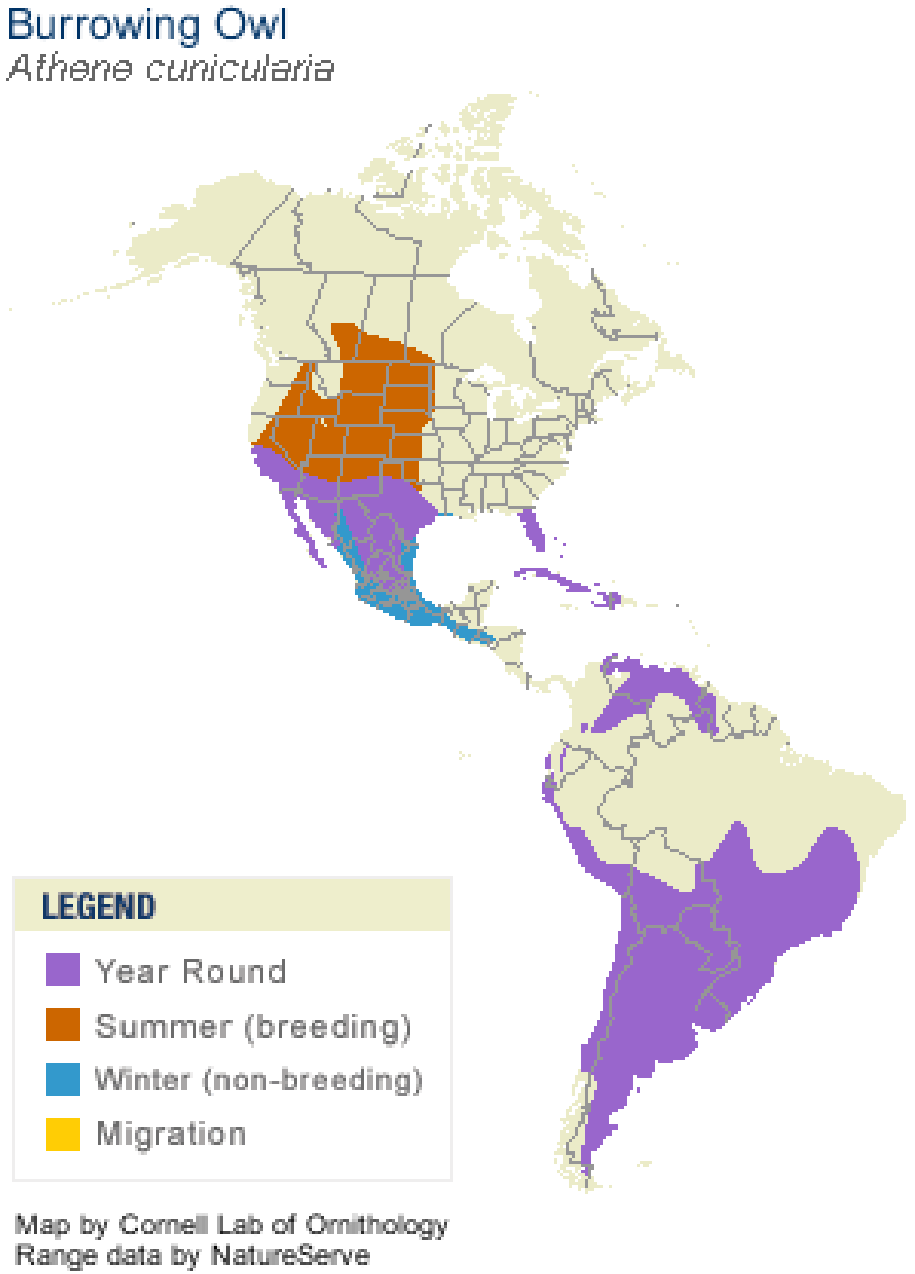
Test – modify material at previously used burrows:

1. Clean
2. Microwave
3. Control

Analysis: treatment had no effect on flea levels, but owls were more likely to reuse burrows with old material.

Why Does This Matter?

- Burrowing owls in population decline, especially on north edge of range.
- We need to know as much about them as possible to effectively help them.
- Other issues affect multiple species…

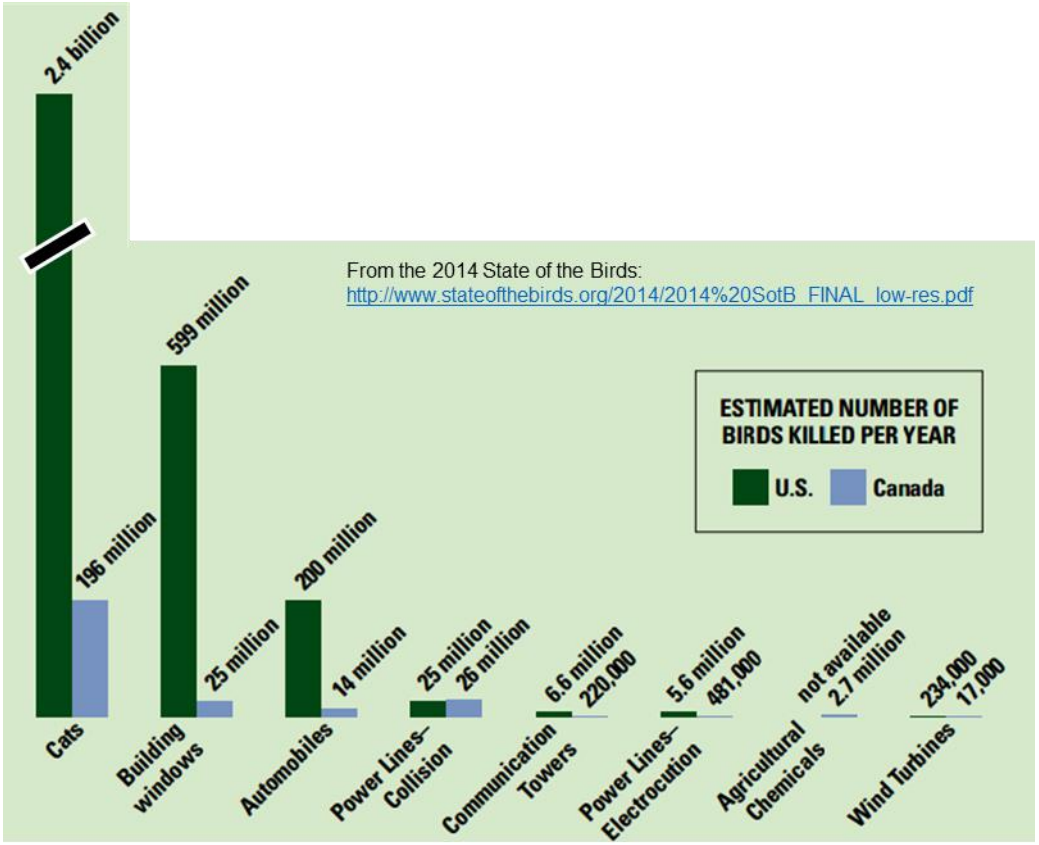


Estimates of Direct Anthropogenic Mortality

USA & Canada, annually:

- Total: 3.5 billion
- Collisions: 896 million

No good large-scale estimates for other locations.



Estimates from Calvert et al. (2013) and Loss et al. (2014)

Do Collision Fatalities Affect Populations?

Arnold & Zink (2011): “no discernible effect”

- Schaub et al. (2011) – analytical methods
- Klem et al. (2012) – limited sampling

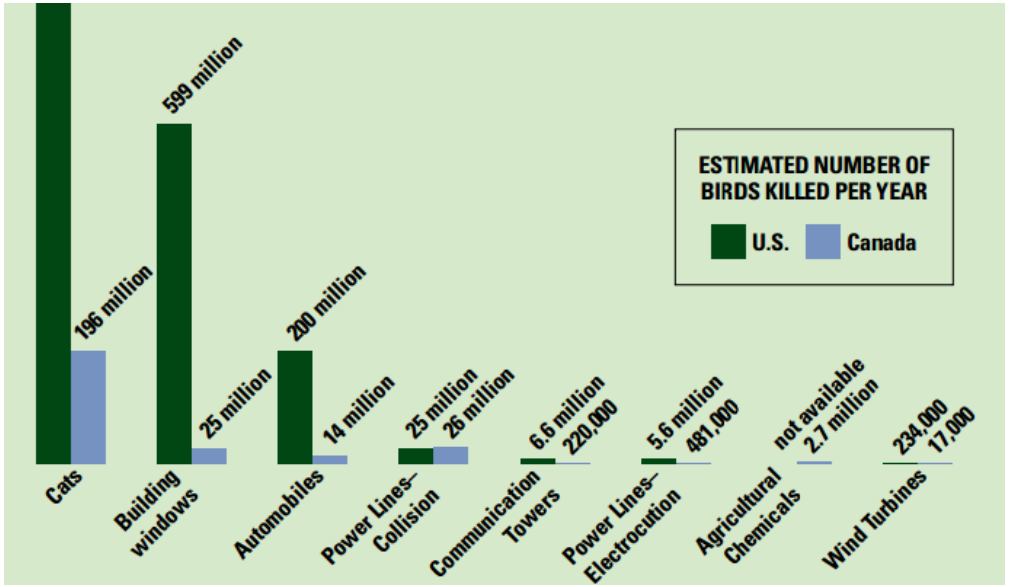
Longcore et al. (2013): “≥1% of total population for 29 species”

Sustainable yield rates vary in other taxa:

- 1.6% in female polar bears (Taylor et al. 1987)
- 2.0-3.1% in Great Lakes sturgeon (Haxton et al. 2014)

Deadliest Collision Types

4. Communication tower
3. Utility line
2. Automobile
1. Building/window



Patterns of Deadliest Collision Types

4. Communication tower

3. Utility line

2. Automobile

1. Building/window

Nocturnal migrants.

- Gehring et al. (2009)
- Longcore et al. (2013)

Artificial lights.

- Jones & Francis (2003)
- Bolshakov et al. (2013)

Patterns of Deadliest Collision Types

4. Communication tower
3. Utility line
2. Automobile
1. Building/window

Fast fliers with high body mass.

- Bevanger & Broseth (2004)
- Jenkins et al. (2010)

“Poor fliers” of large size.

- Janss (2000)

Patterns of Deadliest Collision Types

4. Communication tower
3. Utility line
2. Automobile
1. Building/window

Barn owls most frequent.

- Boves & Belthoff (2012)
- Guinard et al. (2012)

Foraging behavior & habitat.

- Santos et al. (2016)

Patterns of Deadliest Collision Types

4. Communication tower
3. Utility line
2. Automobile
1. Building/window

Structure and landscape.

- Cusa et al. (2015)
- Kummer et al. (2016)

Seasonality/migration.

- Borden et al. (2010)
- Hager et al. (2013)

Other Anthropogenic Collisions

Wind Turbines

- Raptors, gulls, etc.

Fences

- Mostly galliforms.

Sound Barriers

- Common species.

Collision Research at OSU

- 2009-2017, Single-building (NRC) monitoring
- 2013-2014, Continent-wide collaboration
- 2015-2017, Multiple buildings and research questions

Research Topics

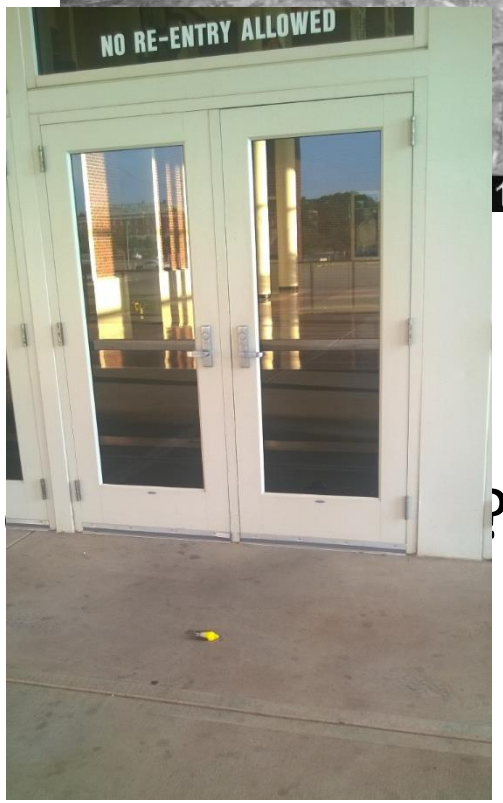
1. Estimating carcass quantification biases.
2. Temporal patterns of bird-window collisions.
3. Multiscale assessment of structural risk factors.
4. Effects of artificial lighting.
5. Comparison of live and dead bird communities.

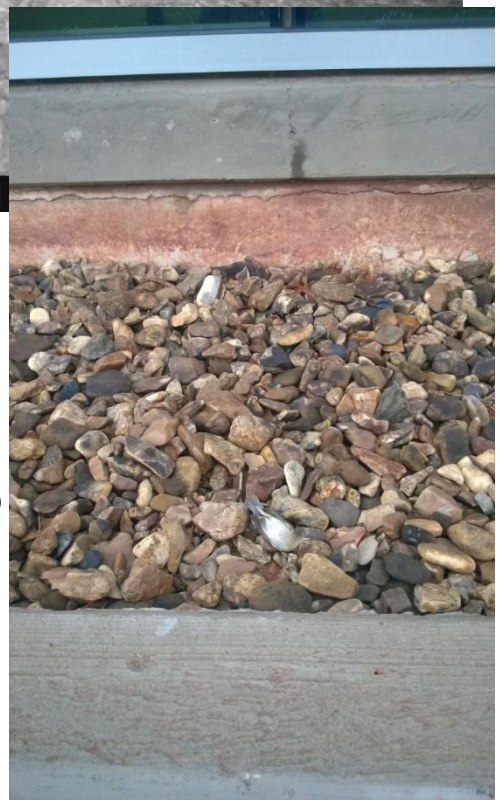
Carcass Quantification Biases

Raw counts are biased.

- Carcasses removed by scavengers.
- Carcasses not detected by surveyors.

1. How long do carcasses persist?
2. What species are primary scavengers?
3. What proportion of carcasses are detect
4. Does substrate affect detectability?





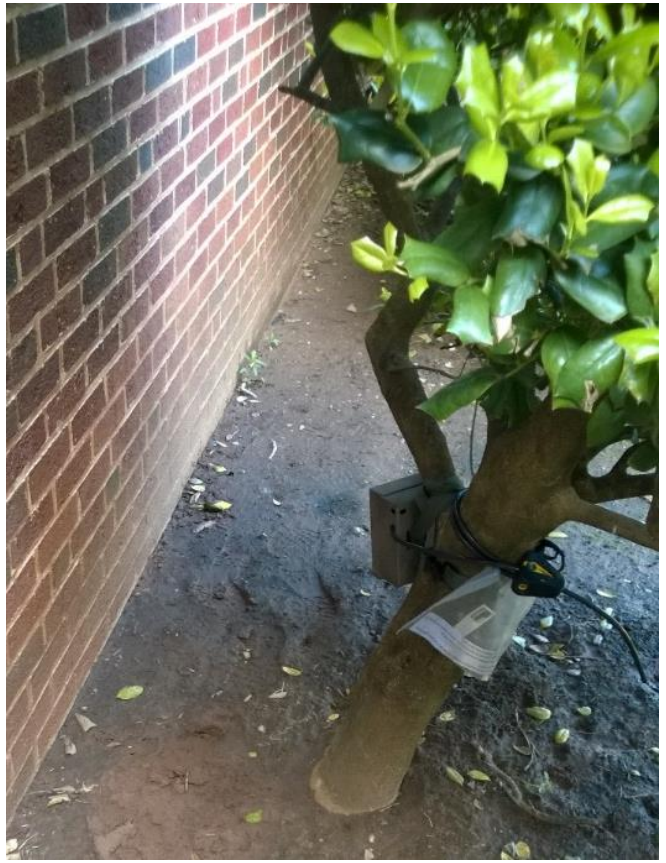
Carcass Quantification Biases

- **Scavenger removal**: place carcass with camera.

- **Observer detection**: place carcass on survey route.

Use mathematical models:

- Estimate biases.
- Adjust mortality rates.



Temporal Patterns

Minor evidence for hourly patterns.

- More collisions in mornings.

Evidence for seasonal patterns.

- More collisions during migration.

1. Does collision frequency vary with time of day?
2. Do daily collision patterns vary across seasons?
3. When are residents most likely to collide?

Morning surveys daily (spring-fall) or weekly (winter).
Afternoon & evening surveys periodically.

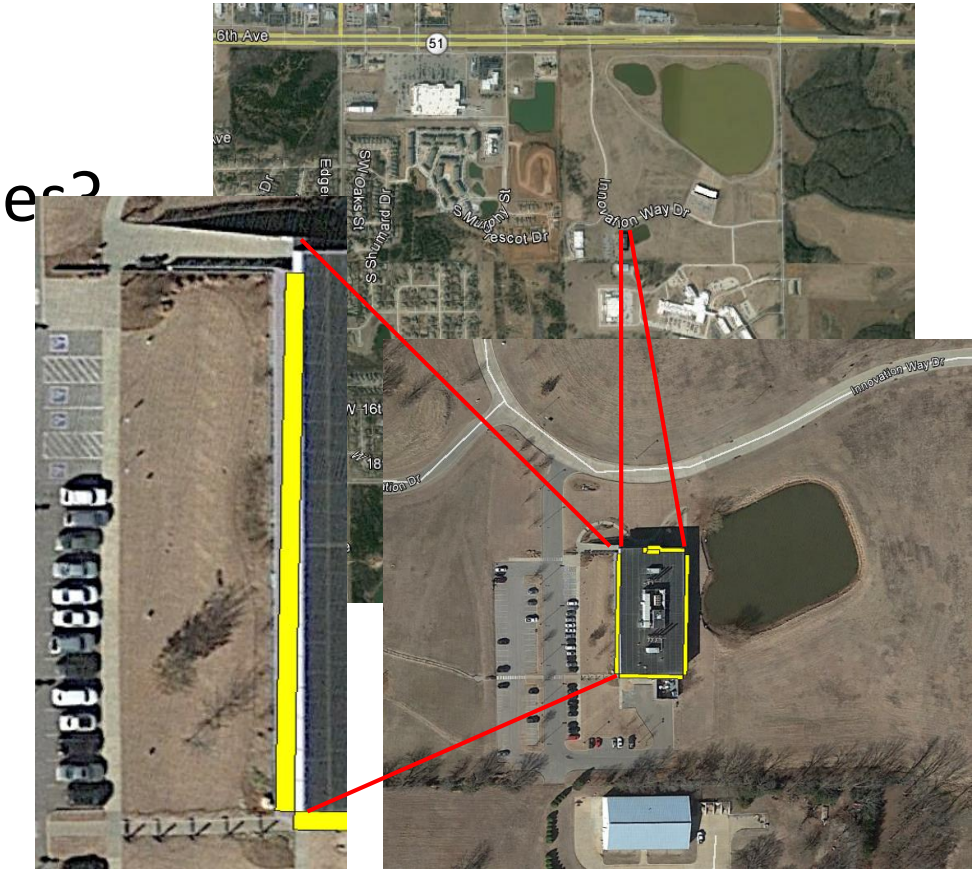
Structural Factors

- Many features may influence collision risk.

1. What façade features are important?
2. Do important features vary at across scales?

Compare at three scales:

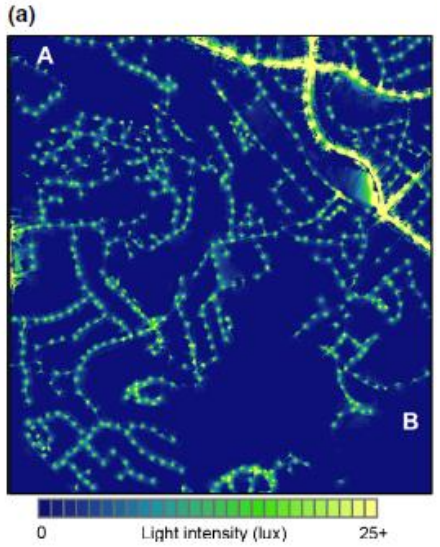
- Neighborhood
- Building
- Façade



Artificial Lighting

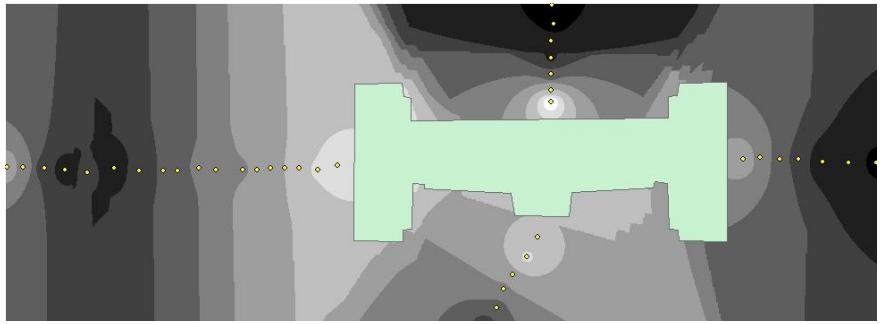
Lights can affect behavior.

1. Does collision rate correlate to ambient light?
2. Do flood lights affect collision rates?



Measure ambient light with/without flood lights.

Interpolate a “lightscape”.



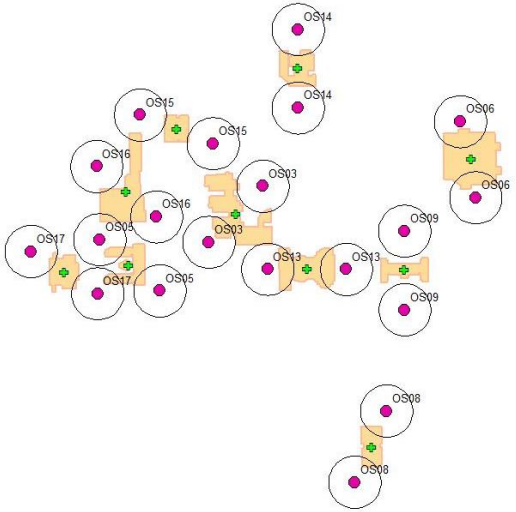
Compare to Live Birds

Collision risk varies among species.

1. Do collisions occur mostly in areas with more bird activity?
2. Which species are disproportionately vulnerable?

Live bird counts.

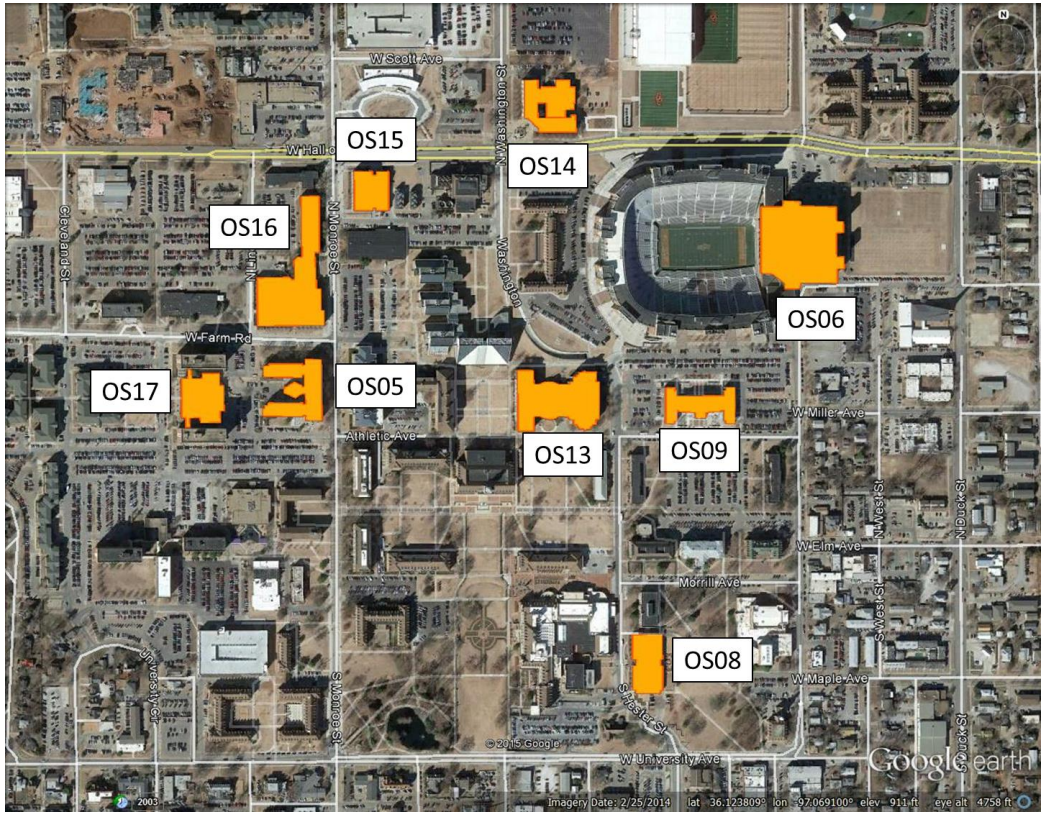
- Sample twice per season.



Citizen Science

Need volunteers for 2017 surveys:

- Apr-May, Mon-Sat, 7-9 am.
- Search 2 m swath around target building.
- Most surveys < 10 min.



Will hire one tech:

- Part-time (Apr-early May), near full-time (mid-May to early June).
- Will do carcass surveys, point counts, data entry, etc.

Raw Data

Common Name	N	Season(s)
Lincoln's Sparrow	34	Fall, Spring
Mourning Dove	26	Summer, Spring
European Starling	23	Spring, Summer
House Finch	17	Summer, Spring
American Robin	16	Summer, Spring
Swainson's Thrush	15	Spring
Northern Cardinal	12	Spring, Summer
Common Yellowthroat	10	Fall, Spring
Cedar Waxwing	9	Spring
Grasshopper Sparrow	9	Fall, Spring

Year	Period	Weeks	Buildings	Carcasses/ Non-fatalities	Species
2013	fall	3	6	12 / 2	7
2014	fall	3	10	16 / 3	10
2014	Oct-Nov	4	2	8 / 4	5
2015	spring-fall	30	15	138 / 71	41
2015-16	winter	23	3	3 / 0	3
2016	spring-fall	30	16	175 / 54	52
2016-17	winter	19	5	9 / 0	5
TOTAL	**–**	**71**	**18**	**361 / 134**	**68**