

Baseline Snake Species Occupancy in Madison-Area Prairie Restorations

By Will Vuyk

Advisor: Professor Catherine Woodward



Article

A global reptile assessment highlights shared conservation needs of tetrapods

(Cox et al., 2022)

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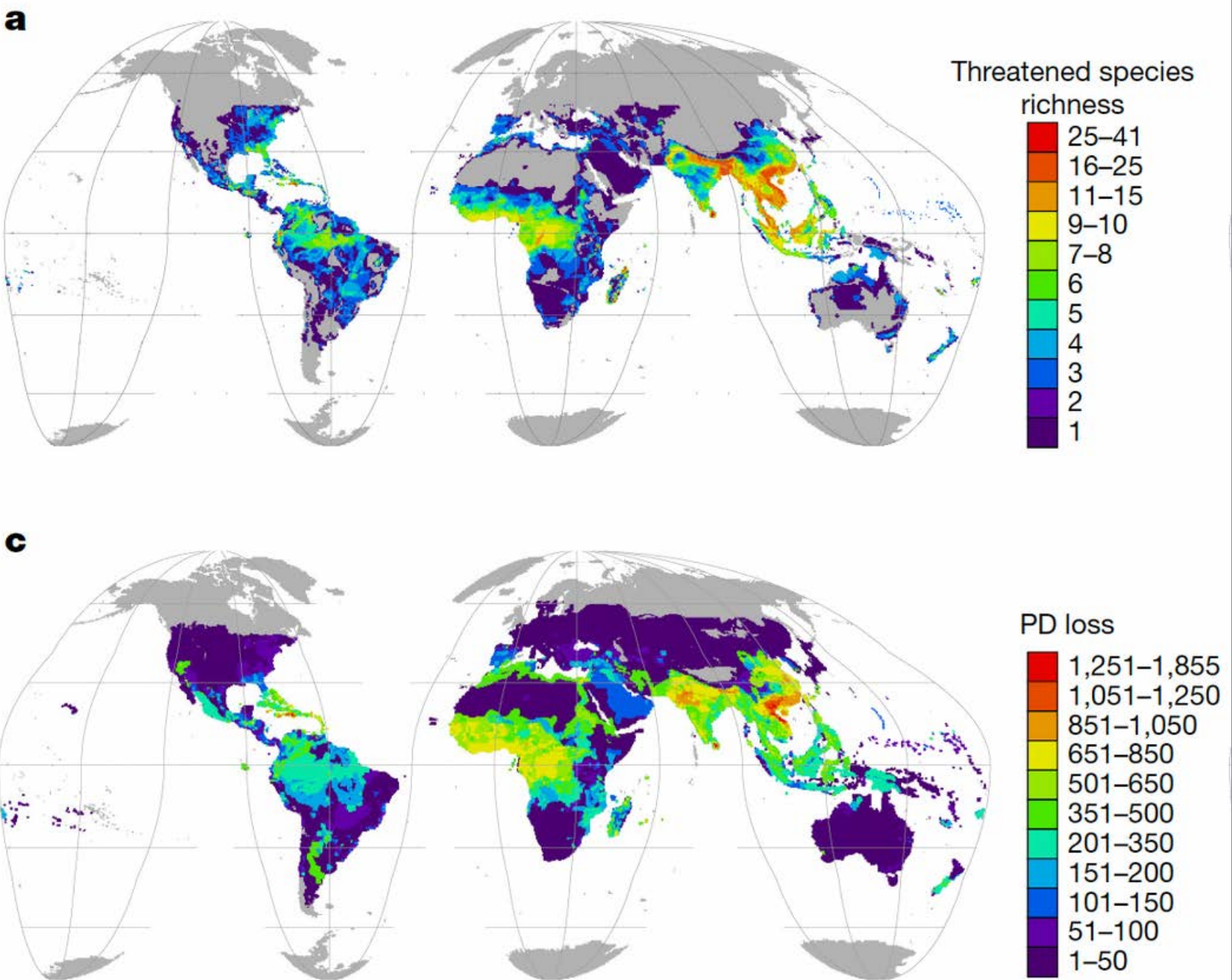
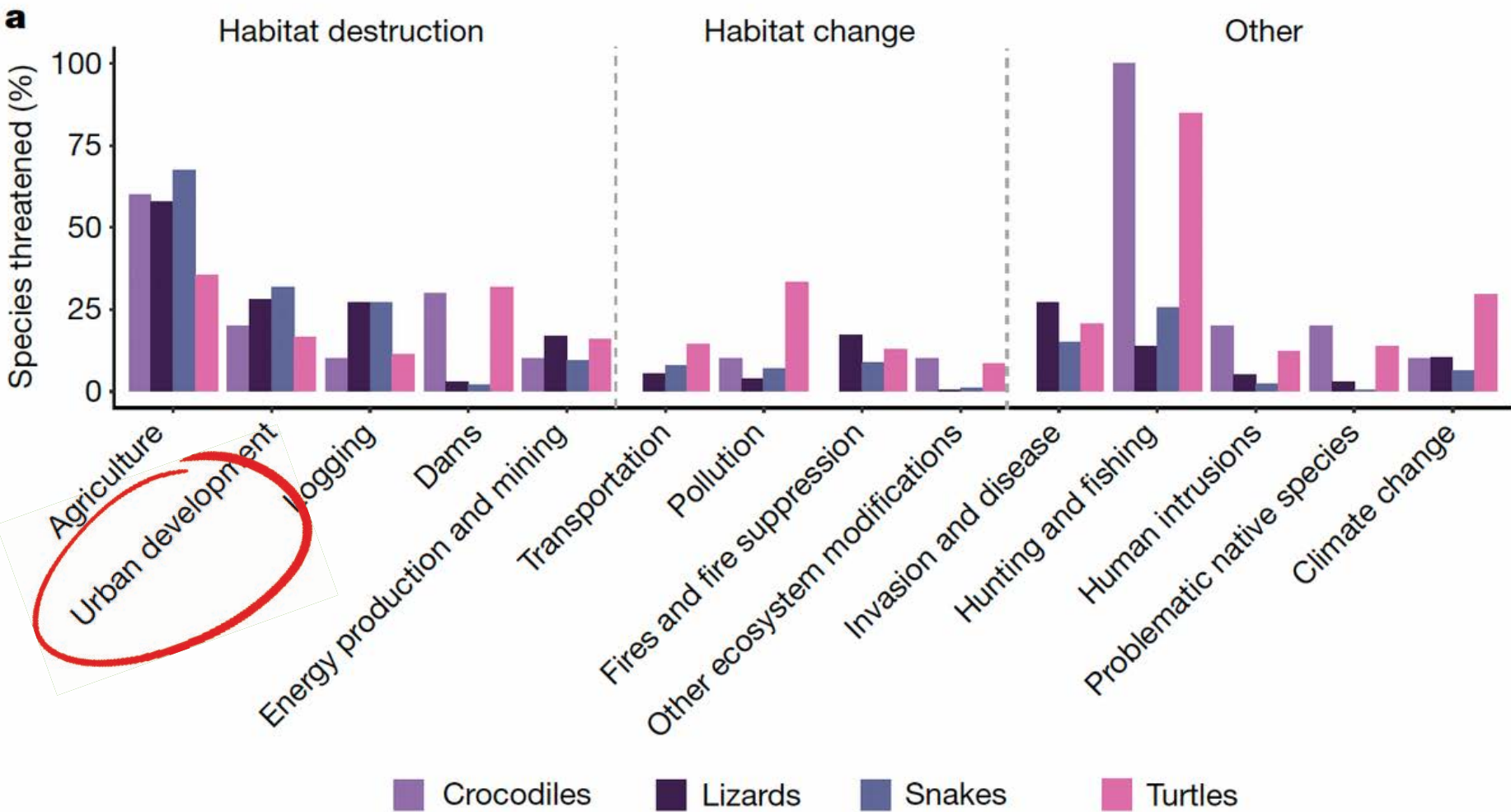
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 Check for updates

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Wisconsin Snakes



WISCONSIN
DEPARTMENT OF
NATURAL RESOURCES

- 21 species (Wisconsin DNR)
 - 9 species of special concern
 - 4 endangered species
- 16 species found in Dane County, according to DNR range maps
 - Common Garter Snake
 - Common Water Snake
 - Dekay's Brown Snake
 - Eastern Fox Snake
 - Eastern Hog-nosed Snake
 - Eastern Massasauga (Endangered)
 - Gopher Snake (Special Concern)
 - Gray Rat Snake (Special Concern)
 - Lined Snake (Special Concern)

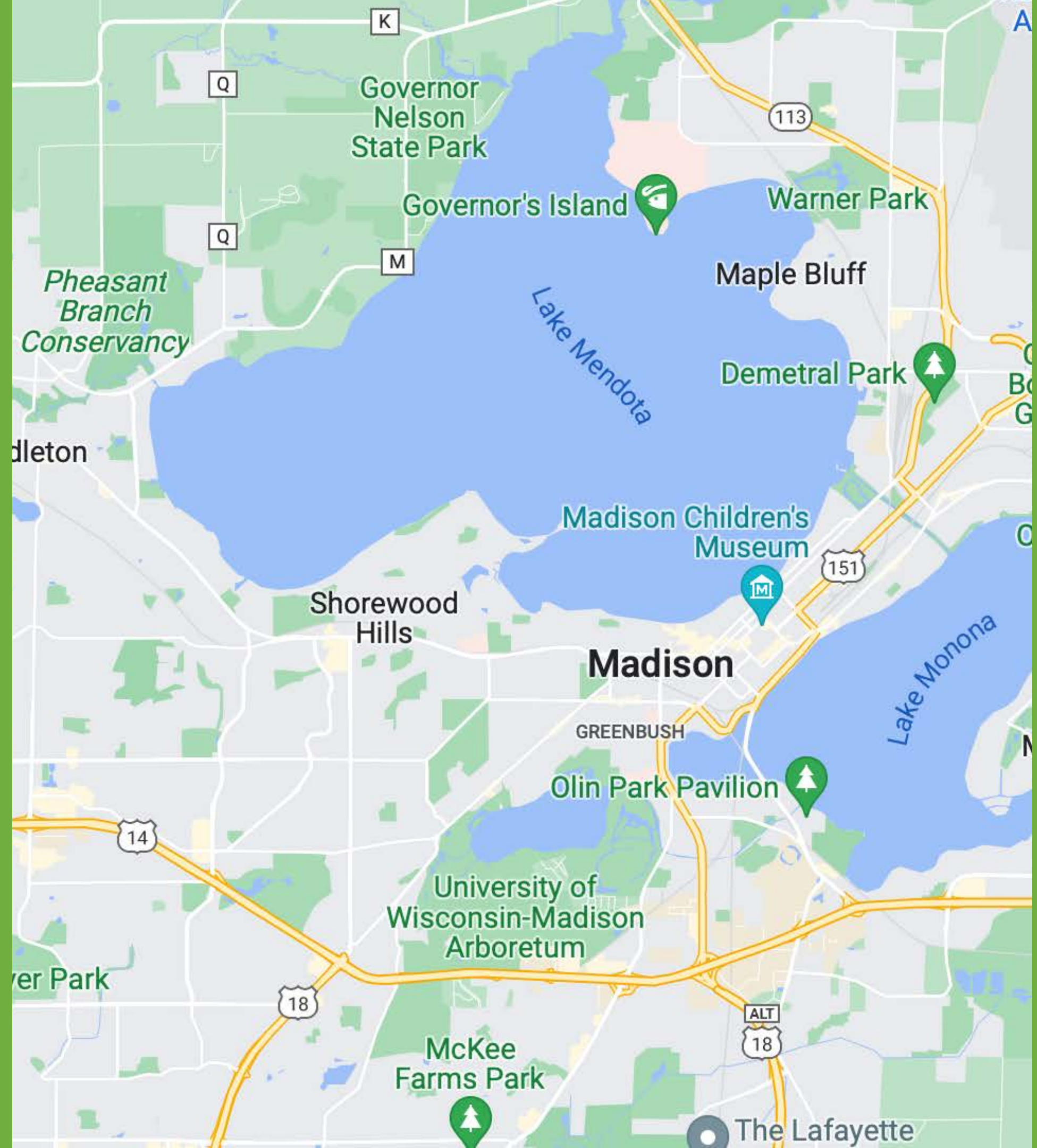


species range

- Milk Snake
- Blue Racer (Special Concern)
- Plains Garter Snake (Special Concern)
- Red-bellied Snake
- Smooth Greensnake
- Timber Rattlesnake (Special Concern)
- Western Ribbonsnake (Endangered)

Urban Ecology

- Urban spaces are ecologically relevant, but more precarious (Grimm et al., 2008)
- Restored natural spaces become "islands" in a sea of human infrastructure (Macarthur and Wilson, 2001)
- This is especially true for slow-moving terrestrial animals like reptiles and amphibians
- Restored sites not only important for snakes, but snakes are also important to the ecology of restored sites



Urban Environments are Perilous for Snakes

- Roads
- Pollutants
- Human hostility
- Domestic/feral animals
- Limited mobility and high mortality

(Andrews and Gibbons, 2005; Cassel et al., 2019)

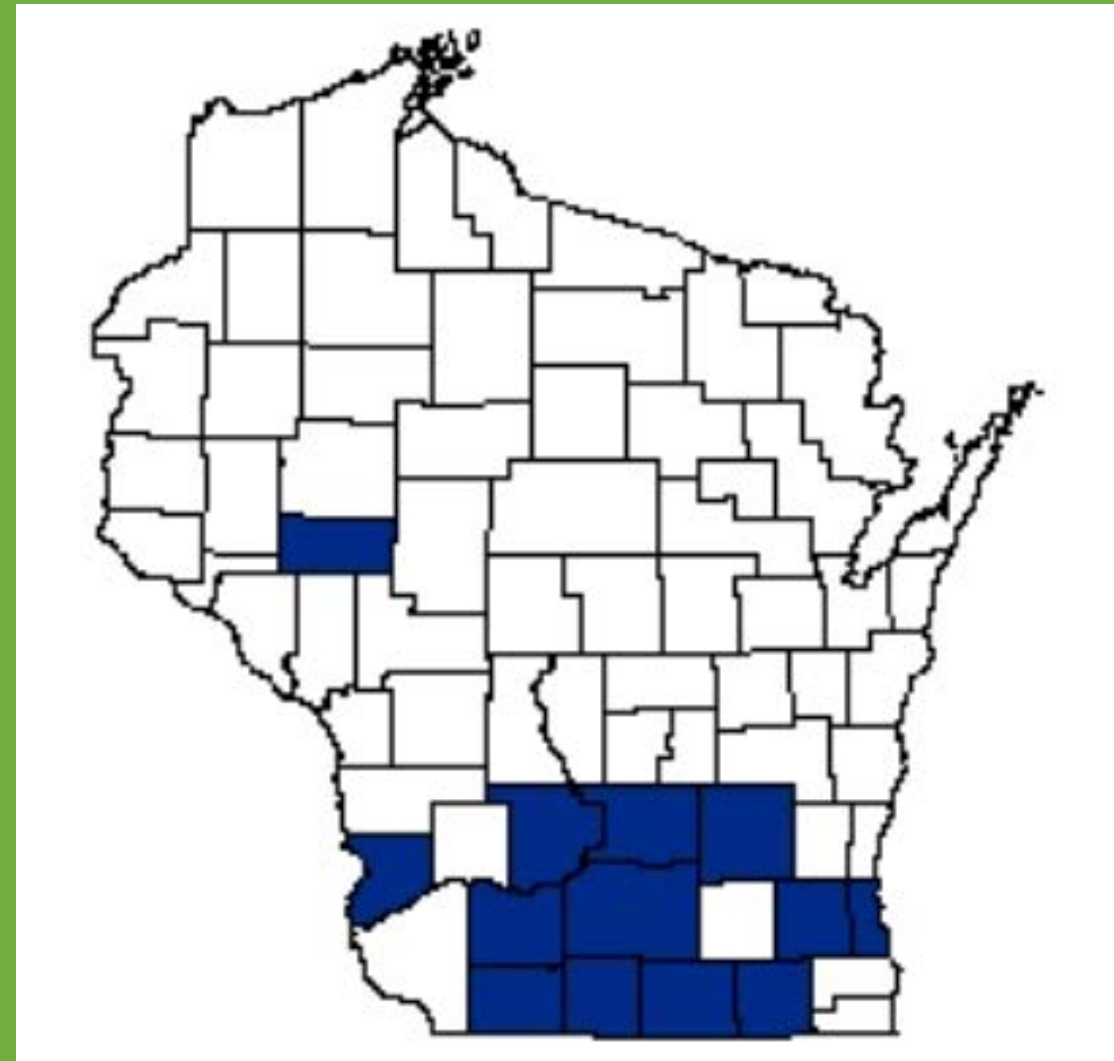


Urban Environments are Perilous for Snakes

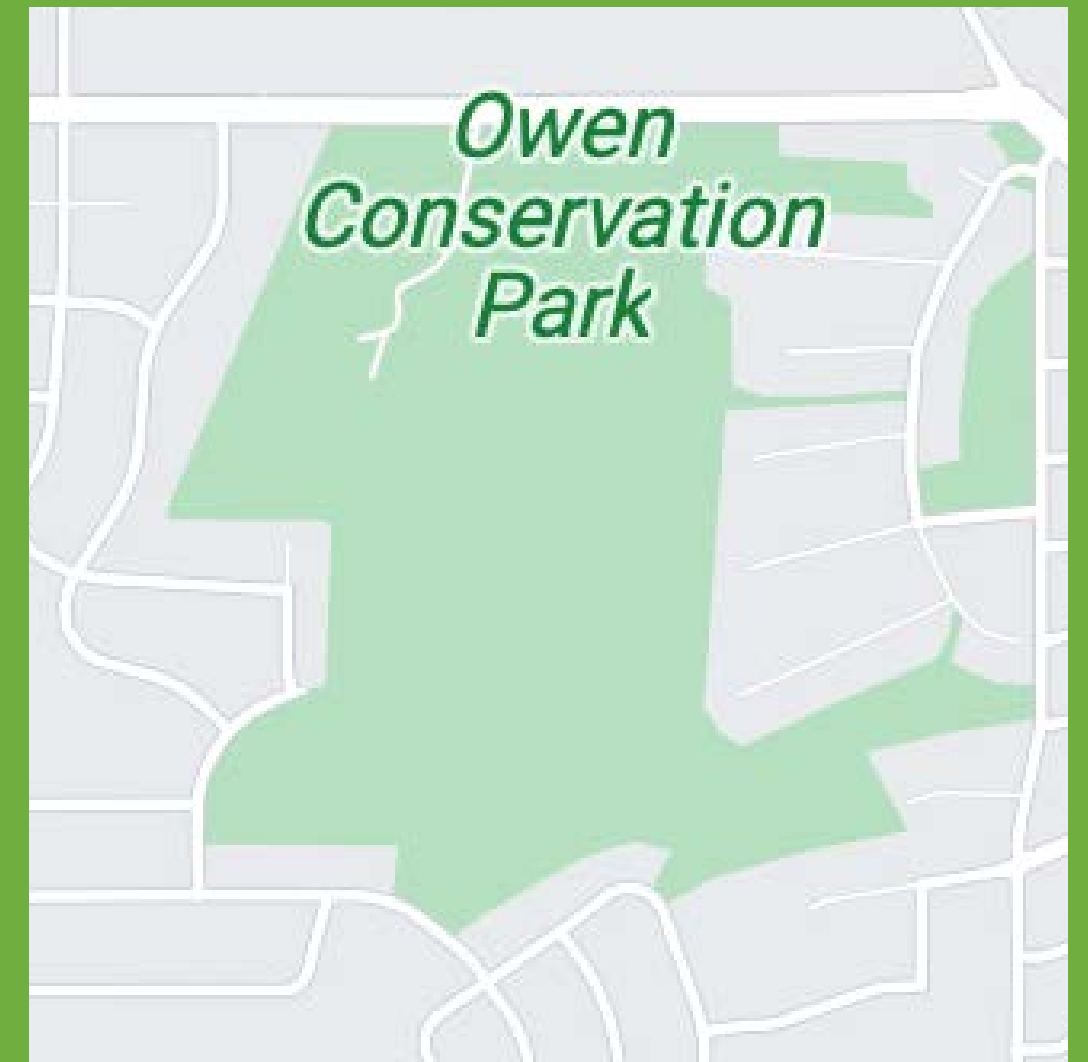
- Roads,
 - Human hostility
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- Limited mobility and high mortality
(Andrews and Gibbons, 2005; Cassel et al., 2019)



Plains Garter Snake



Confirmed at County Level



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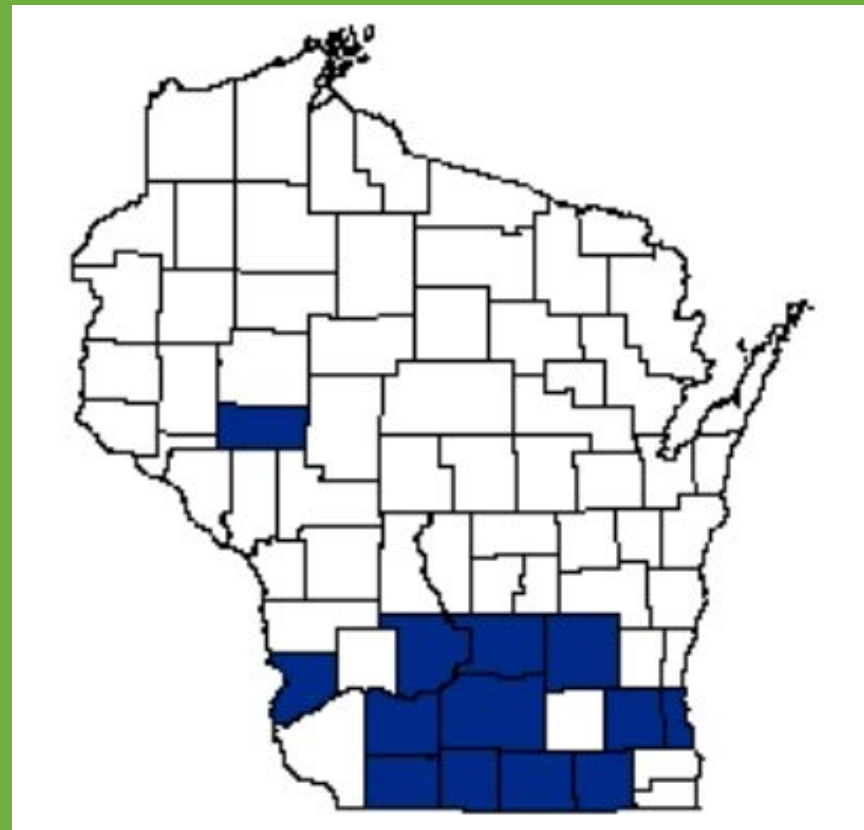
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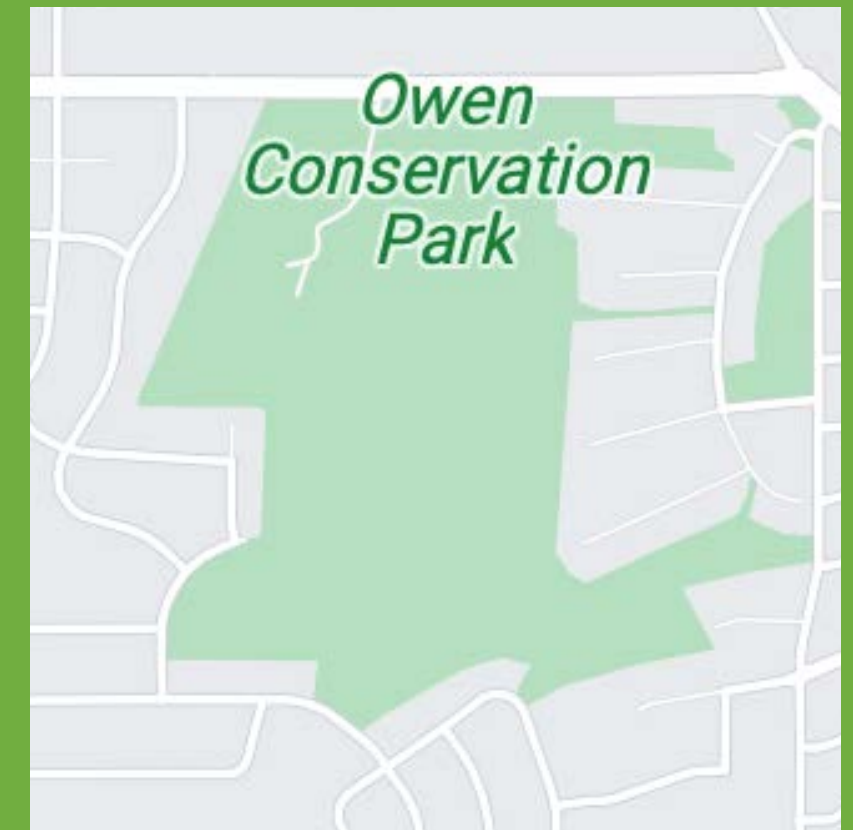
Can snake recolonization of a restored urban site be expected?



Plains Garter Snake



Confirmed at County Level



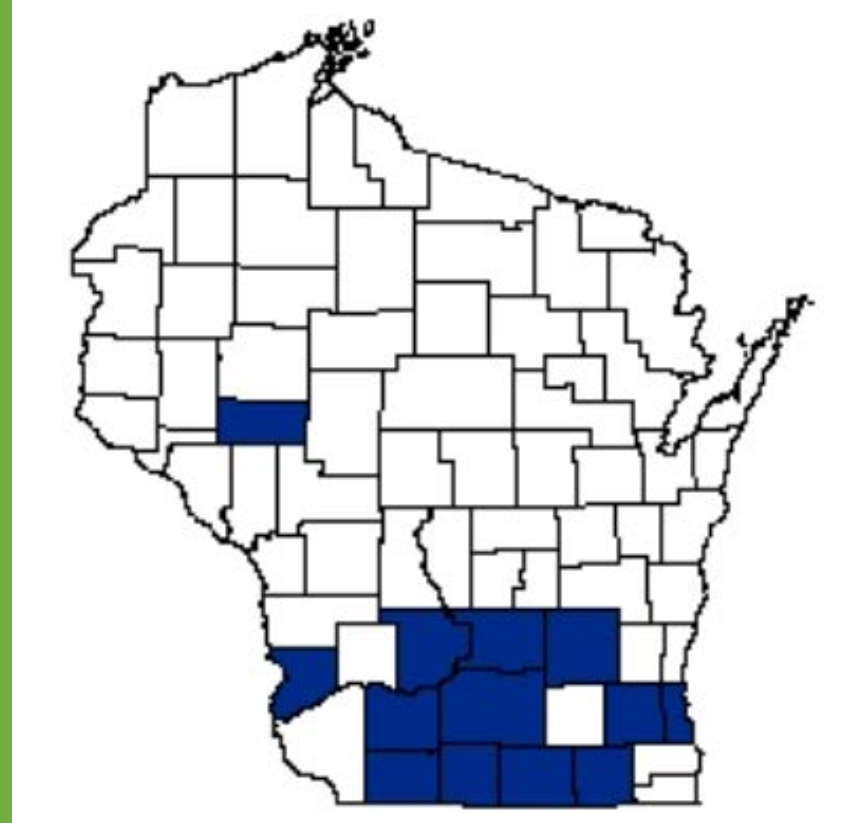
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Study Purpose

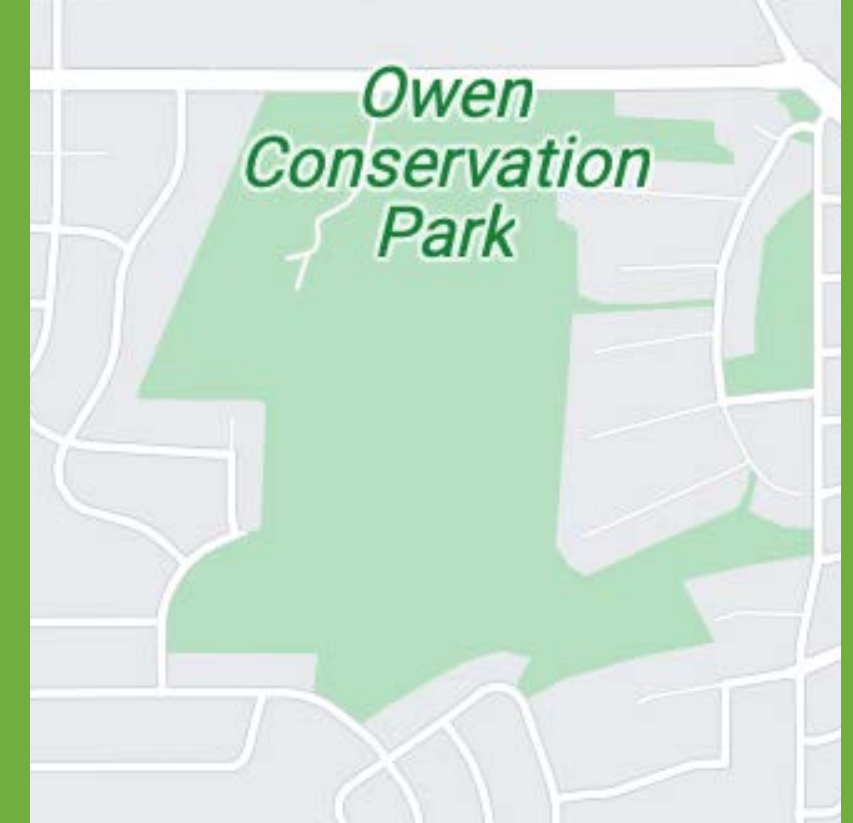
- Provide baseline data about snake communities in Madison-area prairie restorations
- Assess whether different, nearby sites varied in species richness



Plains Garter Snake



Confirmed at County Level



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Methods



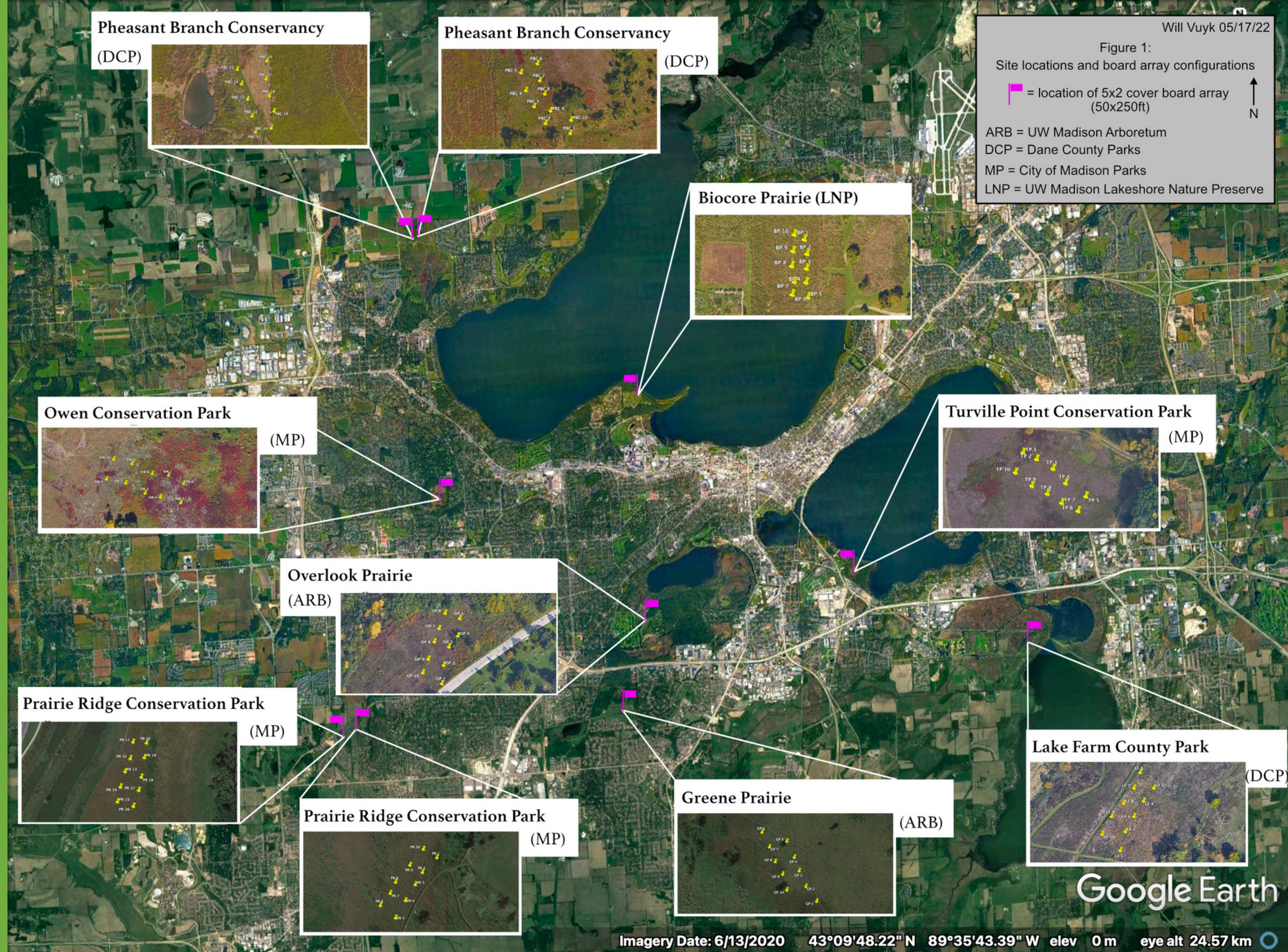
- Identical 5x2 board arrays at 8 different prairie sites
- 3'x4'x3/4" plywood boards, and smaller corrugated metal boards
- Each board checked 10 times between 06/21-10/21
- Time and weather standardized: 4 to 10pm, not when raining



Methods

Prairie Approximate Size

1. Biocore Prairie ~
a. **12 acres**
2. Greene Prairie ~
a. **20 acres**
3. Lake Farm County Park ~
a. **11 acres**
4. Overlook Prairie ~
a. **2.5 acres**
5. Owen Conservation Park ~
a. **30 acres**
6. Pheasant Branch Conservancy ~ **125 acres**
7. Prairie Ridge Conservation Park ~ **48 acres**
8. Turville Point Conservation Park ~ **4 acres**



Expected Results

21 snake species in Wisconsin
10 expected species in Dane County

- Blue Racer
- Common Garter Snake
- Dekay's Brown Snake
- Eastern Fox Snake
- Eastern Hog-nosed Snake
- Eastern Milk Snake
- Gopher Snake
- Northern Water Snake
- Plains Garter Snake
- Red-bellied snake



Expected Results

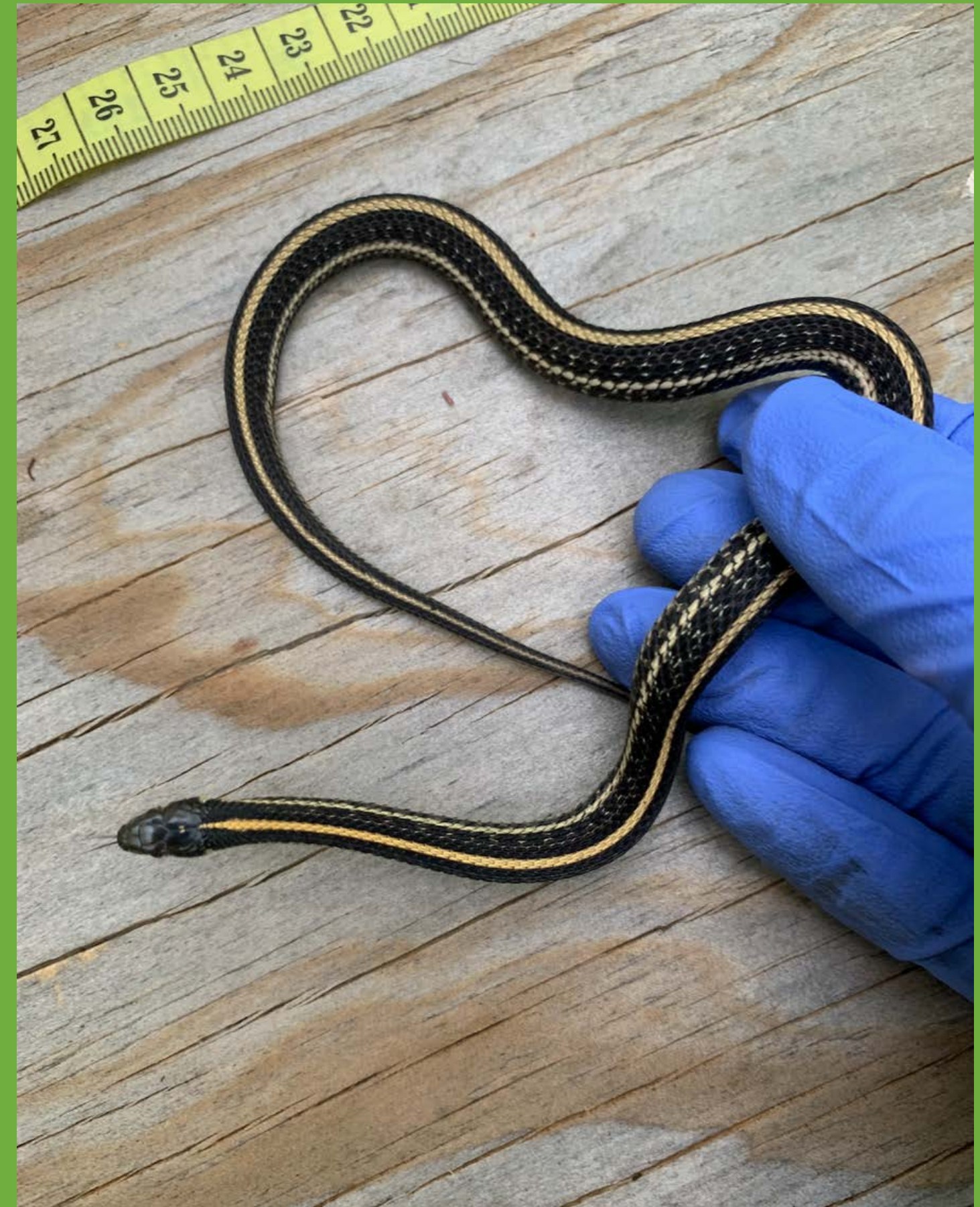
22 snake species in Wisconsin
10 species I expected to possibly find in
Madison

- Blue Racer
 - Common Garter Snake
 - Dekay's Brown Snake
 - Eastern Fox Snake
 - Eastern Hog-nosed Snake
 - Eastern Milk Snake
 - Gopher Snake
 - Northern Water Snake
 - Plains Garter Snake
 - Red-bellied snake
- 5 Species Encountered
- Common Garter Snake
 - Dekay's Brown Snake
 - Eastern Milk Snake
 - Plains Garter Snake
 - Red-bellied snake





Common Garter Snake



Plains Garter Snake



Dekay's Brown Snake



Red-bellied Snake



Eastern Milk Snake

Results

140 Snake Encounters
5 different species

-
- UW Madison
 - Dane County Parks
 - City of Madison Parks

Takeaways

- Differences between sites
- Effectiveness of cover boards (species specific)
- Plains Garter Snake

Site	Previously reported (iNaturalist, HerpMapper)
Biocore Prairie (Lakeshore Nature Preserve)	None
Greene and Overlook Prairies (Arboretum)	Dekay's Brown Snake Red-Bellied Snake Common Garter Snake Northern Water Snake
Lake Farm County Park	Common Garter Snake Dekay's Brown Snake
Owen Conservation Park	None
Pheasant Branch Conservancy	Dekay's Brown Snake Red-Bellied Snake Common Garter Snake Eastern Milk Snake
Prairie Ridge Conservation Park	None
Turville Point Conservation Park	None

Results

140 Snake Encounters
5 different species

- UW Madison
- Dane County Parks
- City of Madison Parks

Takeaways

- Differences between sites
- Effectiveness of cover boards (species specific)
- Plains Garter Snake

Site	Previously reported (iNaturalist, HerpMapper)	My Cover Board Data
Biocore Prairie (Lakeshore Nature Preserve)	None	None
Greene and Overlook Prairies (Arboretum)	Dekay's Brown Snake Red-Bellied Snake Common Garter Snake Northern Water Snake	Dekay's Brown Snake Red-Bellied Snake Common Garter Snake ---
Lake Farm County Park	Common Garter Snake Dekay's Brown Snake	Common Garter Snake ---
Owen Conservation Park	None	Dekay's Brown Snake
Pheasant Branch Conservancy	Dekay's Brown Snake Red-Bellied Snake Common Garter Snake Eastern Milk Snake	Dekay's Brown Snake --- Common Garter Snake Eastern Milk Snake
Prairie Ridge Conservation Park	None	Dekay's Brown Snake Plains Garter Snake
Turville Point Conservation Park	None	Dekay's Brown Snake Common Garter Snake

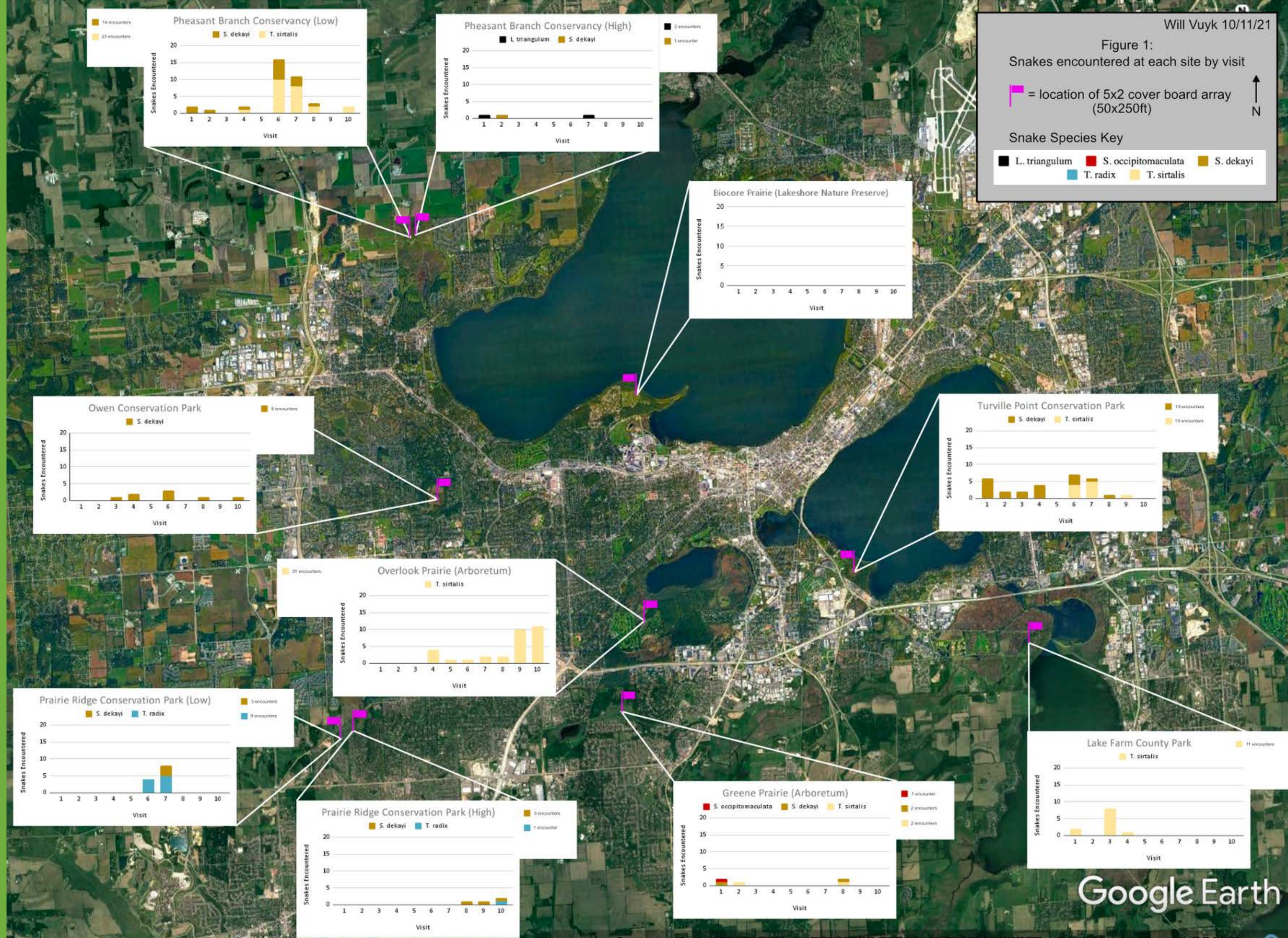
Results

140 Snake Encounters
5 different species

- Common Garter Snake
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- Eastern Milk Snake
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Points of interest

- Differences between sites
- Biocore Prairie
- Plains Garter Snake



Species of
special concern
in Wisconsin

Plains Garter Snake

Prairie Ridge Conservation Park

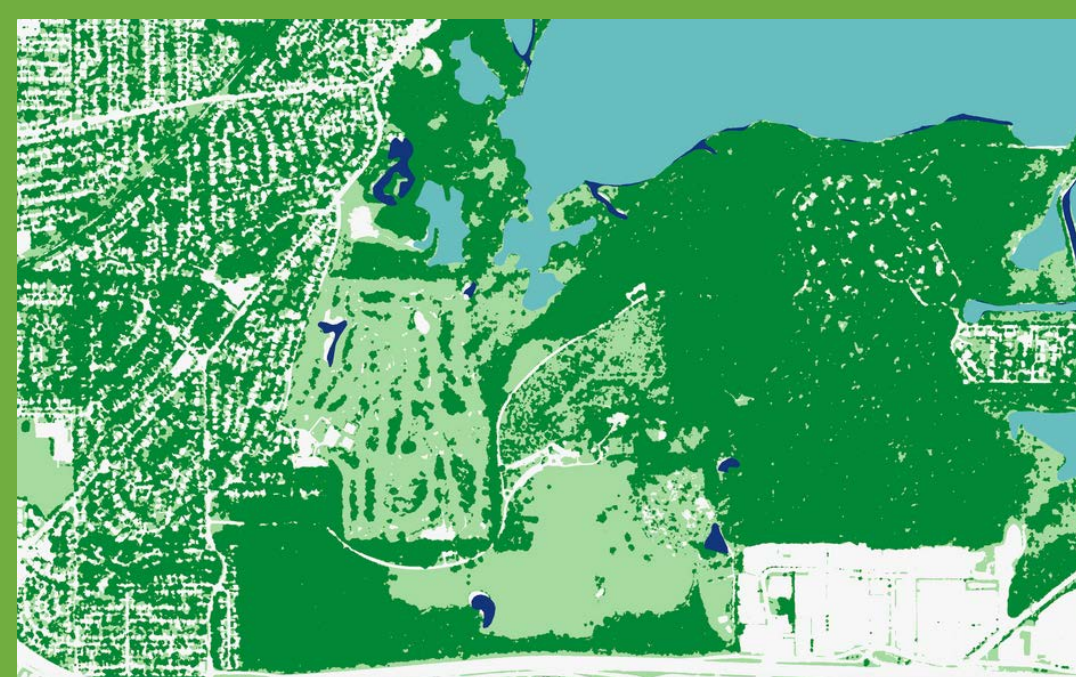
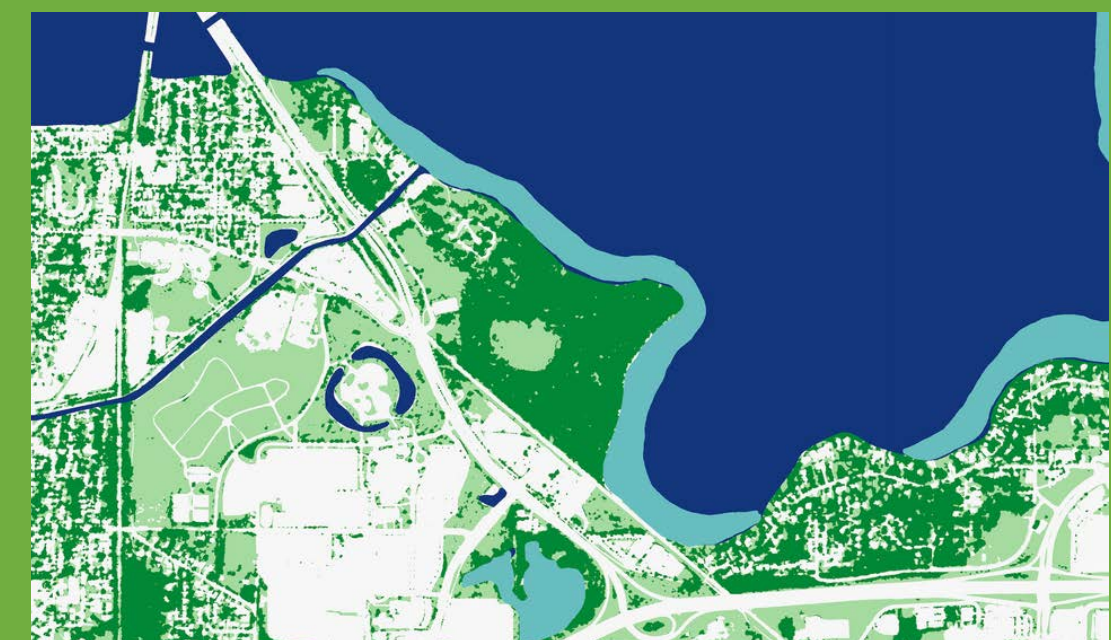
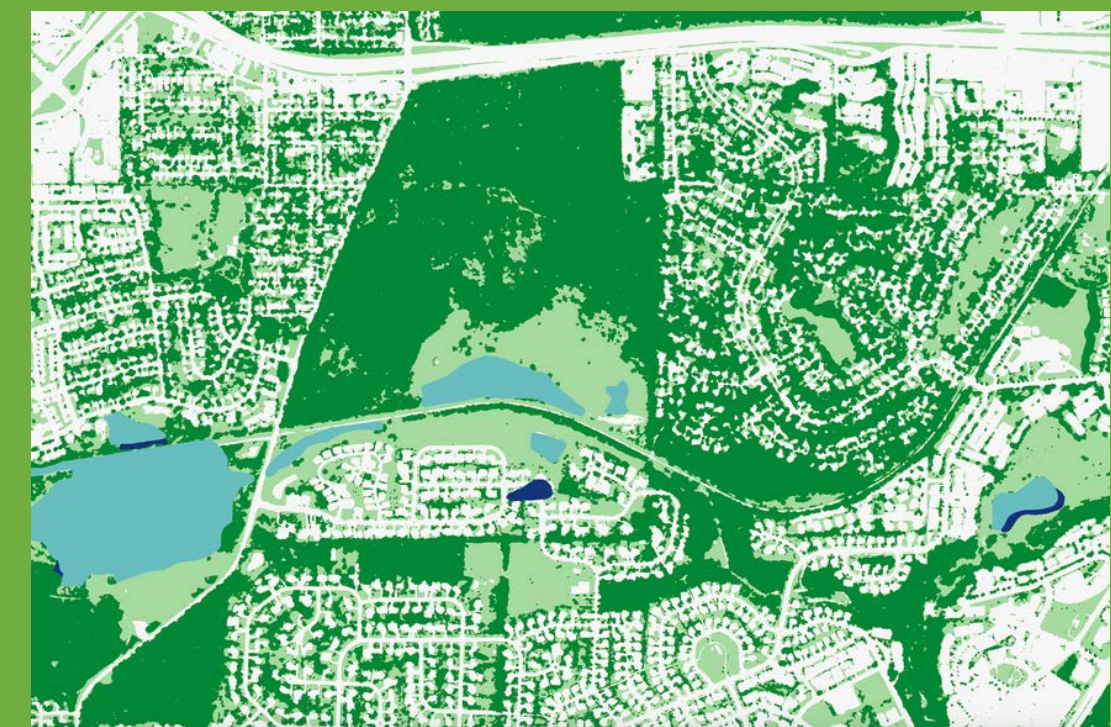
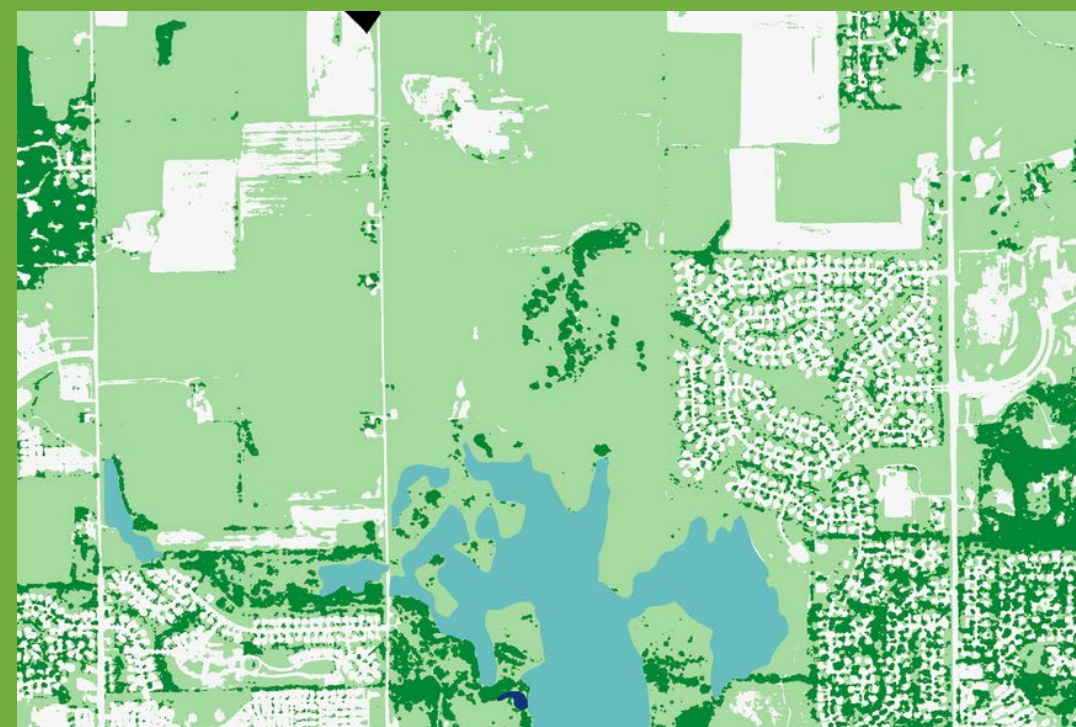


What explains Differences in Species Occupancy?

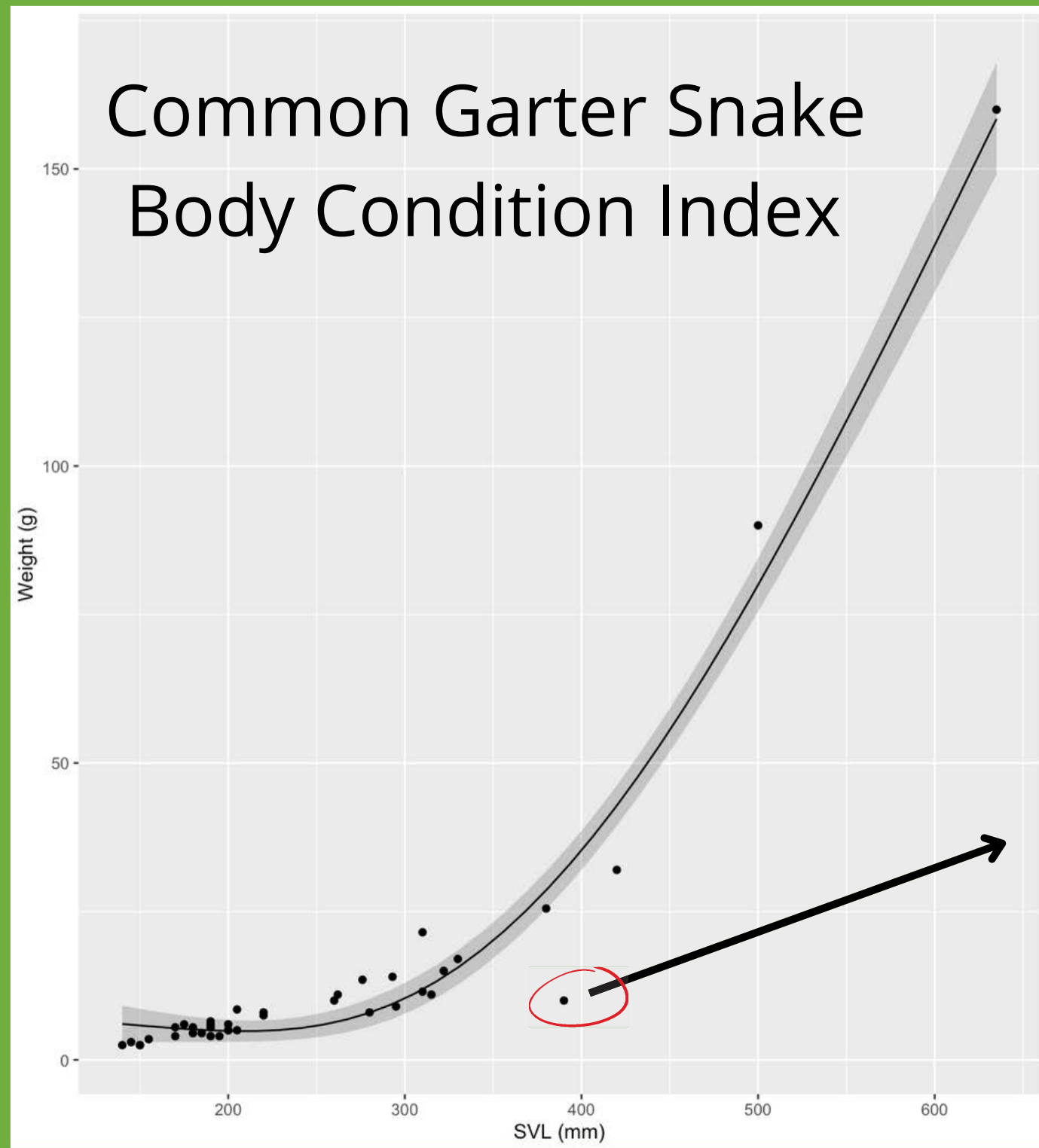
Landscape-scale factors found
to correlate with snake species
occupancy (Cagle, 2008; Cassel
et al., 2019)

Used WI DNR's Community Tree
Canopy Raster Data to
Investigate

No occupancy models
(Unmarked, R) were significant



Snake Body Condition



Possible case of Snake
Fungal Disease (SFD)

Emerging disease in
North American Snakes

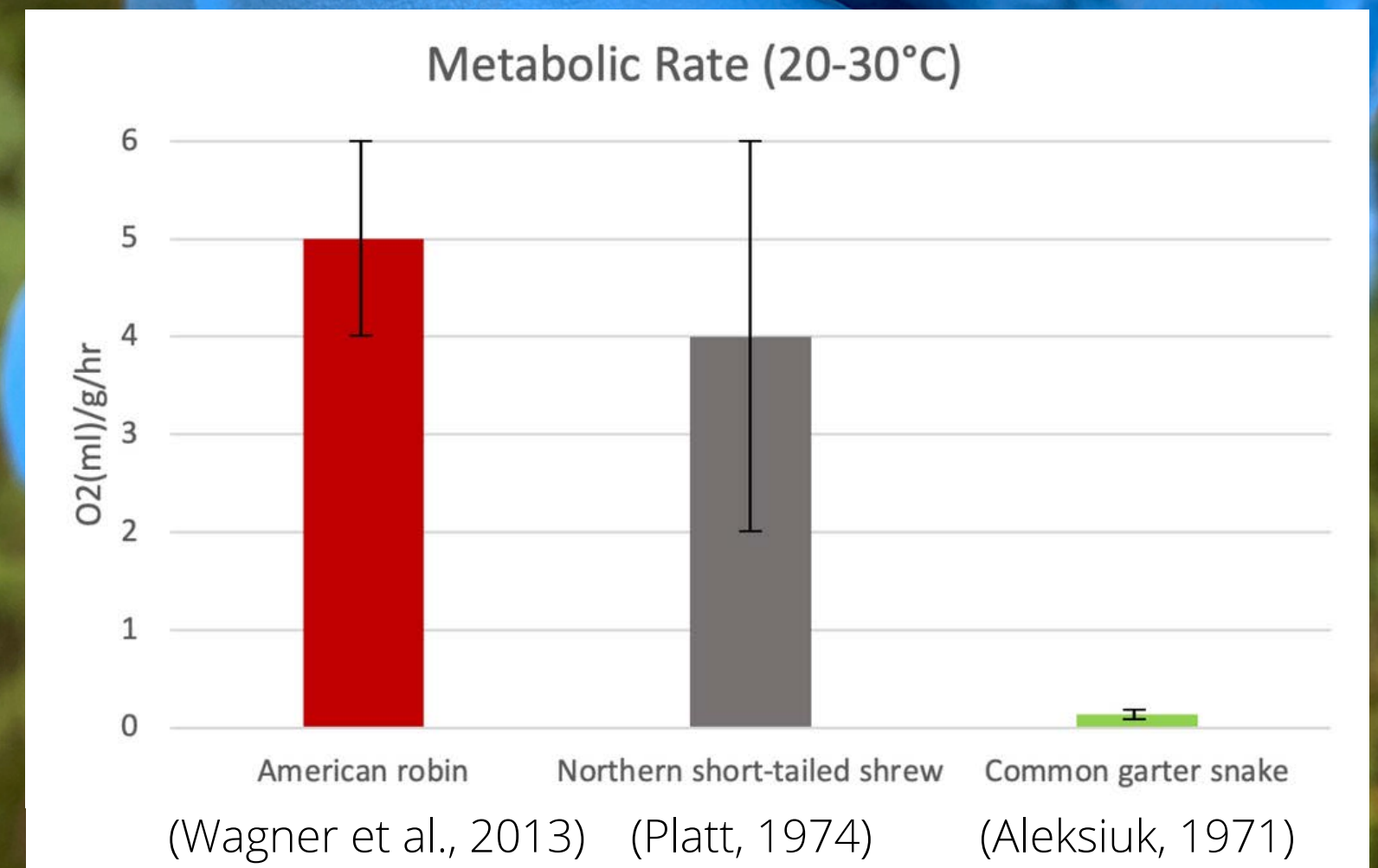
Importance for Management

- Snakes play a significant role in native grassland ecosystems
- Prey on - and are prey for - a wide range of invertebrates, amphibians, mammals, and birds (Seigel et al., 2001)
- Slow metabolism, fasting capability allow for greater population sizes than predators of comparable trophic level.



Importance for Management

- Snakes play a significant role in native grassland ecosystems
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- Slow metabolism, fasting capability allow for greater population sizes than predators of comparable trophic level.



Importance for Management

- Small snakes can exist at high population densities
- Have been found to feed on invasive species, like *Amyntas* jumping worms



Biol Invasions
<https://doi.org/10.1007/s10530-022-02781-y>

ORIGINAL PAPER



Effects of invasive jumping worms (*Amyntas* spp.) on microhabitat and trophic interactions of native herpetofauna

Erin R. Crone  · Erin L. Sauer · Bradley M. Herrick · David Drake · Daniel L. Preston

(Crone et al., 2022)

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Conclusion

Snakes are often overlooked, understudied, and undervalued in urban prairie restorations

I hope this baseline Madison-area data can help educate needed future investigations



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(Herpetologist)
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- Leta Landucci
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Maulbetsch
- Amy Vuyk
- Nathan Vuyk
- Friends of Owen Park

Questions?



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