Herpetology Halloween!

Unnatural Occurrences at the Missouri / Kansas Border!

Or

Why We Should Be Working With Other States to Understand Species Distributions In Missouri

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Introduction

- General Observations
- Missouri Herpetology
- Ecoregions
- Missouri / Kansas Species Maps
- Other States
- Summary

General Observations

- Uncommon species or common species at the edge of their range tend to be over-represented in state collections.
- Collectors often exhibit an affinity to their own state and an aversion to regular collecting in nearby states.
- Areas of higher diversity are often collected more often than areas of lower diversity.

General Observations

- The result is often a “shadow effect” on one or more borders, often in the eastern, southern, or southeastern border of a state. Why?
- One would expect species distributions to more closely follow ecoregions rather than state boundaries.
- For many reasons, recent records are more reliable than older records. Why?

Missouri Herpetology

- Missouri has not been thoroughly explored herpetologically, even now.
- Missouri collecting has been concentrated around hotspots:
  - Ozarks
  - Urban centers
  - Favorite field trip locations (Mingo, Hercules)
- Prairie areas have mostly been ignored.

Missouri Herpetology

- Each state, including Missouri, has a unique biologist history and “culture” and this affects collecting activity and collections management.
- History
  - Classic Period (1890 – 1965)
  - Research Period (1966 – 1986)
  - Modern Period (1987 – present)

Classic Period

- Classic Period (1890 – 1965)
  - Starts with earliest collections in the 1800s but these are rare
  - Julius Hurter (1842 – 1916)
  - Paul Anderson (1914 – 1962)
  - Ends with Anderson's *Reptiles of Missouri* (1965)

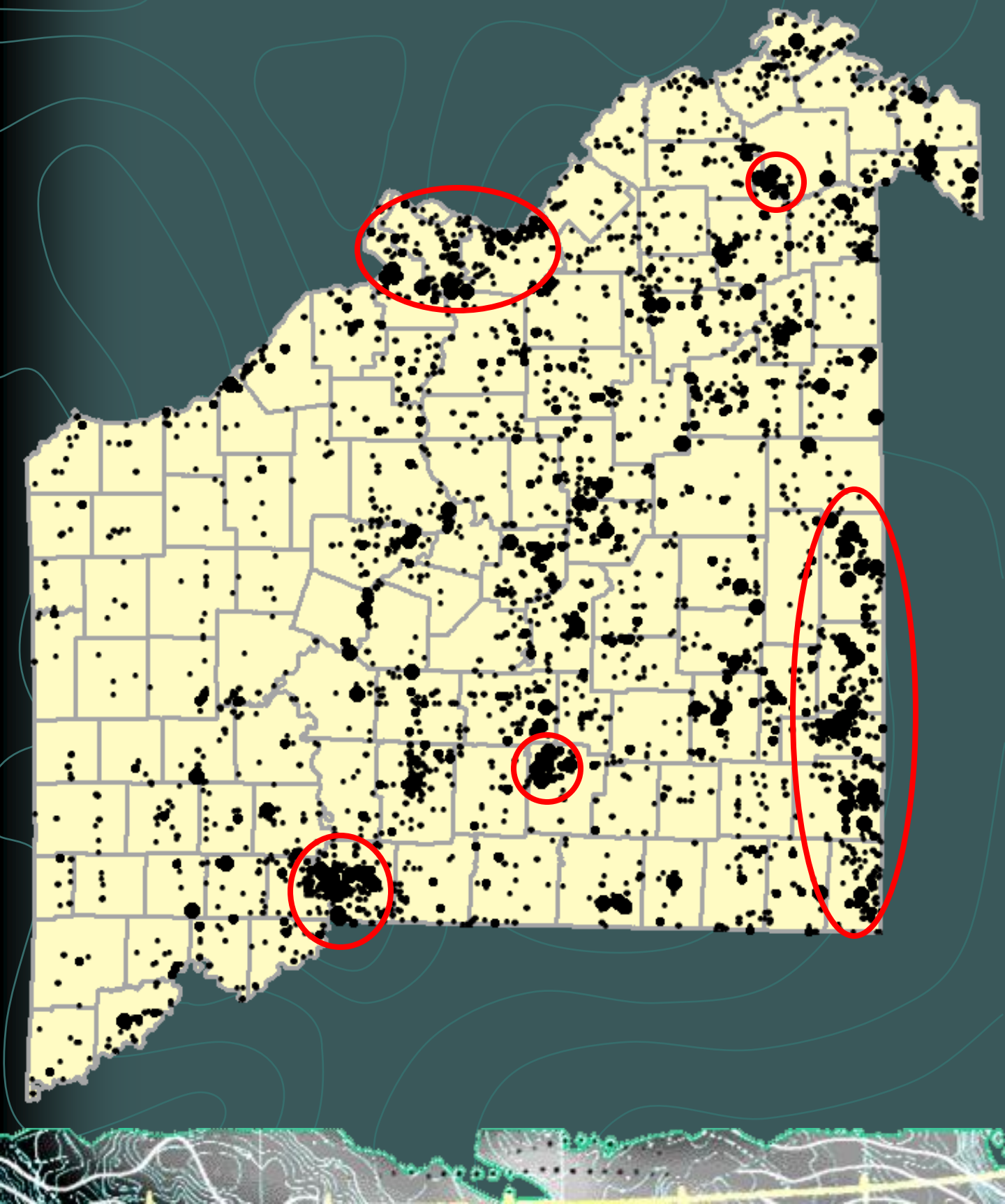
Research Period

- Research Period (1966 – 1986)
  - Many universities involved in active field research around the state but there is little interest in species distributions
  - Universities are building collections at this time but not necessarily for distribution records

Modern Period

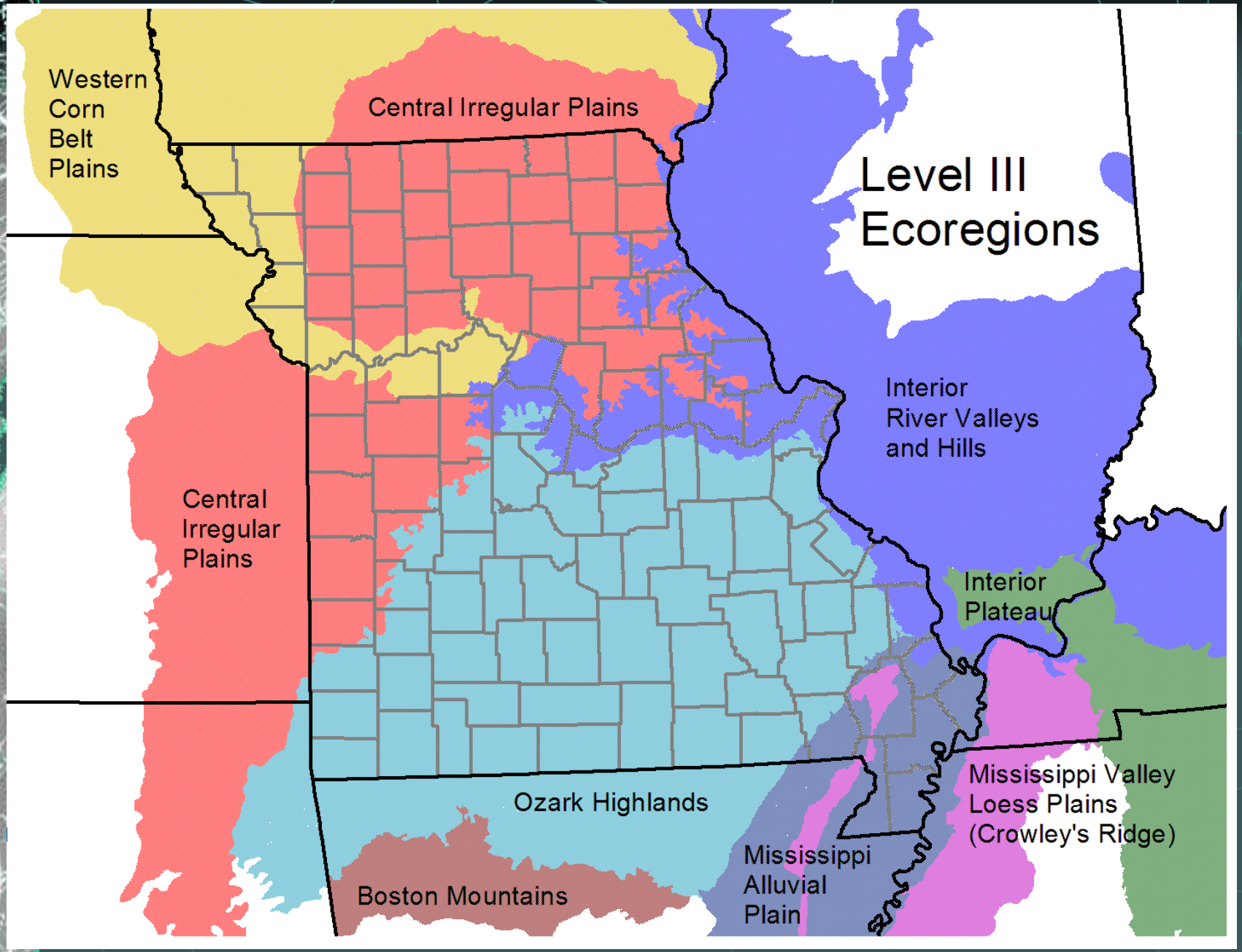
- Modern Period (1987 – present)
  - Starts with Johnson's *Amphibians and Reptiles of Missouri* (1987) (although several collections are not represented)
  - There is a renewed interest in distribution and a push to fill in "county records"
  - Most collections are single specimens, salvaged roadkill or photographs
  - A focus on distribution continues today with annual updates to the *Atlas*

Classic / Research Periods



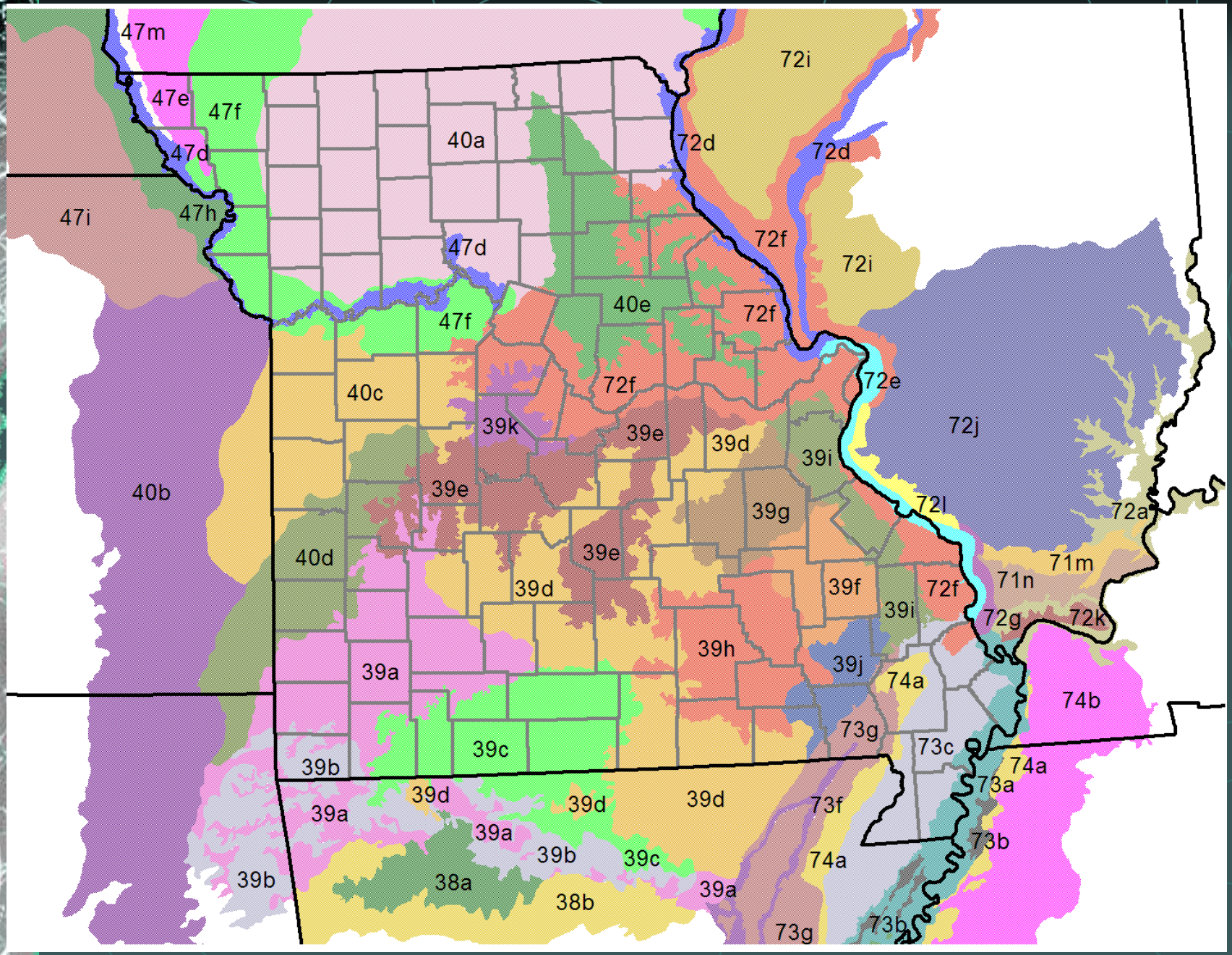
Ecoregions

- Level I and II are very broad
- Level III Ecoregions (general)
- Level IV Ecoregions (specific)
- Source: EPA (http://www.epa.gov/wed/pages/ecoregions.htm)



Level III Ecoregions

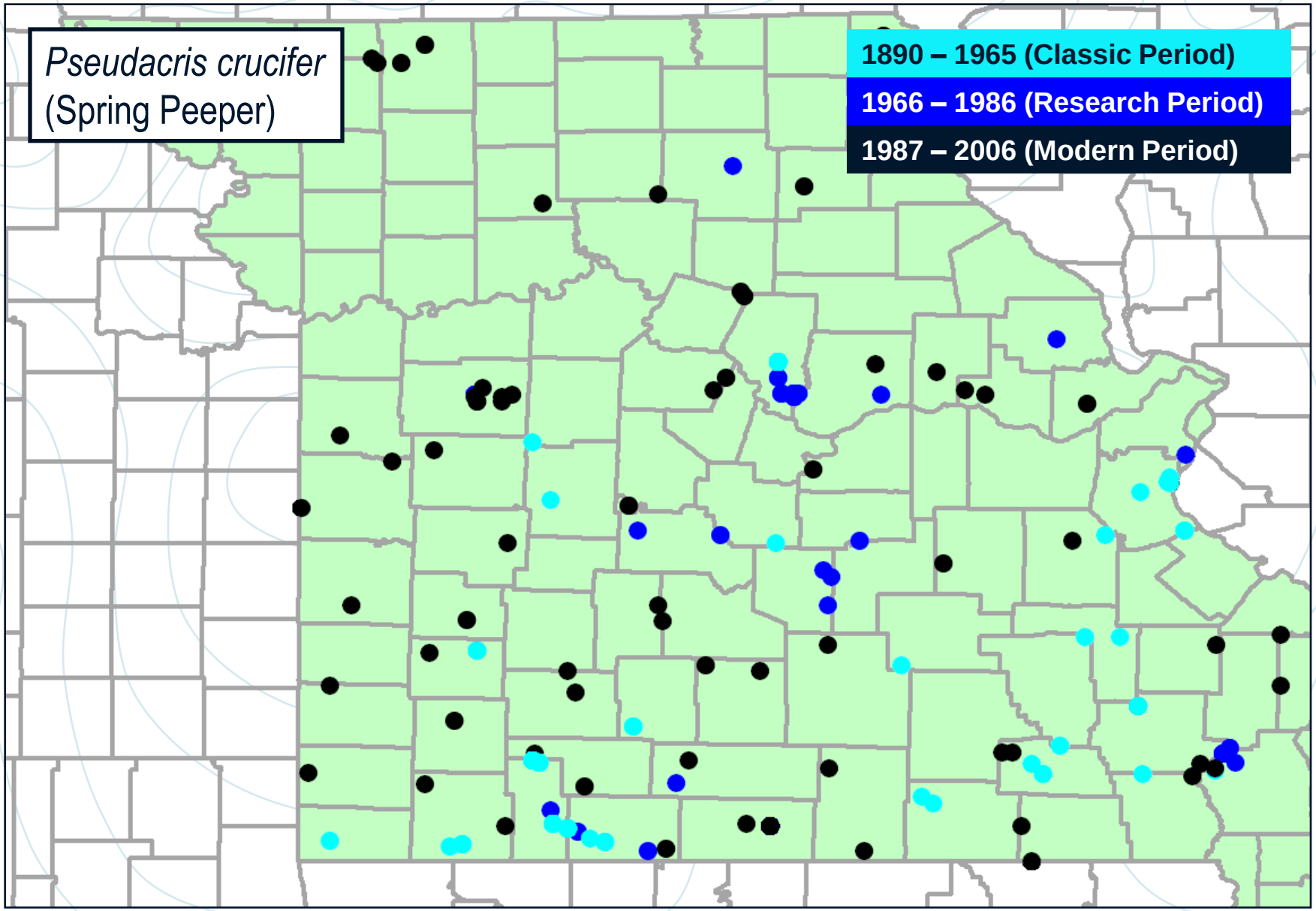
Level IV Ecoregions



Missouri / Kansas Maps

- Shadow effects
- Great Plains “toads”
- Unnatural occurrences!
- Northern prairie relicts

Shadow effect



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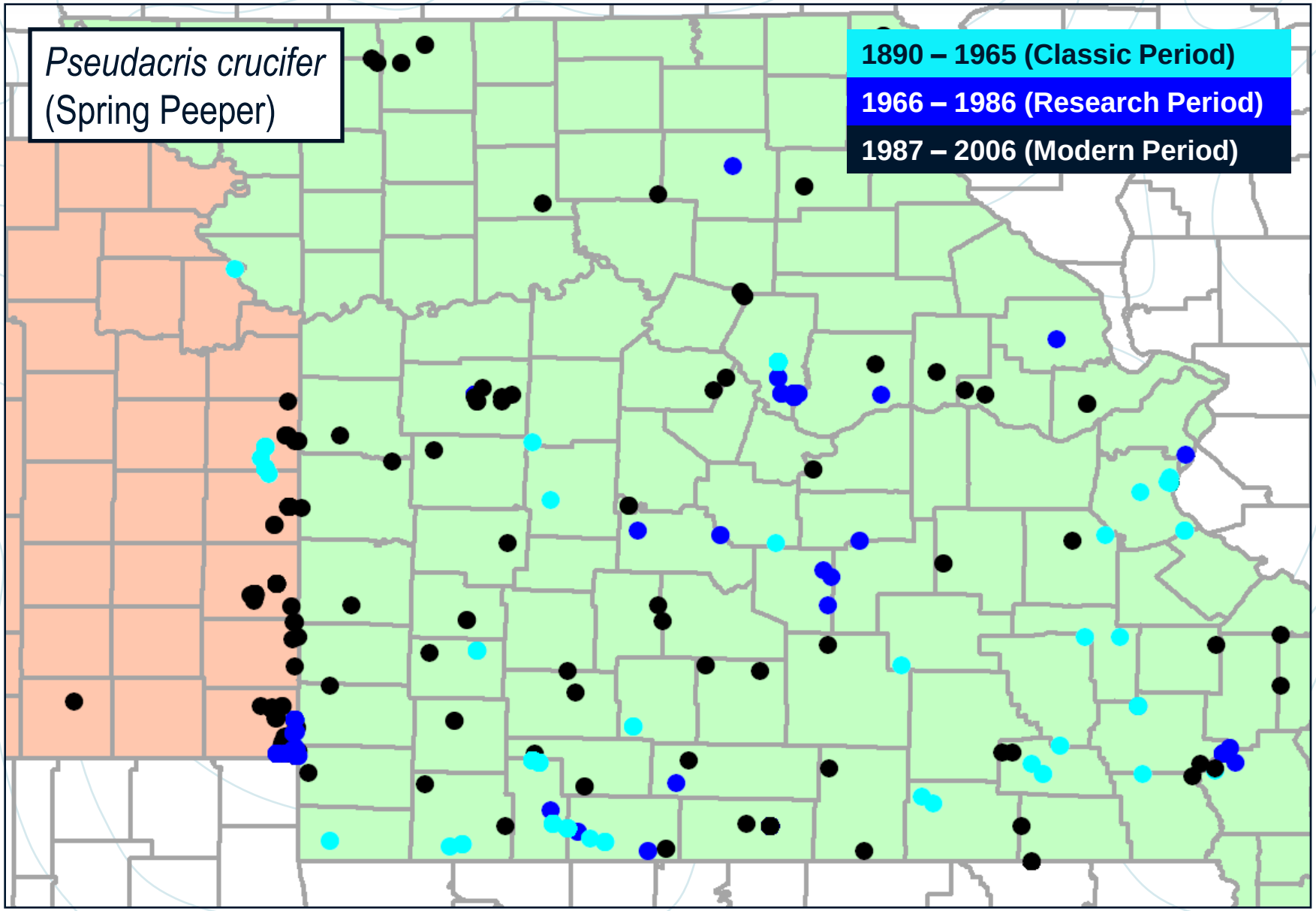
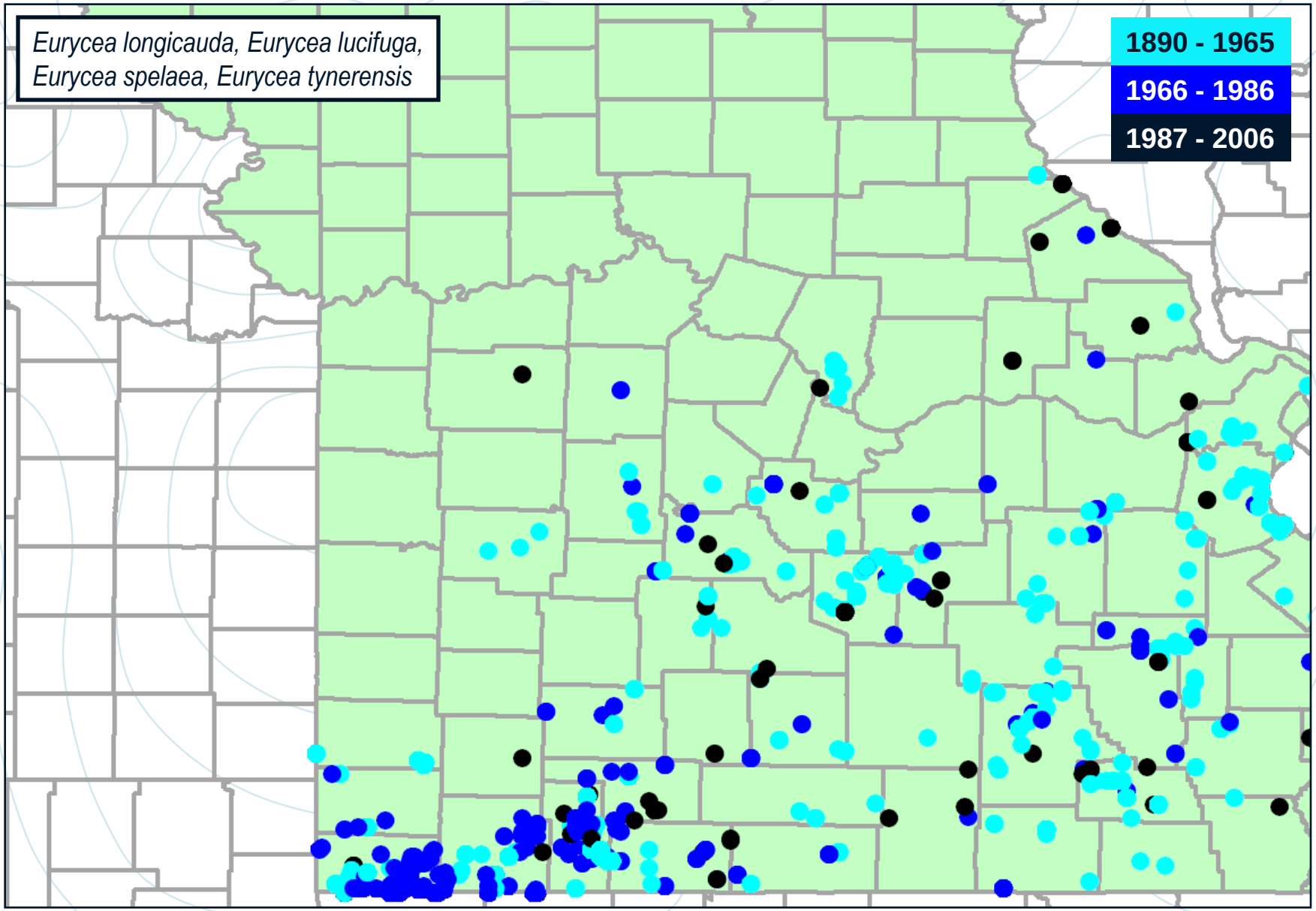


Extreme shadow effect!



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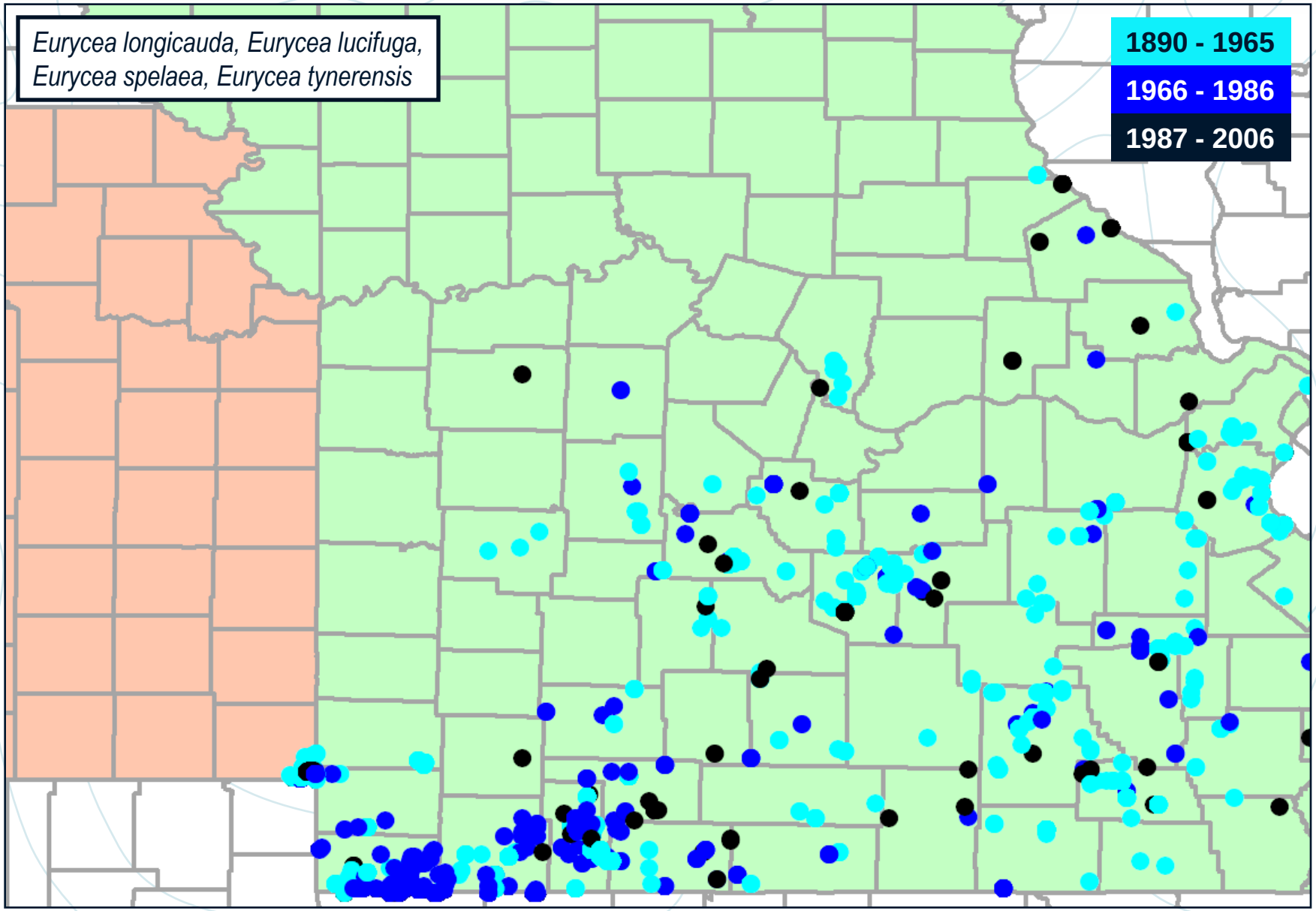

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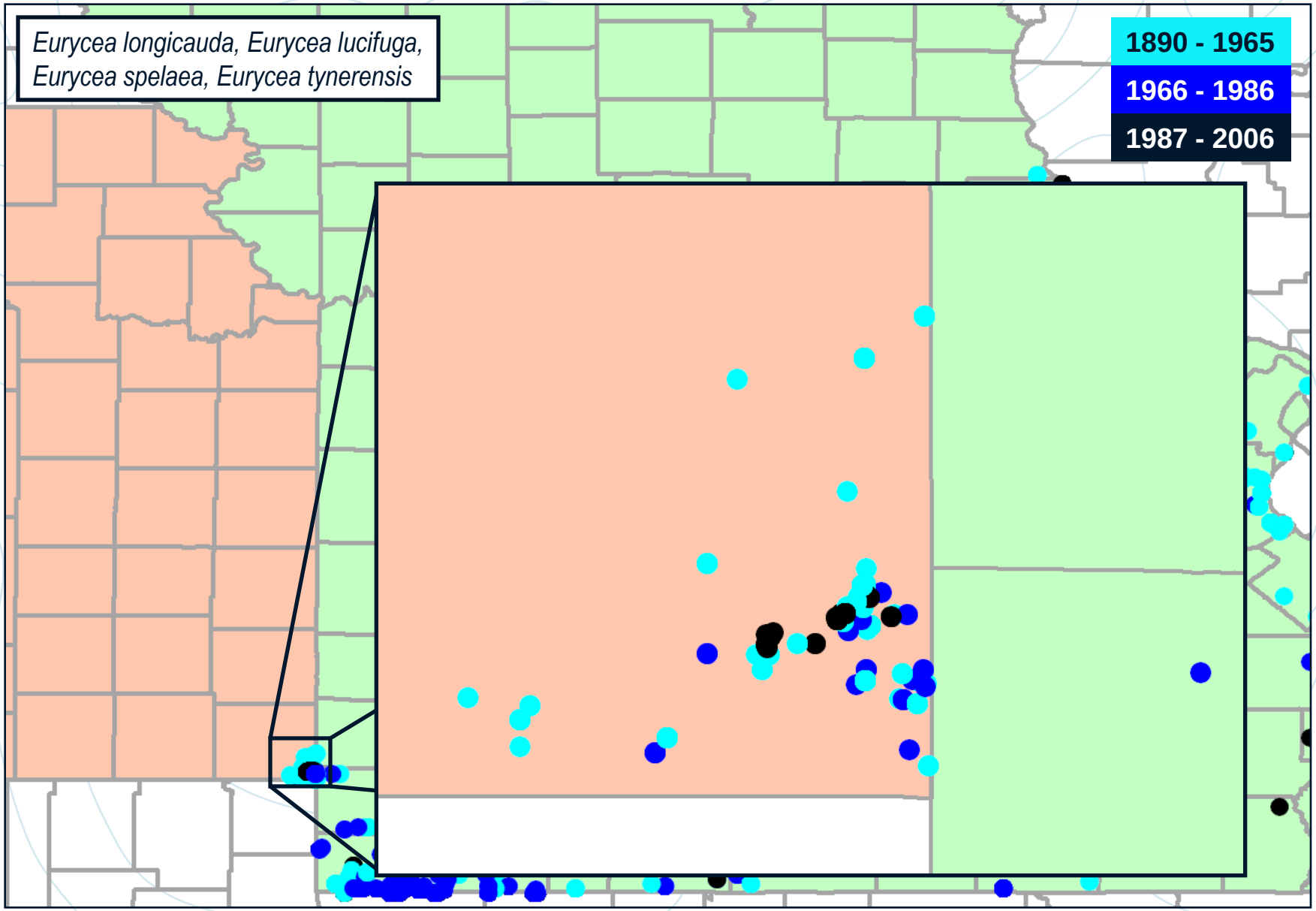
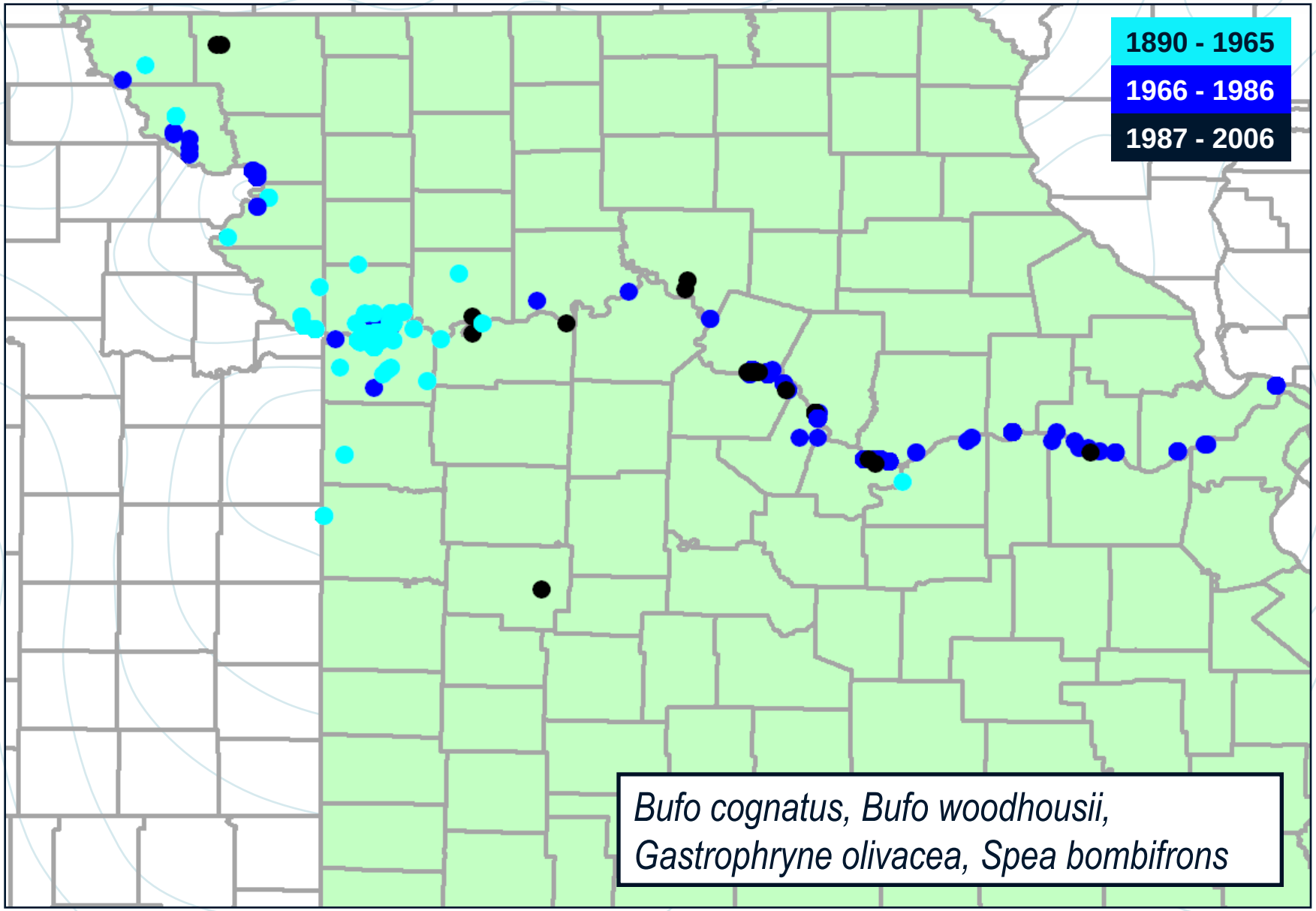


Great Plains “toads”



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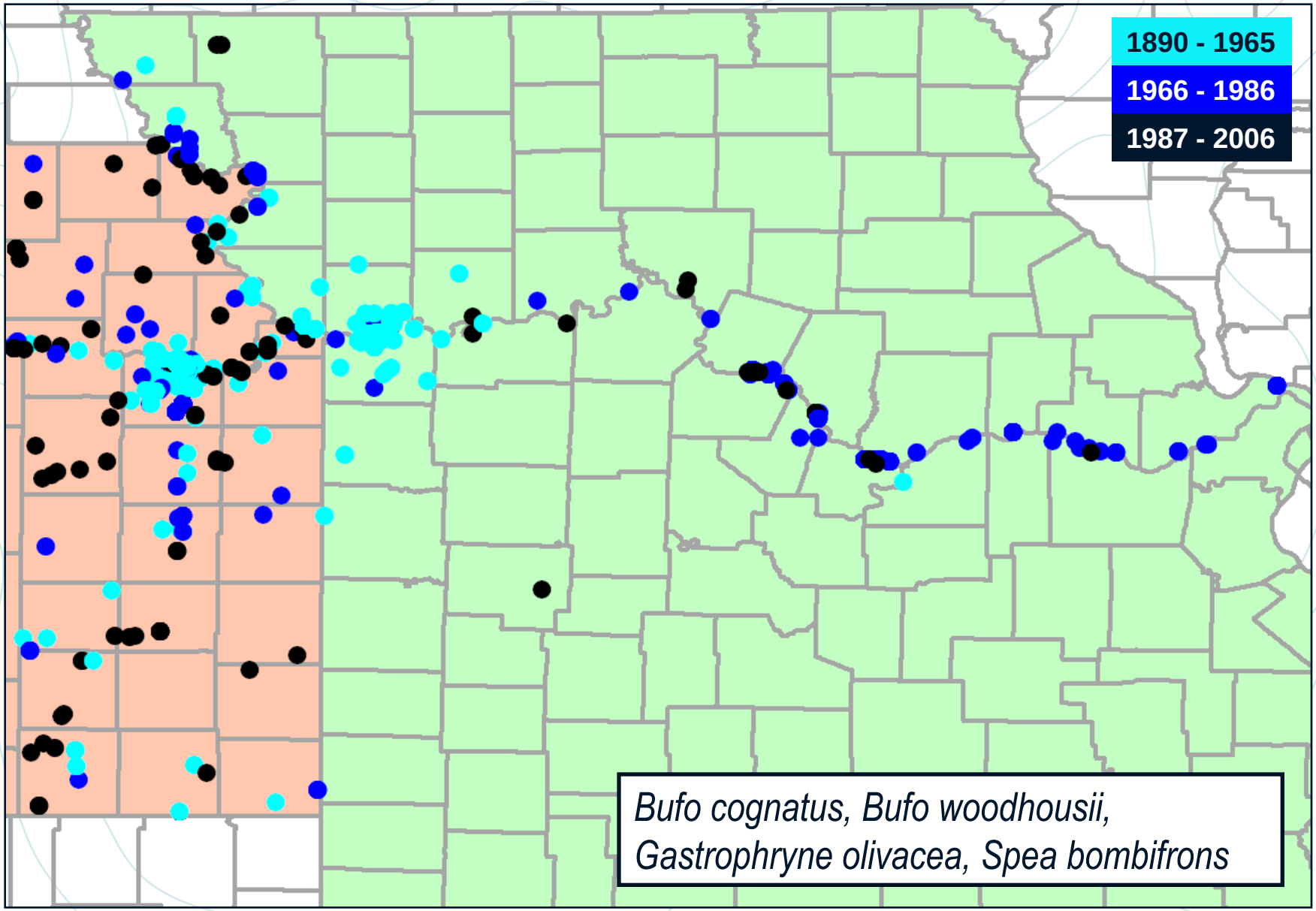
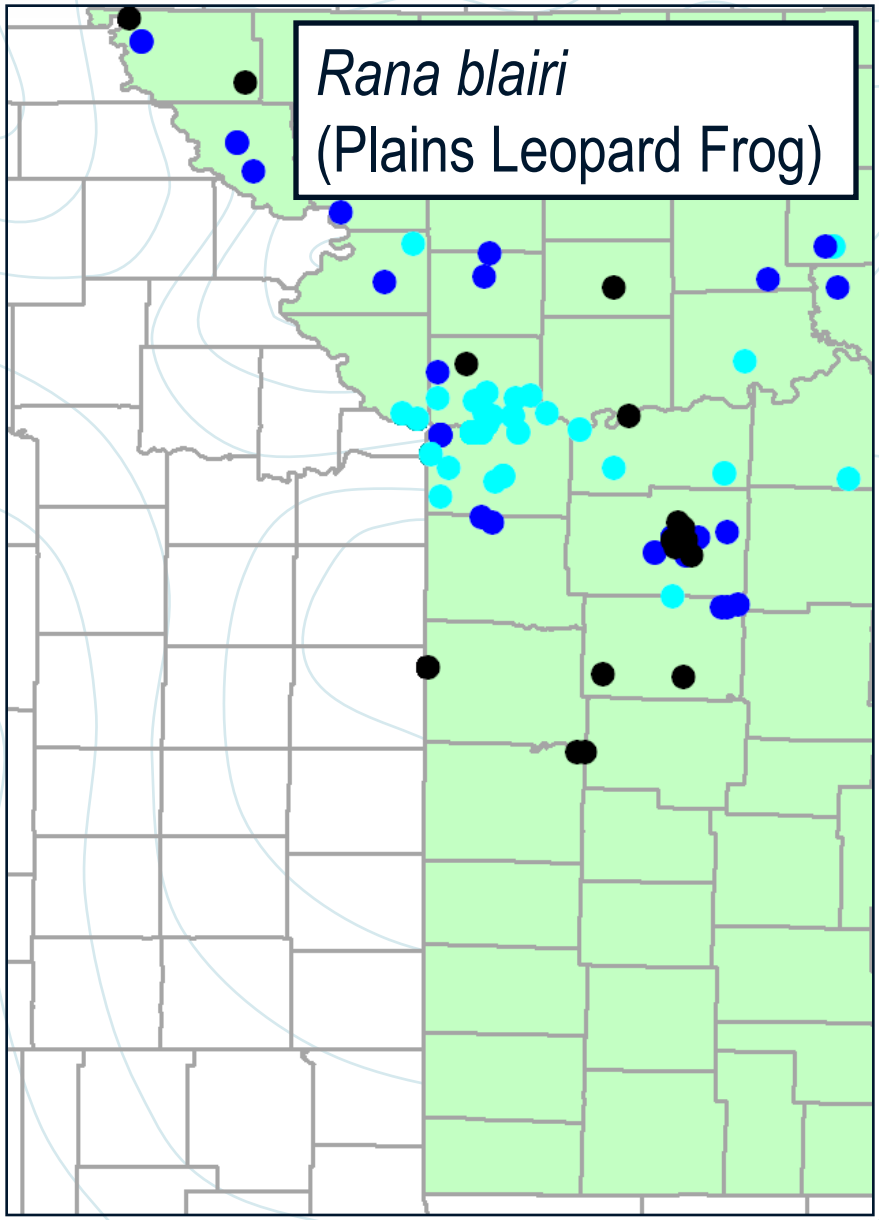
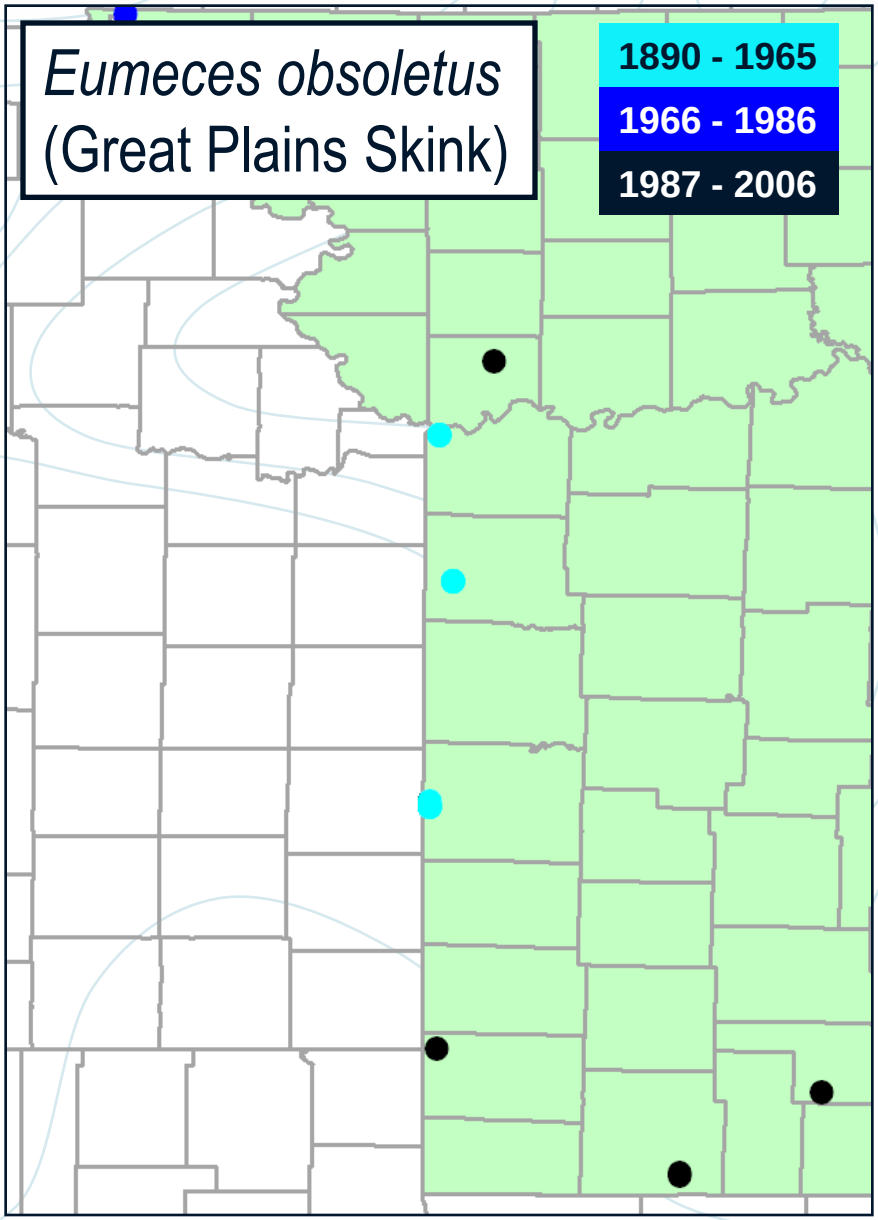


Unnatural occurrences!





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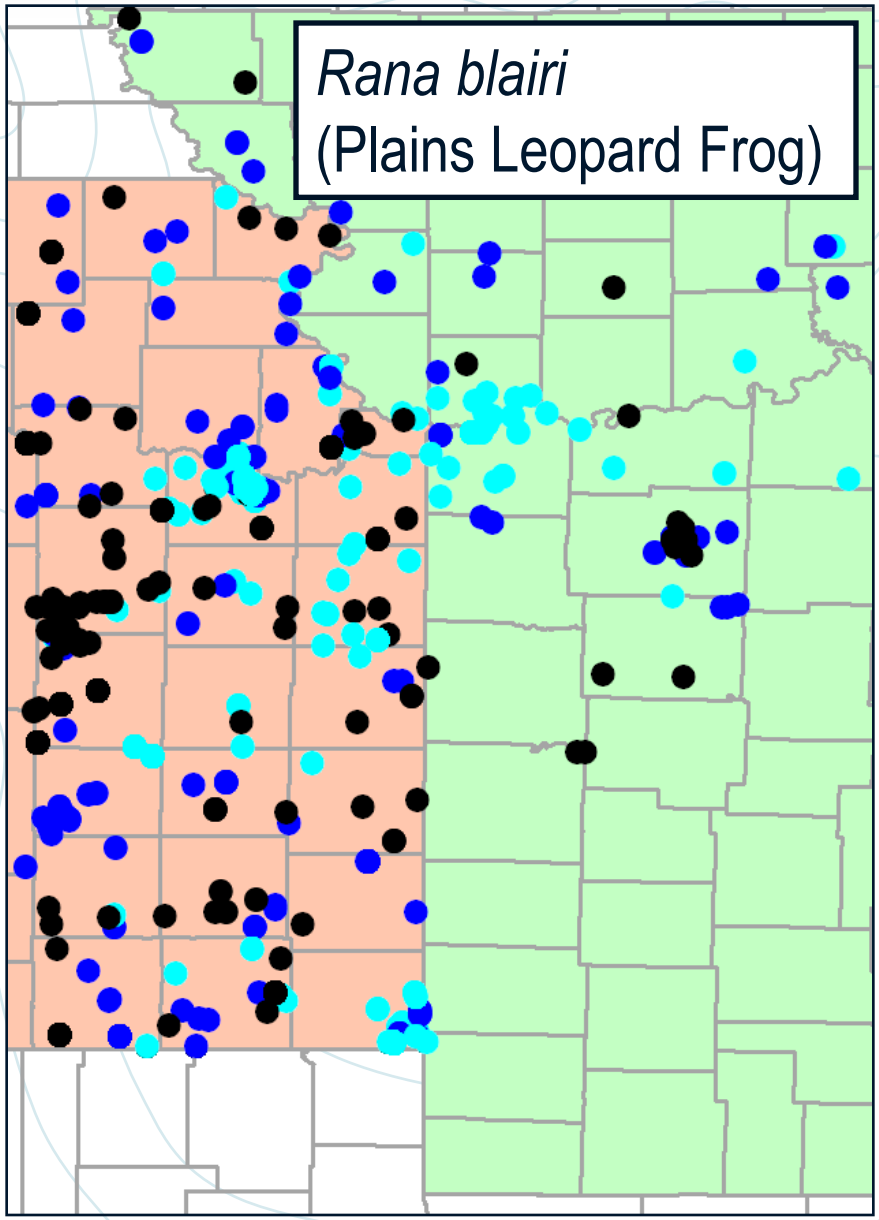
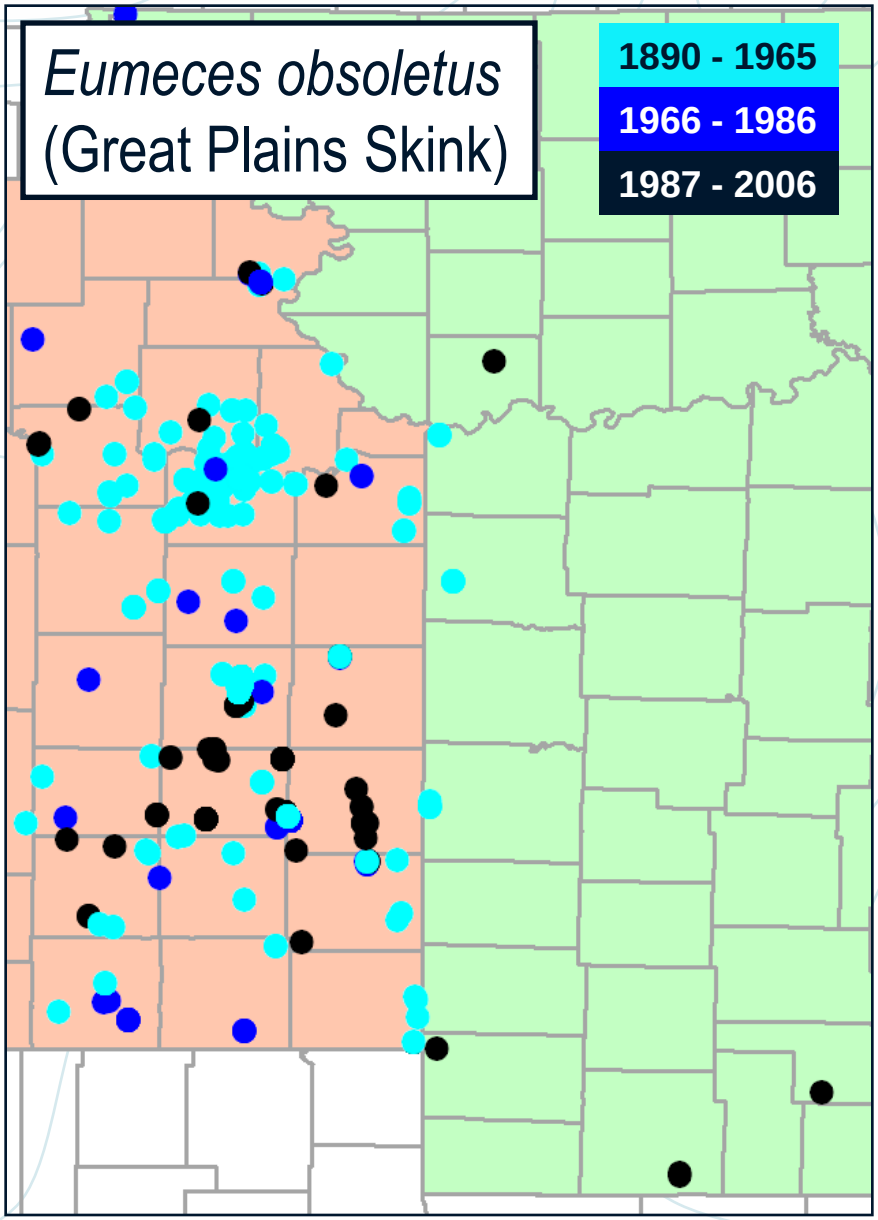
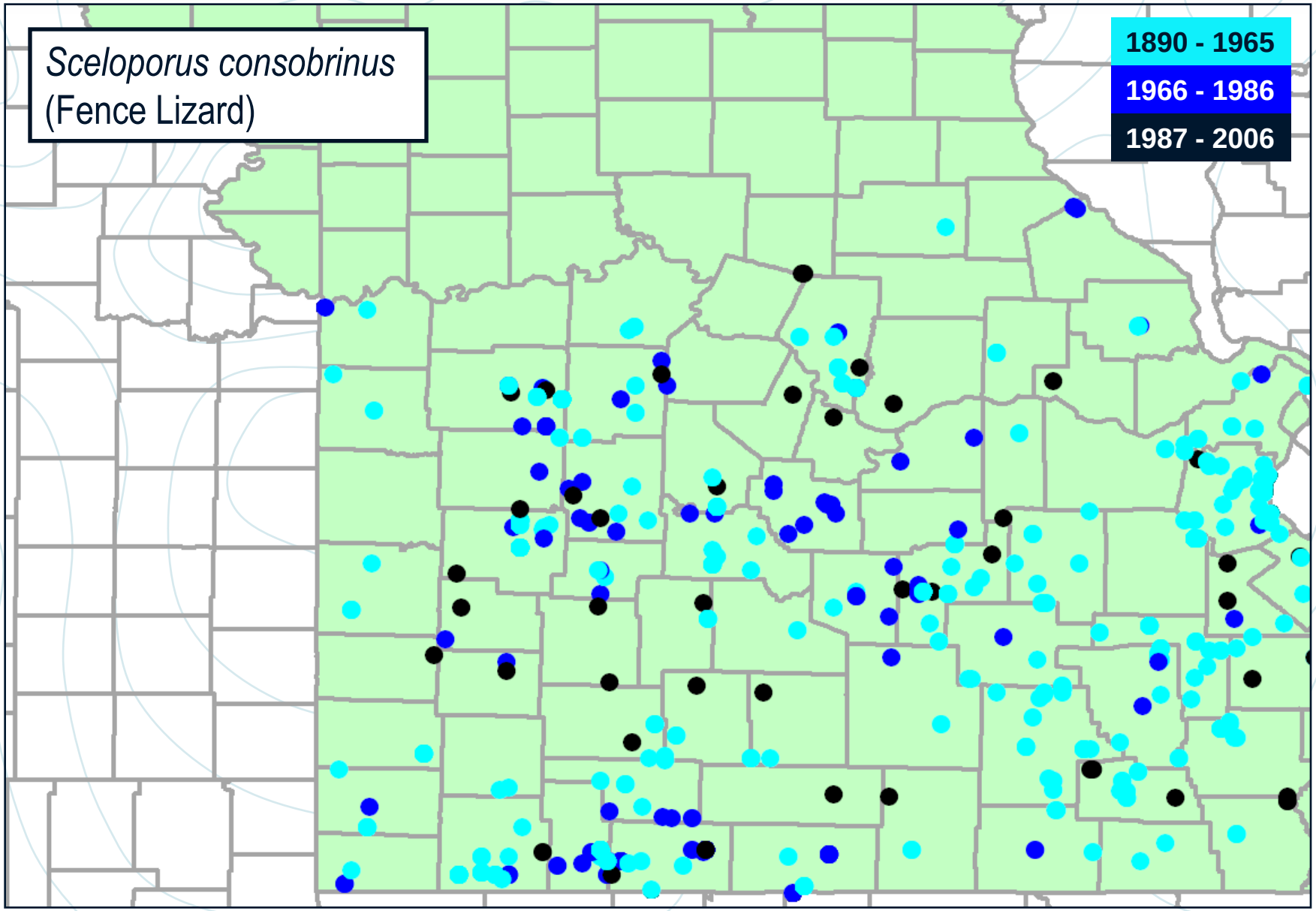




Another anomaly



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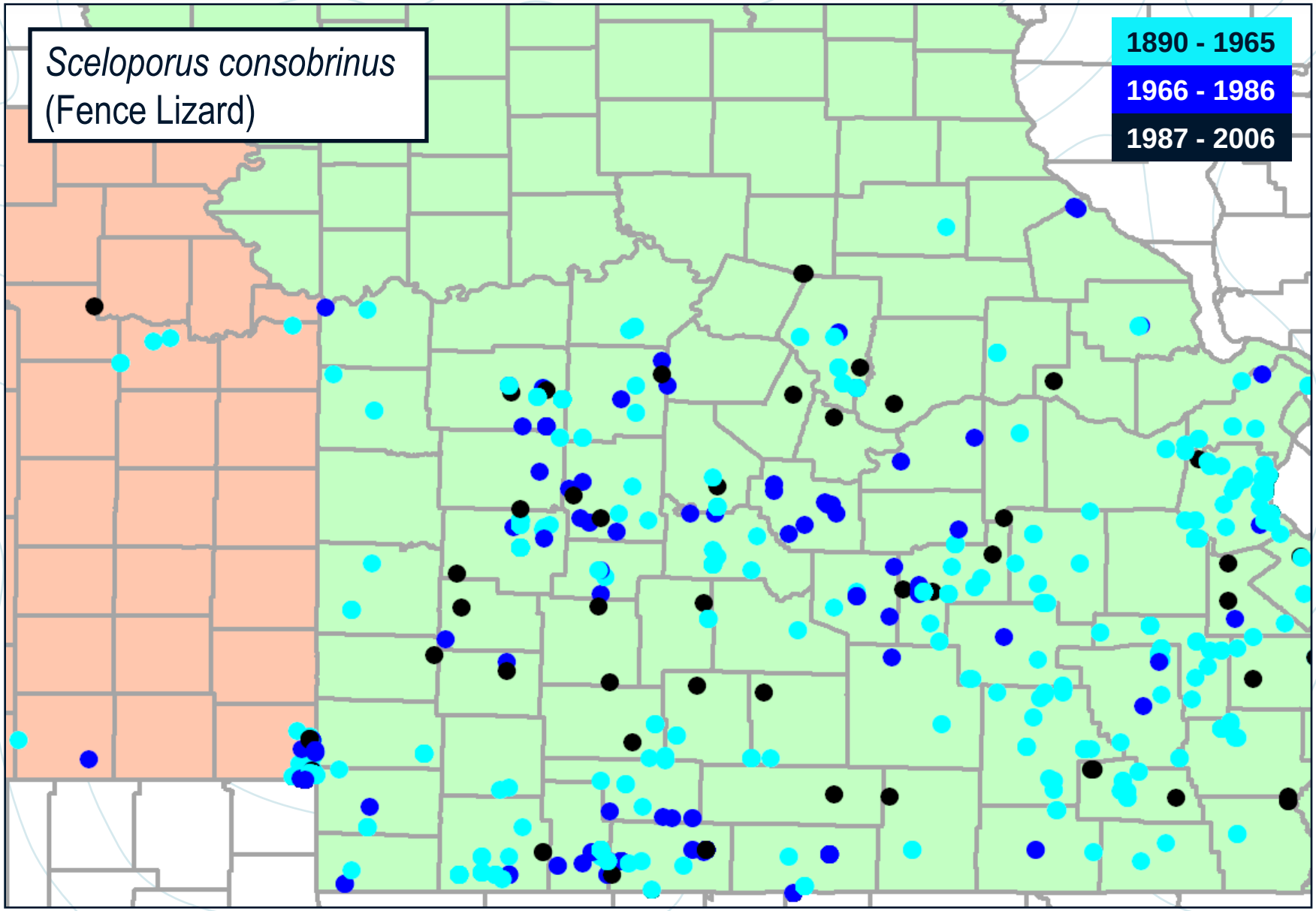
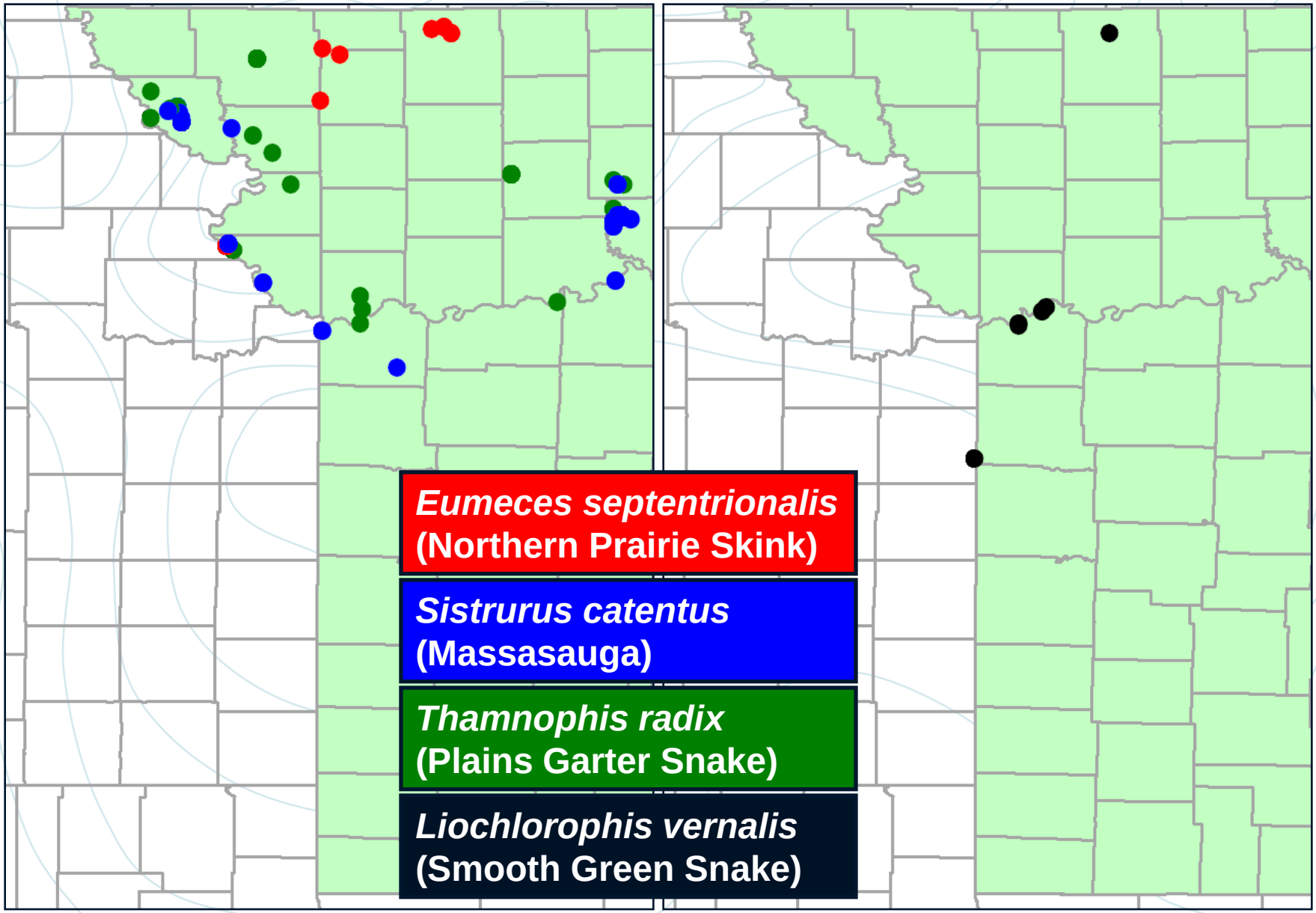


Northern prairie relicts



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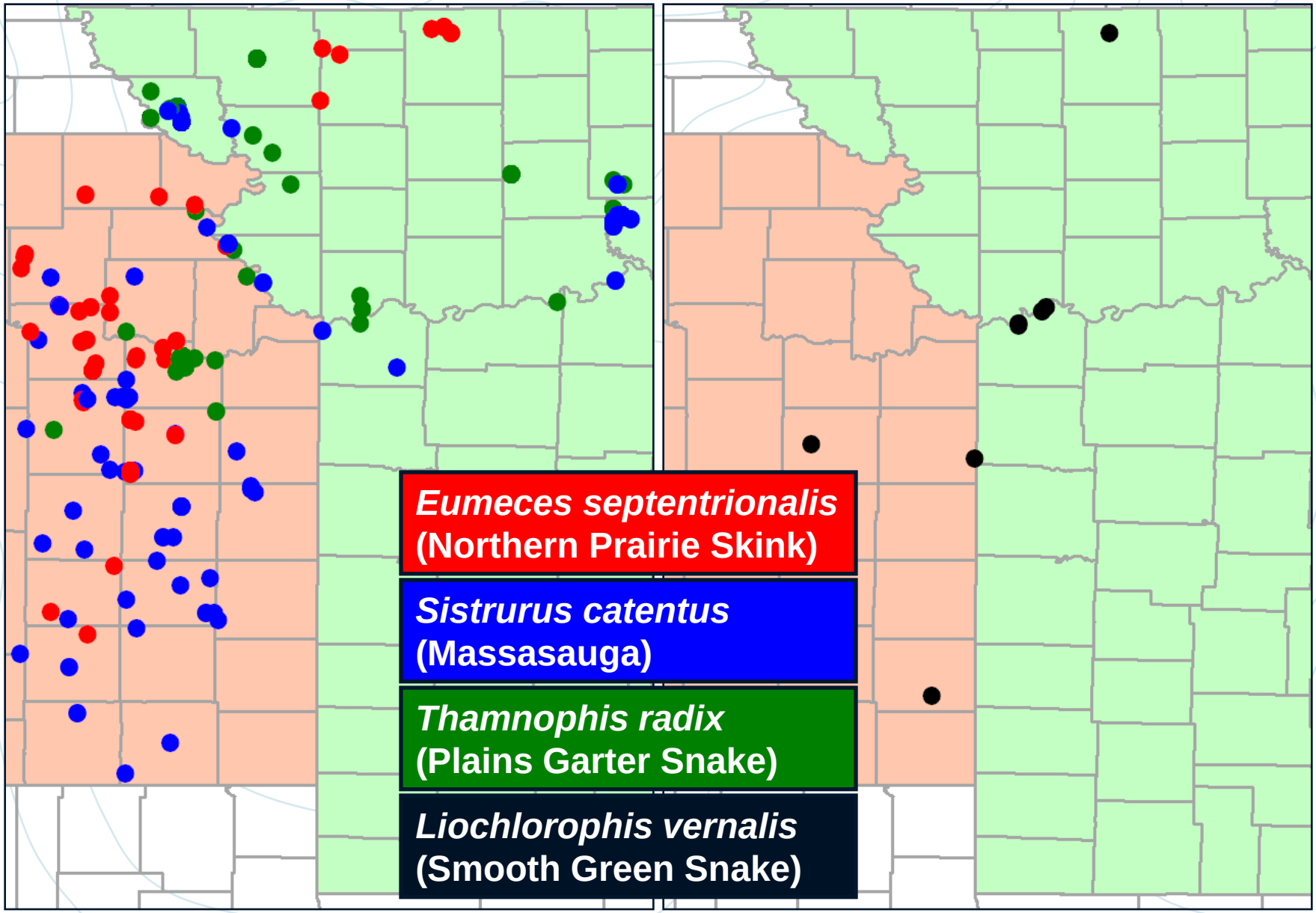

Other States

- Sharing atlas data with neighboring states can reveal interesting distribution patterns.
- Some states do not have active atlas programs—KS, IL, (IA), (AR), (TN).
- States with “artificial” boundaries are more likely to reveal interesting patterns.

Missouri Possibilities

- Scarlet snake records in the NE AR Ozarks are in the same ecoregion as the SE MO Ozarks, a poorly explored area.
- Northern leopard frogs (*Rana pipiens*) and Plains garter snakes (*Thamnophis radix*) occur in several southern Iowa counties without corresponding Missouri populations.
- Extant populations of smooth green snakes (*Liochlorophis vernalis*) are known within a few miles of the MO – NE border.

Summary

- Distribution anomalies exist at state borders (*e.g.*, Missouri / Kansas) but many (not all) can be explained by collecting history in each state.
- We need to:
  - Spend more time exploring the western and northern prairie regions of Missouri.
  - Work with other states and know what's going on there—particularly Kansas, Iowa, Arkansas, and Oklahoma, those states that share an "artificial" boundary with Missouri.

References

- *Atlas of Missouri Amphibians and Reptiles* (Daniel and Edmond 2006) (http://atlas.moherp.org/)
- *Amphibians and Reptiles in Kansas* (Collins 1993)
- Census Bureau (http://www.census.gov/) for maps
- EPA (http://www.epa.gov/) for ecoregions
- *Kansas Herpetofaunal Atlas* (Taggart and Collins 2007) (http://webcat.fhsu.edu/ksfauna/herps/)
- *The Amphibians and Reptiles of Missouri* (Johnson 1987, 2000)
- *The Reptiles of Missouri* (Anderson 1965)