

# **Atlas of Missouri Amphibians and Reptiles for 2025**



**Richard E. Daniel and Brian S. Edmond**



# Atlas of Missouri Amphibians and Reptiles for 2025

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## Table of Contents

Introduction . . . . .	3
Distribution . . . . .	3
Terrestrial Ecoregions . . . . .	3
Aquatic Subregions . . . . .	5
Natural Divisions and Sections Map . . . . .	6
Level I Terrestrial Ecoregions Map . . . . .	7
Level II Terrestrial Ecoregions Map . . . . .	8
Level III Terrestrial Ecoregions Map . . . . .	9
Level IV Terrestrial Ecoregions Map . . . . .	10
Rivers and Major Streams Map . . . . .	11
Watershed Boundaries Map . . . . .	12
Ecological Drainage Units Map . . . . .	13
County and Surrounding States Map . . . . .	14
Species Locality Maps . . . . .	15
County Records Maps . . . . .	45
Acknowledgements . . . . .	75
Literature Cited . . . . .	76
Appendix A: Collection Sources . . . . .	77
Appendix B: Literature Sources . . . . .	78

## Introduction

Since 1988, members of the Missouri Herpetological Association have compiled new county distribution records for amphibians and reptiles native to the state (Daniel *et al.* 2025 and previous updates). Cumulative accounts of these new records were presented in Powell *et al.* (1993), Powell and Daniel (1997), and Daniel and Edmond (2002). Johnson (2000) presented revised distribution maps based on a combination of these cumulative accounts and more recent annual compilations. The publication of Johnson (1987, 2000) renewed interest in expanding our knowledge of the distribution of the state's herpetofauna. Briggler and Johnson (2021) published an updated version of the *The Amphibians and Reptiles of Missouri* that incorporated all *Atlas* records up until that time. In order to provide herpetologists working in Missouri with current information that is easily taken into the field, we are presenting revised species distribution and county records maps in a format that can be easily updated as new records are documented.

In 1997, with the initiation of the Missouri Herpetological Atlas Project (MOHAP), a database was established to serve as the basis for verifying new distribution records and tracking changes in individual species distributions within the state (Edmond and Daniel 2026). Qualification for inclusion in the database requires a catalogued voucher specimen housed in an institutional collection (Appendix A). However, in order to be valuable in tracking changes in the distribution of individual species, it is important to document historical records. Many of the specimens collected prior to the 1970s, most notably those reported by Hurter (1911) and Anderson (1965), were documented by specimens that have since been lost or destroyed. In order to provide the most accurate picture of the distribution of the state's herpetofauna we have included some literature records (Appendix B).

Some records were not included because the identification could not be determined with certainty. Within Missouri, the *Dryophytes versicolor* complex consists of two broadly sympatric and morphologically indistinguishable species (*D. chrysoscelis* and *D. versicolor*). Specimens collected for which the species identification was not determined by some non-morphological trait were not included.

Currently, the MOHAP database contains 38,958 entries and 34,819 valid, non-duplicated collections. This represents specimens housed in 37 museum collections and cited from 34 historical literature sources; 5,363 documented county records; 11,200 unique localities; and 18,556 unique species / locality combinations. This new total constitutes 603 new database entries since the 2023 edition of the *Atlas* (Daniel and Edmond 2024). The total number of species contained in the current edition of the atlas is 119, comprised of 117 native species and 2 non-native species. We follow the most recent SSAR Checklist (Nicholson 2025) with an adjustment to some common names.

Previous editions of the atlas are available upon request. Readers may also contribute new records for the project. The MOHAP web site (Edmond and Daniel 2026)

contains project details. Questions, comments, and suggestions should be directed to the senior author.

## Distribution

Distribution is one of many characteristics used to describe a species and range maps (such as those found in Conant and Collins (1998)) are used to approximate a species' likely distribution. This atlas uses locality dot maps, with each dot representing a known locality for that species. This conservative method results in an underestimate of a species distribution but is more accurate than a range map. The purpose of the atlas project is to document as closely as possible both current and historical distributions for all native amphibians and reptiles in Missouri.

However, the printed version of the atlas only reflects the best historical approximation of each species' distribution in the state. The most noticeable resulting incongruity is that fact that some species are shown in historical localities in which they are almost certainly no longer found. For example, the Smooth Greensnake (*Opheodrys vernalis*) was once found in scattered populations in the prairie regions of the state. Due to extensive habitat loss and possibly other reasons, they are extremely rare or extirpated in the state.

While natural communities have long been a staple in ecology, formal classification of natural communities has been undertaken relatively recently in Missouri (Nelson 2005). Like individual species, natural communities can be described and characterized with distinct distributions and abundances in different ecoregions (see next section). For example, glades are common in the Ozarks but rare elsewhere in the state. Steyermark (1963), Yatskievych (1999), Pflieger (1989), Hawker (1992), and Unklesbay and Vineyard (1992) all describe and summarize the complex interplay among geology, natural history, ecoregions, natural divisions, natural communities, and the passage of time from slightly different perspectives. Taken together, these ideas form the basis of the biogeography of Missouri and they are essential in understanding why plants and animals have the distributions that we see today.

## Terrestrial Ecoregions

An ecoregion classification system attempts to define and describe geographic regions that correspond to broad ecosystem patterns, topography, geology, soils, vegetation patterns, and the distributions of plants and animals. Omernik (1987) described ecoregions (Levels I, II, and III) for the conterminous United States as a hierarchical scheme with Level I corresponding to large regions and Level III representing smaller, more precisely described regions. The Environmental Protection Agency (2003) is coordinating an effort to further subdivide Level III regions into Level IV regions. Nigh and Schroeder (2002) published Level III and Level IV ecoregions for Missouri.

Some amphibian and reptile species follow defined ecoregions closely. For example, the Cave Salamander (*Eurycea lucifuga*) is neatly confined to the Ozark

Highlands (Level III) and found throughout the ecoregion, with the exception of most of the Springfield Plateau (Level IV). Several species found in the southeastern alluvial plain are particularly characteristic and also confined to that area (e.g., Three-toed Amphiuma (*Amphiuma tridactylum*) and Southern Watersnake (*Nerodia fasciata*)).

Many species, however, seem to be abundant throughout Missouri, regardless of the region or natural community. The North American Bullfrog (*Lithobates catesbeianus*) and North American Snapping Turtle (*Chelydra serpentina*), among many others, fall into this category. Finally, many species are more closely associated with a particular natural community or habitat than with a particular ecoregion or natural division. For example, The Flat-headed Snake (*Tantilla gracilis*) can be found in the Ozark Highlands, Osage Prairie, and Interior River Valleys and Hills but it is restricted to rocky glades.

In general, Level IV ecoregions are too granular to be useful in describing the distributions of Missouri amphibians and reptiles, several Ozark salamander species and many of the coastal plains species being notable exceptions. However, this level of detail is useful to understand natural community distributions on which some species are dependent. It also underscores the importance of looking at border states and across artificial political boundaries to understand distributions within Missouri.

Level I (page 8), Level II (page 9), Level III (page 10), and Level IV (page 11) ecoregion maps for Missouri and surrounding states, based on Omernik (1987) and Nigh and Schroeder (2002) are included here. The hierarchy for Levels I, II, and III is included in Table 1 (below), while the Level III and Level IV hierarchy is included in Table 2 (below). Unfortunately, the authors' coding scheme for Level III is inconsistent, though the names do match. Both authors' codes for Level III are included in the tables as a cross-reference. An earlier approach by Thom and Wilson (1980) divided Missouri into natural divisions and sections (page 7), roughly corresponding to Level III and Level IV ecoregions, respectively.

**Table 1.** List of Level I, II, and III Terrestrial Ecoregions from Omernik (1987). Those regions marked with an asterisk (\*) do not occur in Missouri but are sufficiently close to be of interest to Missouri biologists. Level III codes from Nigh and Schroeder (2002) are in parentheses.

- 8. Eastern Temperate Forests
  - 8.3. Southeastern USA Plains
    - 8.3.3. Interior Plateau\* (71)
    - 8.3.6. Mississippi Valley Loess Plains (74)
    - 8.3.2. Interior River Valleys and Hills (72)
  - 8.4. Ozark / Ouachita / Appalachian Forests
    - 8.4.5. Ozark Highlands (39)
    - 8.4.6. Boston Mountains\* (38)
  - 8.5. Southeast US Coastal Plain
    - 8.5.2. Mississippi Alluvial Plain (73)
- 9. Great Plains
  - 9.2. Temperate Prairies
    - 9.2.3. Western Corn Belt Plains (47)
    - 9.2.4. Central Irregular Plains (40)

**Table 2.** List of Level III and Level IV Terrestrial Ecoregions from Nigh and Schroeder (2002). Those regions marked with an asterisk (\*) do not occur in Missouri but are sufficiently close to be of interest to Missouri biologists. Those regions marked with a caret (^) are contained entirely within the state's borders.

- 38. Boston Mountains\* (8.4.6)
  - 38a. Upper Boston Mountains\*
  - 38b. Lower Boston Mountains\*
- 39. Ozark Highlands (8.4.5)
  - 39a. Springfield Plateau
  - 39b. Elk River Hills
  - 39c. White River Hills
  - 39d. Central Plateau
  - 39e. Osage / Gasconade River Hills^
  - 39f. Saint Francois Knobs / Basins^
  - 39g. Meramec River Hills^
  - 39h. Current River Hills^
  - 39i. Easter Ozark Border^
  - 39j. Black River Hills Border^
  - 39k. Prairie Ozark Border^
- 40. Central Irregular Plains (9.2.4)
  - 40a. Loess Flats and Till Plains
  - 40b. Osage Cuestas\*
  - 40c. Wooded Osage Plains
  - 40d. Cherokee Plains
  - 40e. Claypan Prairie^
- 47. Western Corn Belt Plains (9.2.3)
  - 47d. Missouri Alluvial Plain
  - 47e. Steeply Rolling Loess Prairies
  - 47f. Rolling Loess Prairies
  - 47h. Nebraska / Kansas Loess Hills\*
  - 47i. Loess and Glacial Drift Hills\*
  - 47m. Western Loess Hills
- 71. Interior Plateau\* (8.3.3)
  - 71m. Northern Shawnee Hills\*
  - 71n. Southern Shawnee Hills\*
- 72. Interior River Valleys and Hills (8.3.2)
  - 72a. Wabash / Ohio Bottomlands\*
  - 72d. Upper Mississippi Alluvial Plain
  - 72e. Middle Mississippi Alluvial Plain
  - 72f. River Hills
  - 72g. Southern Ozarkian River Bluffs\*
  - 72i. Western Dissected Illinoian Till Plain\*
  - 72j. Southern Illinoian Till Plain\*
  - 72k. Cretaceous Hills\*
  - 72l. Karstic Northern Ozarkian River Bluffs\*
- 73. Mississippi Alluvial Plain (8.5.2)
  - 73a. Northern Holocene Meander Belts
  - 73b. Northern Pleistocene Valley Trains\*
  - 73c. Saint Francis Lowlands
  - 73f. Western Lowlands Holocene Meander Belts
  - 73g. Western Lowlands Pleistocene Valley Trains
- 74. Valley Loess Plains (8.3.6)
  - 74a. Bluff Hills
  - 74b. Loess Plains

## Aquatic Subregions

Like terrestrial ecoregions, aquatic subregions can be classified in discrete units, based on watershed and hydrological characteristics. Subregions are composed of ecological drainage units, which are major watersheds that are consolidated based on similarity and proximity (MSDIS 2009a). Subregions and their component drainage units can be seen in Table 3 (below).

Naturally, many of the same patterns emerge in both terrestrial and aquatic geographic classifications since the two are not independent of one another. However, aquatic subregions and ecological drainage units can differ from their terrestrial counterparts since most aquatic organisms are confined to watersheds as well as specific habitats. Since many species of amphibians and reptiles are partially or wholly dependent on aquatic habitats, distributions can sometimes be best understood and explained by examining aquatic subregions, ecological drainage units, and even individual watersheds.

The base map for major rivers and streams (page 12) shows locations of actual rivers and streams inside Missouri and just outside the state's borders where appropriate (USGS 1994; MDC 2007b). The watershed boundaries map (page 13) displays the maximum terrestrial boundary for major watersheds (NRCS 2002). Both of these maps are underlain with unique background colors to display Missouri's primary drainage systems: a) Mississippi River, b) Missouri River, c) Arkansas River, and d) White River.

Some species found in the state exhibit distributions that can be better understood by referring to these primary drainage systems. The ecological drainage units map (page 14) shows a somewhat consolidated view of the watersheds map based on those watersheds and other characteristics. It is underlain with unique background colors showing the three broad aquatic subregions in the state. Still more detailed aquatic region classifications are available but often include areas based on very small creeks and their watersheds and are therefore not included here.

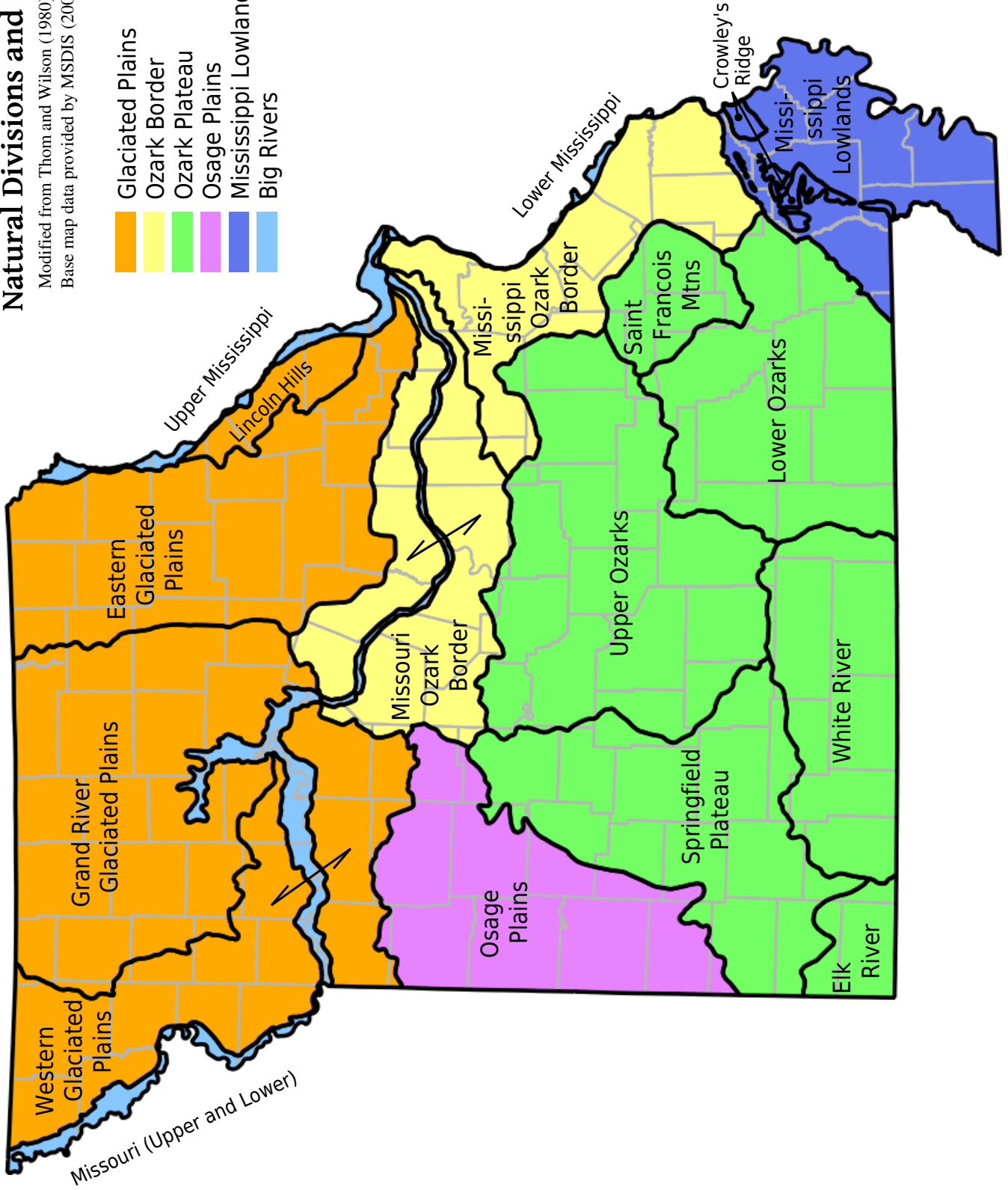
**Table 3.** List of Aquatic Subregions and Ecological Drainage Units from MSDIS (2009a, 2009c). Each drainage unit is indicated with its primary drainage system: a) Mississippi River, b) Missouri River, c) Arkansas River, d) White River.

- \* Central Plains Subregion
  - \* Blackwater / Lamine (b)
  - \* Cuivre / Salt (a)
  - \* Des Moines (a)
  - \* Grand / Chariton (b)
  - \* Kansas (b)
  - \* Nishnabotna / Platte (b)
  - \* Osage / South Grand (b)
- \* Ozarks Subregion
  - \* Apple / Joachim (a)
  - \* Black / Current (d)
  - \* Gasconade (b)
  - \* Meramec (a)
  - \* Moreau / Loutre (b)
  - \* Osage (b)
  - \* Neosho (c)
  - \* Upper Saint Francis / Castor (a)
  - \* White (d)
- \* Mississippi Alluvial Subregion
  - \* Black / Cache (a)
  - \* Saint Francis / Little (a)
  - \* Saint Johns Bayou (a)

# Natural Divisions and Sections

Modified from Thom and Wilson (1980)  
 Base map data provided by MSDIS (2009b) and MDC (2007a)

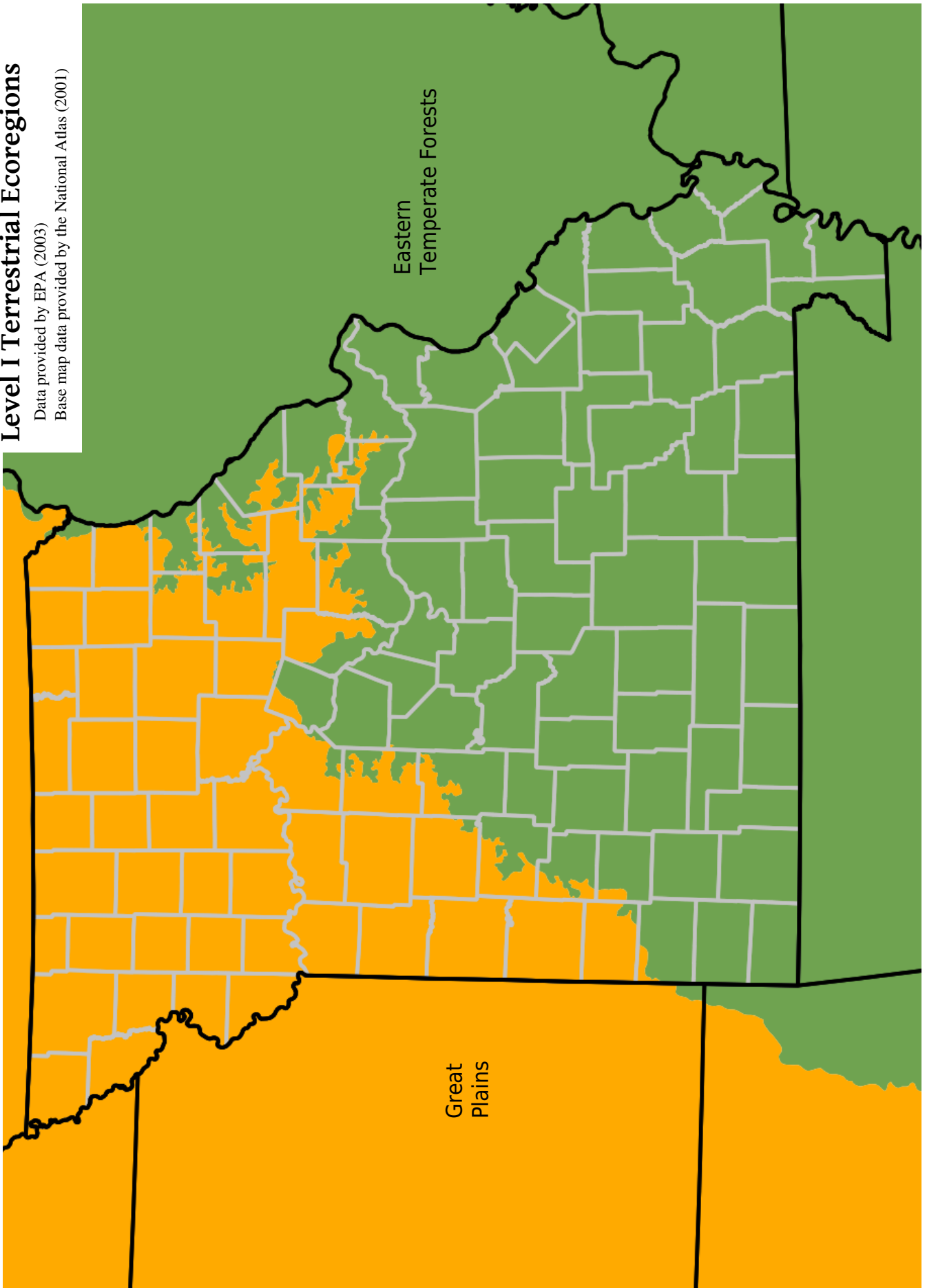
- Glaciated Plains
- Ozark Border
- Ozark Plateau
- Osage Plains
- Mississippi Lowlands
- Big Rivers



## Level I Terrestrial Ecoregions

Data provided by EPA (2003)

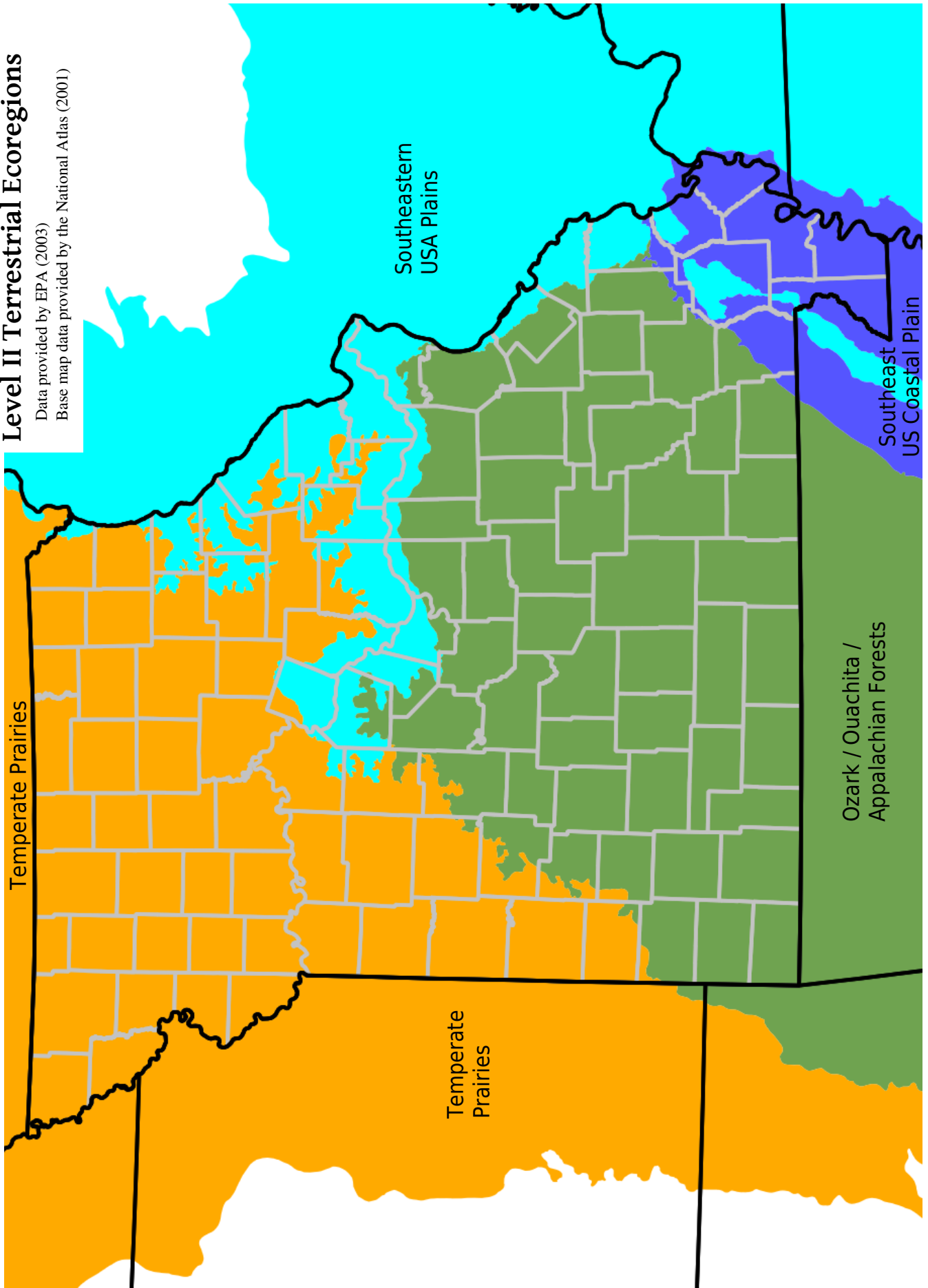
Base map data provided by the National Atlas (2001)



## Level II Terrestrial Ecoregions

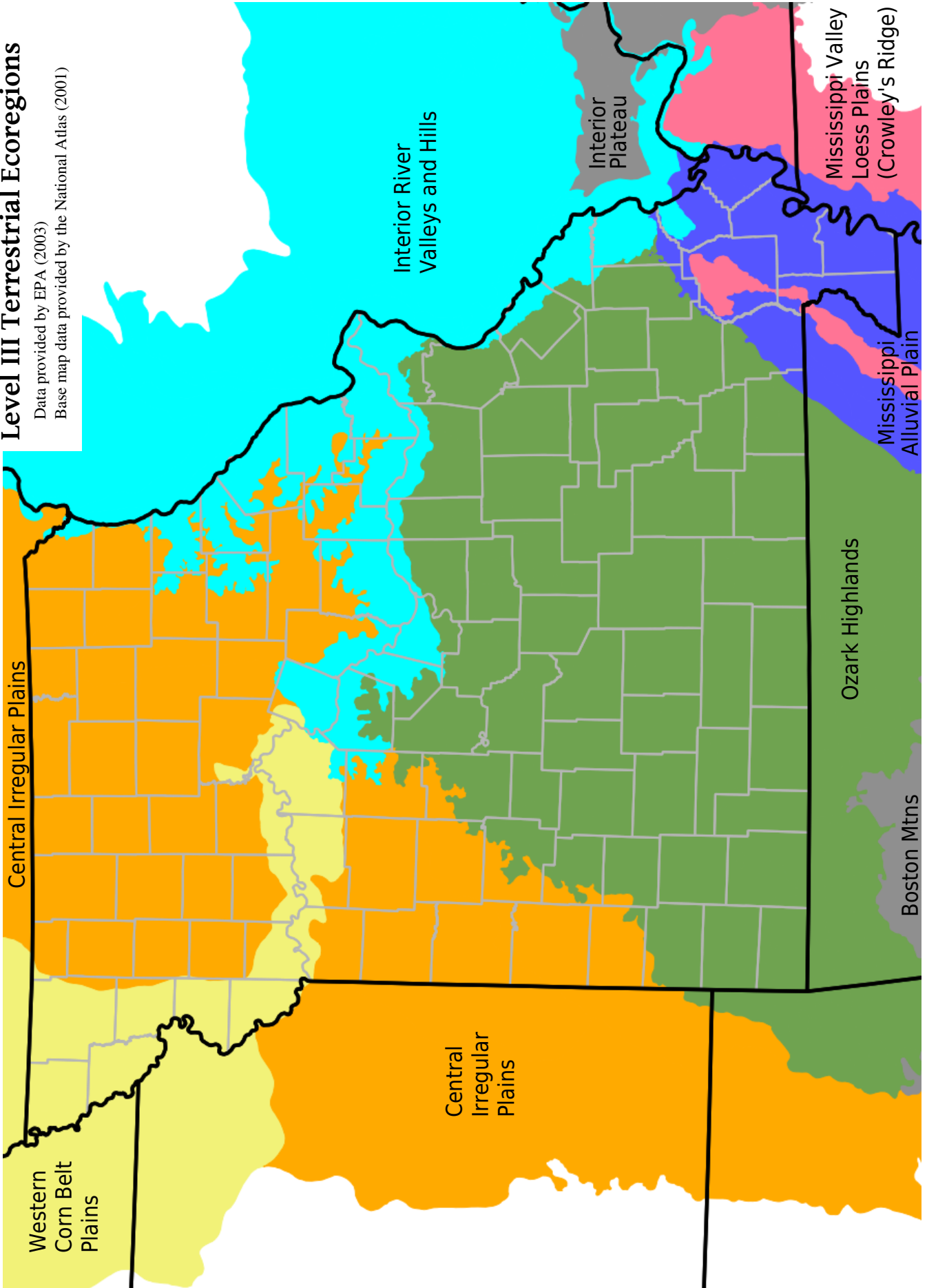
Data provided by EPA (2003)

Base map data provided by the National Atlas (2001)



# Level III Terrestrial Ecoregions

Data provided by EPA (2003)  
Base map data provided by the National Atlas (2001)

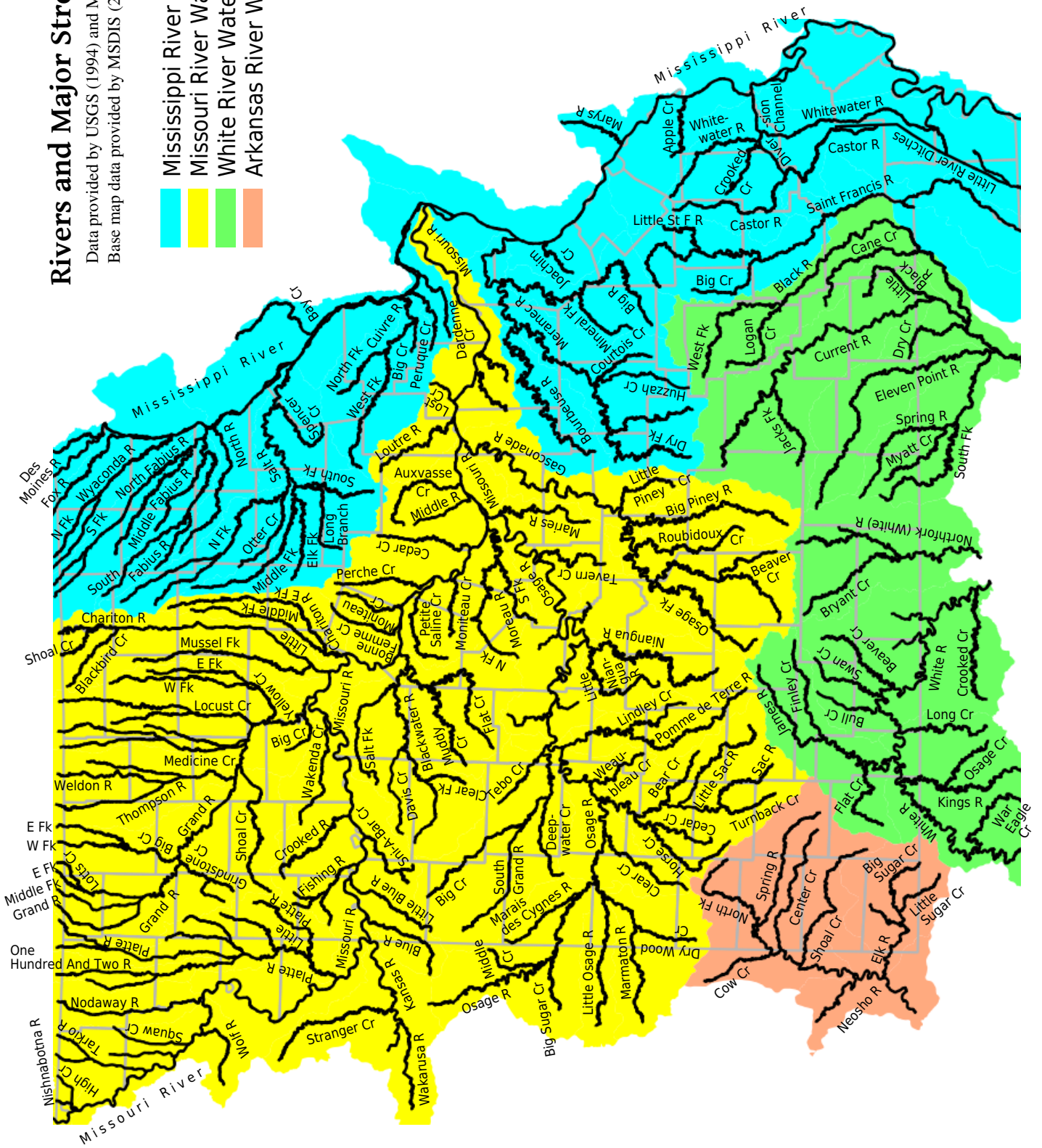




# Rivers and Major Streams

Data provided by USGS (1994) and MDC (2007b)  
 Base map data provided by MSDIS (2009b)

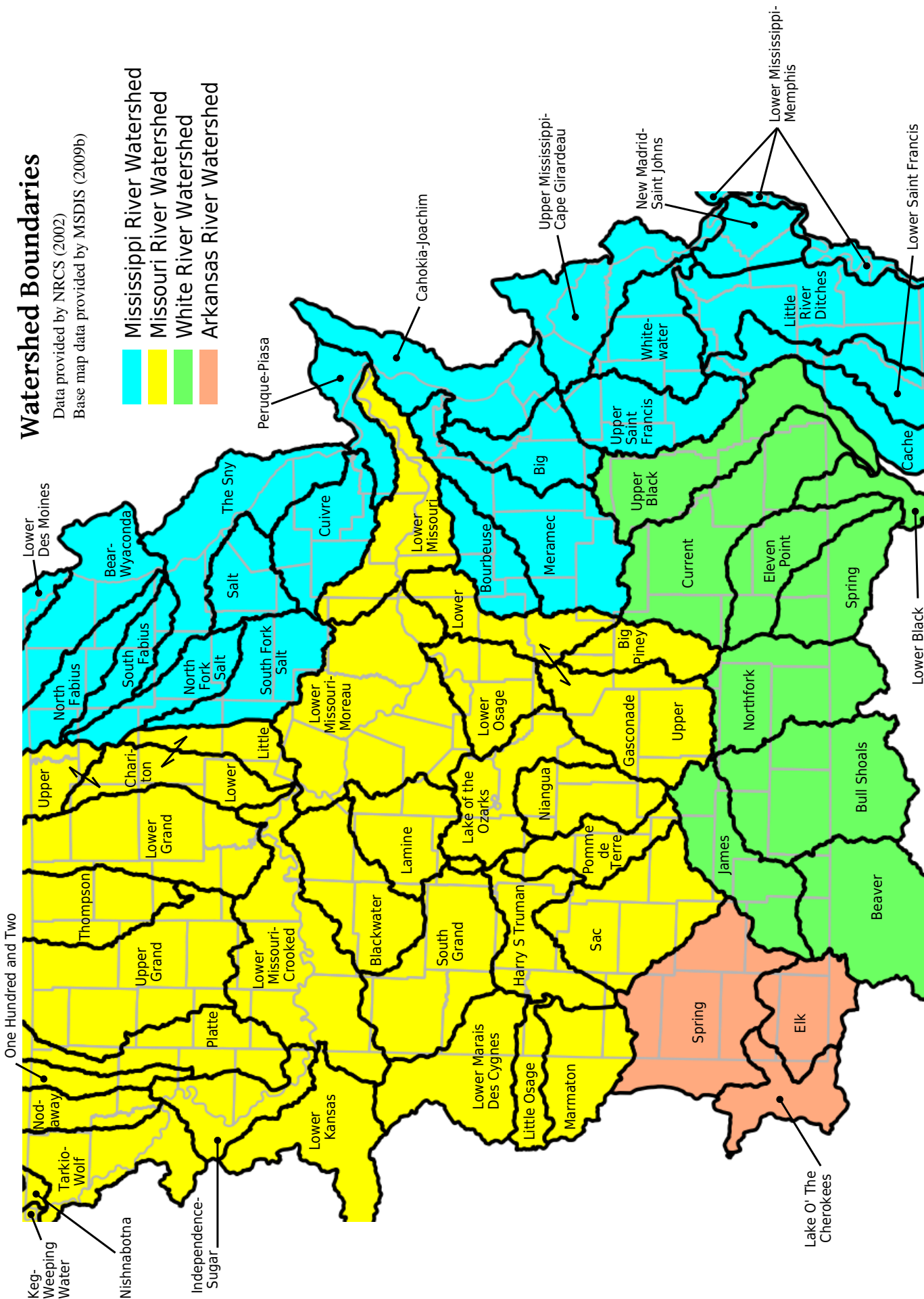
- Mississippi River Watershed
- Missouri River Watershed
- White River Watershed
- Arkansas River Watershed



# Watershed Boundaries

Data provided by NRCS (2002)  
 Base map data provided by MSDIS (2009b)

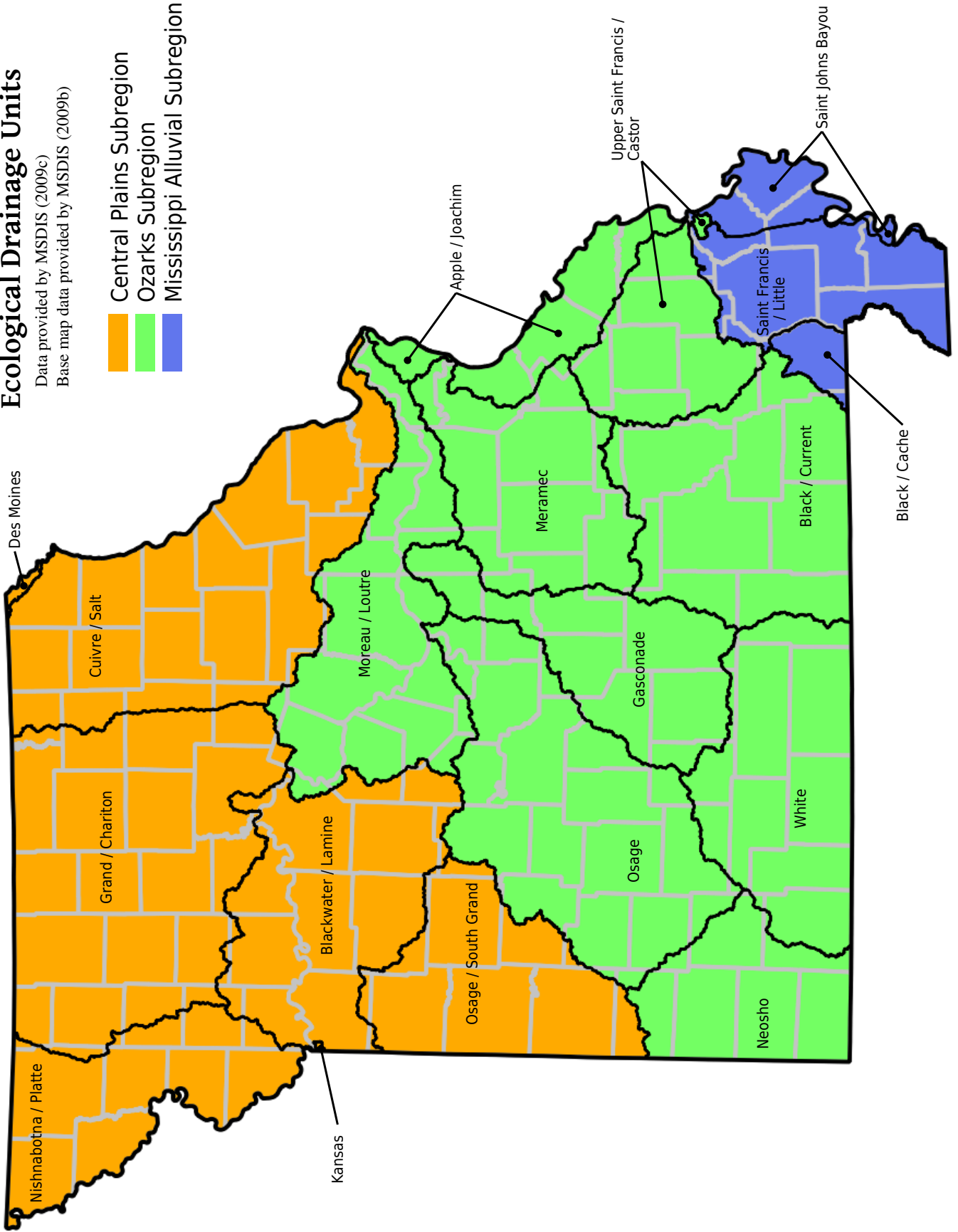
- Mississippi River Watershed
- Missouri River Watershed
- White River Watershed
- Arkansas River Watershed



# Ecological Drainage Units

Data provided by MSDIS (2009c)  
Base map data provided by MSDIS (2009b)

- Central Plains Subregion
- Ozarks Subregion
- Mississippi Alluvial Subregion

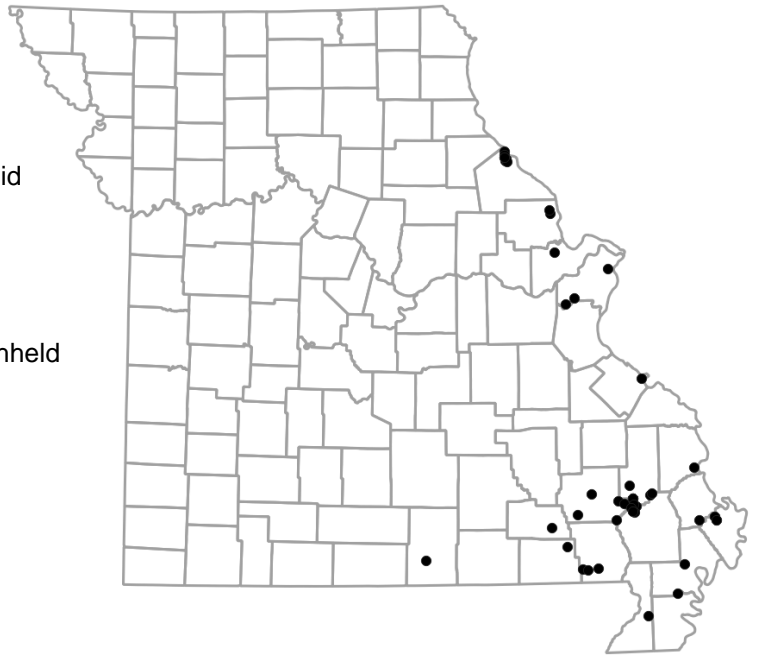




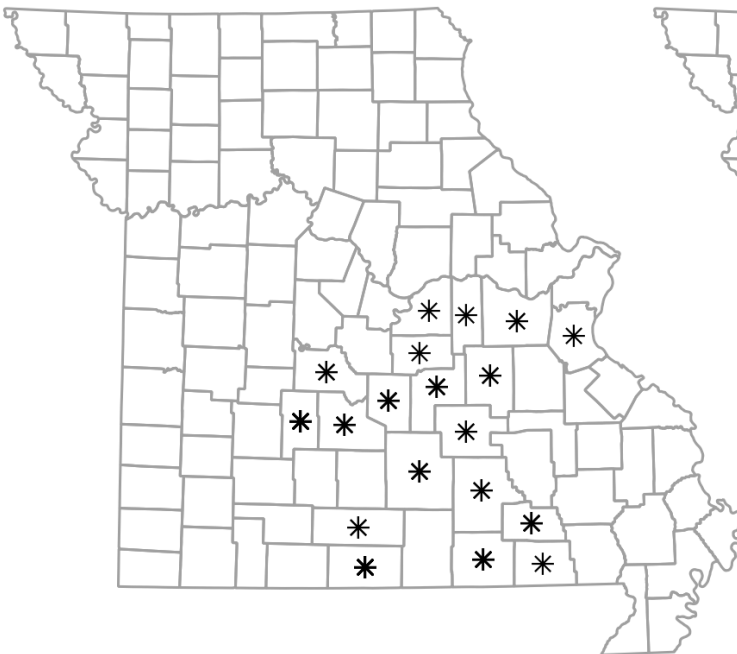
## Species Locality Maps

Key:

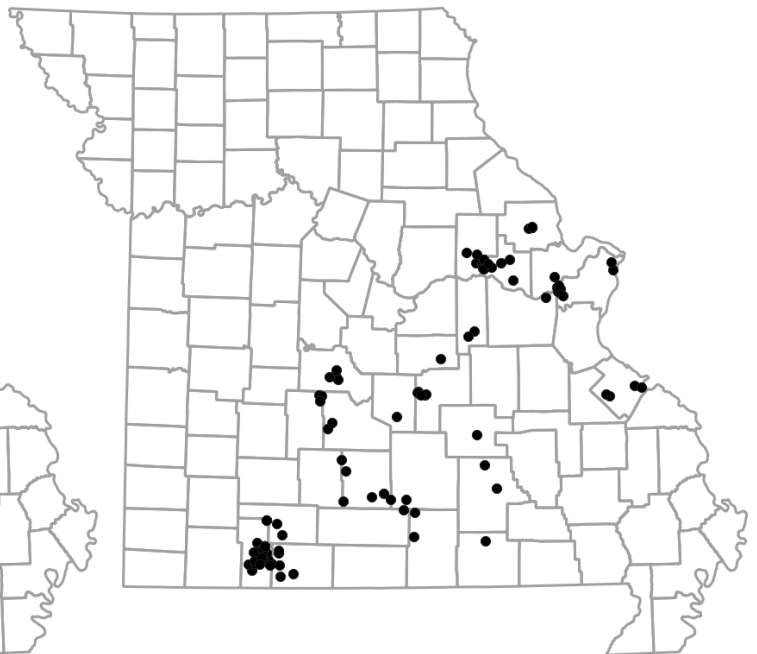
- Museum or published record believed to be valid
- \* County record only for:
  - Valid record without a specific locality
  - Species of conservation concern, locality withheld
- ? Questionable record that may be valid



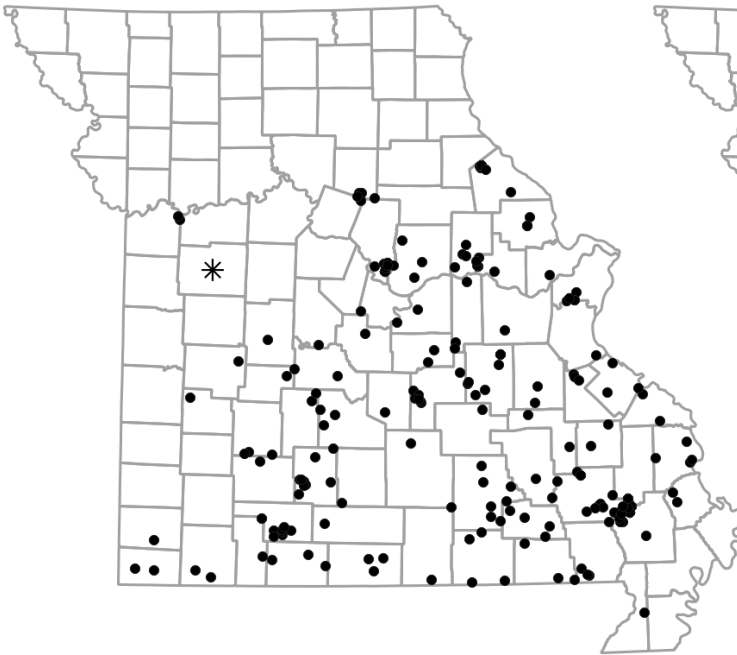
*Siren nettingi*  
Western Lesser Siren



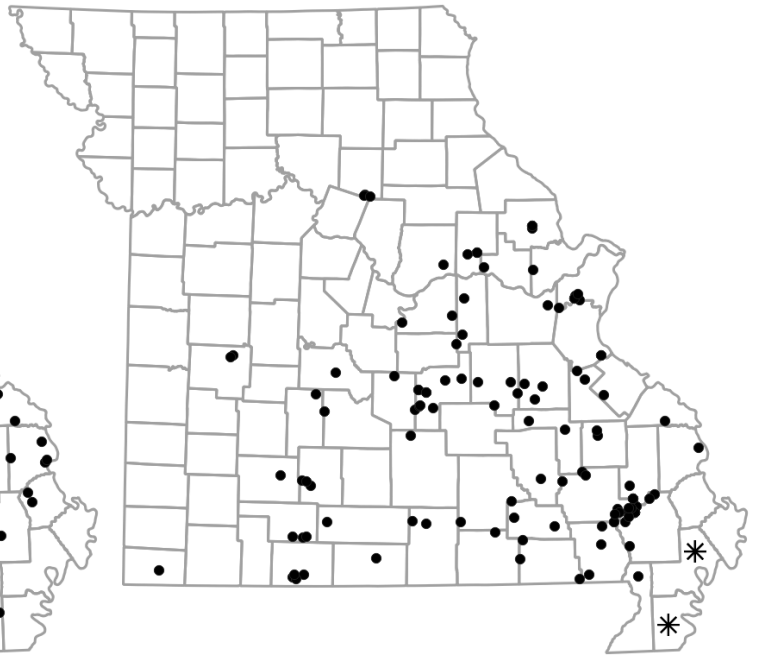
*Cryptobranchus alleganiensis*  
Hellbender



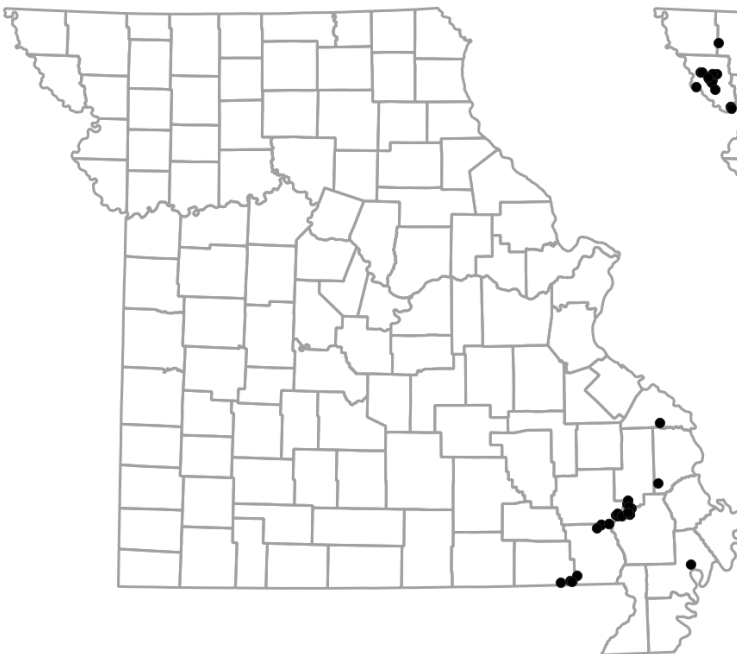
*Ambystoma annulatum*  
Ringed Salamander



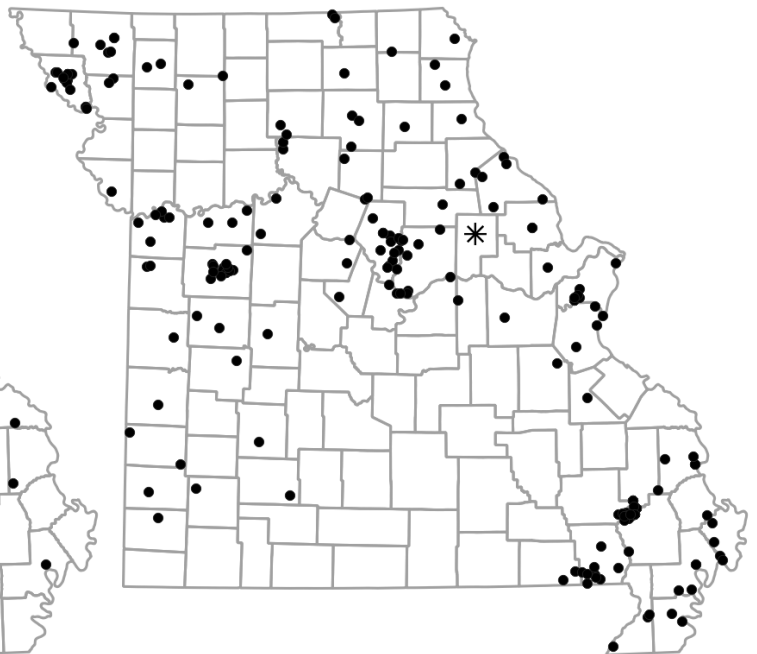
*Ambystoma maculatum*  
Spotted Salamander



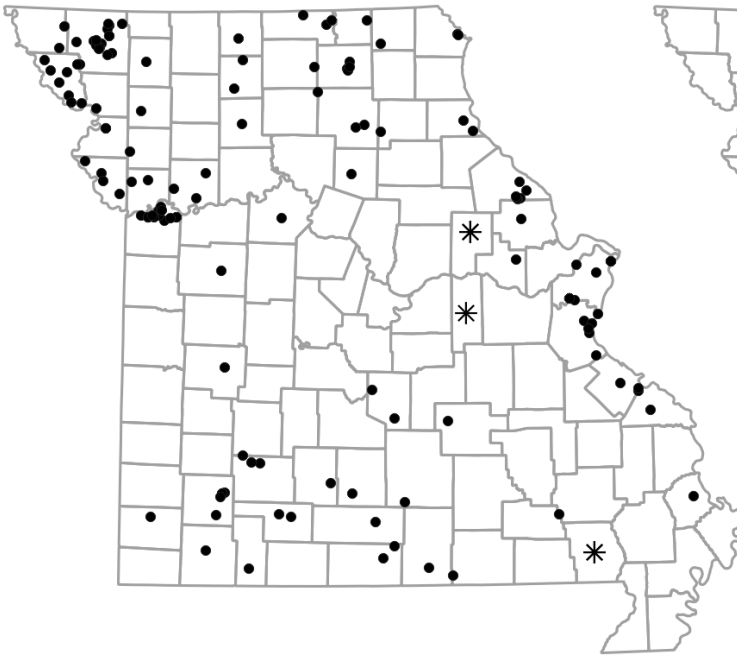
*Ambystoma opacum*  
Marbled Salamander



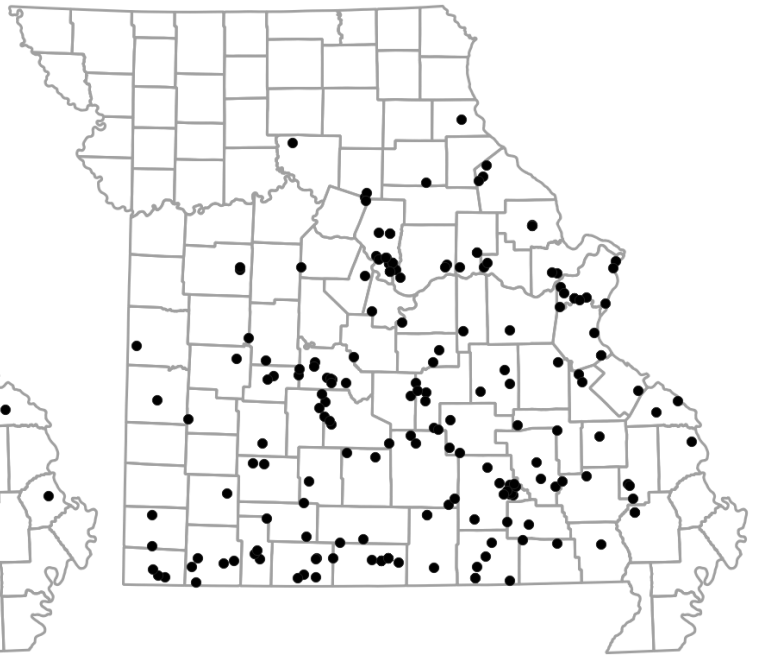
*Ambystoma talpoideum*  
Mole Salamander



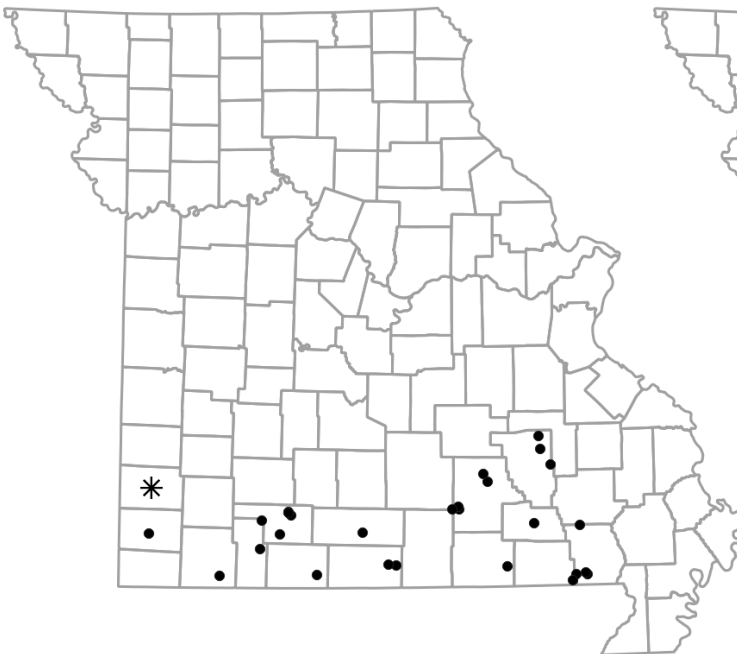
*Ambystoma texanum*  
Small-mouthed Salamander



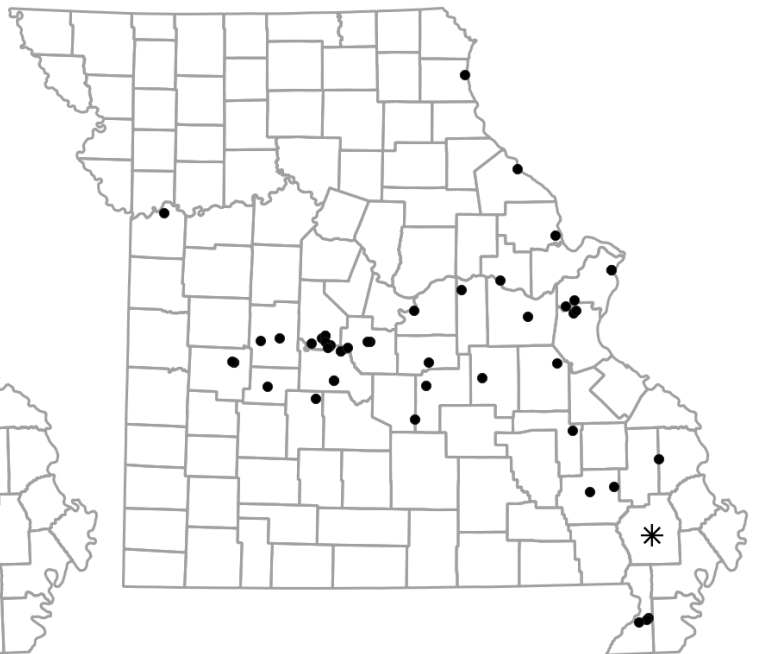
*Ambystoma tigrinum*  
Eastern Tiger Salamander



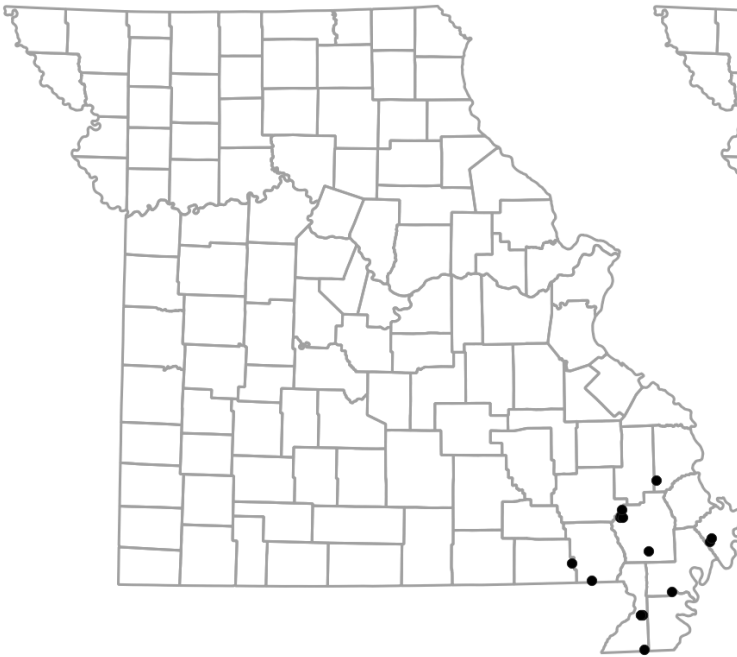
*Notophthalmus viridescens*  
Central Newt



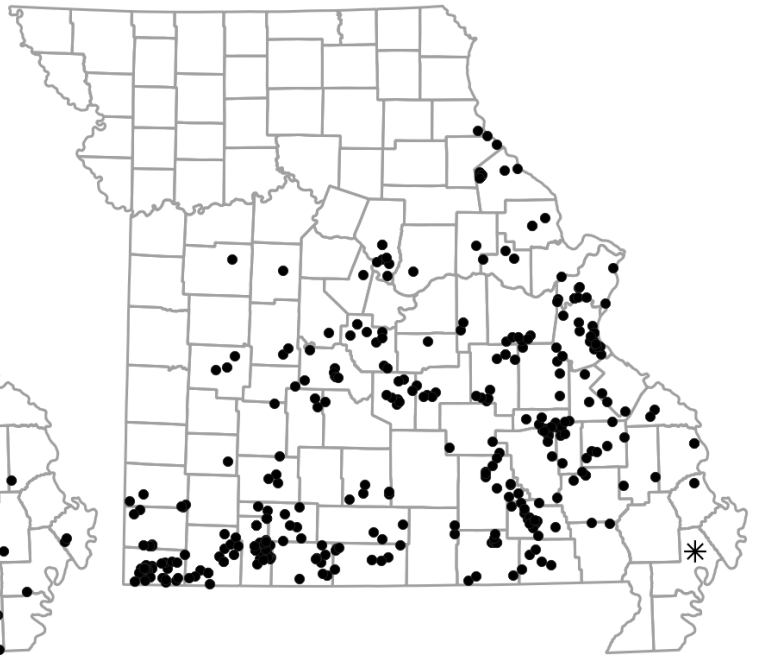
*Necturus louisianensis*  
Red River Mudpuppy



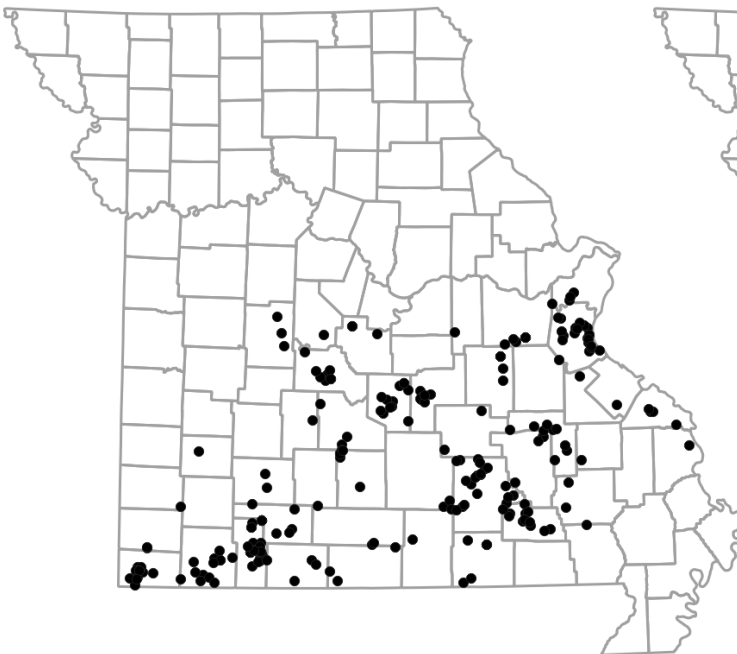
*Necturus maculosus*  
Mudpuppy



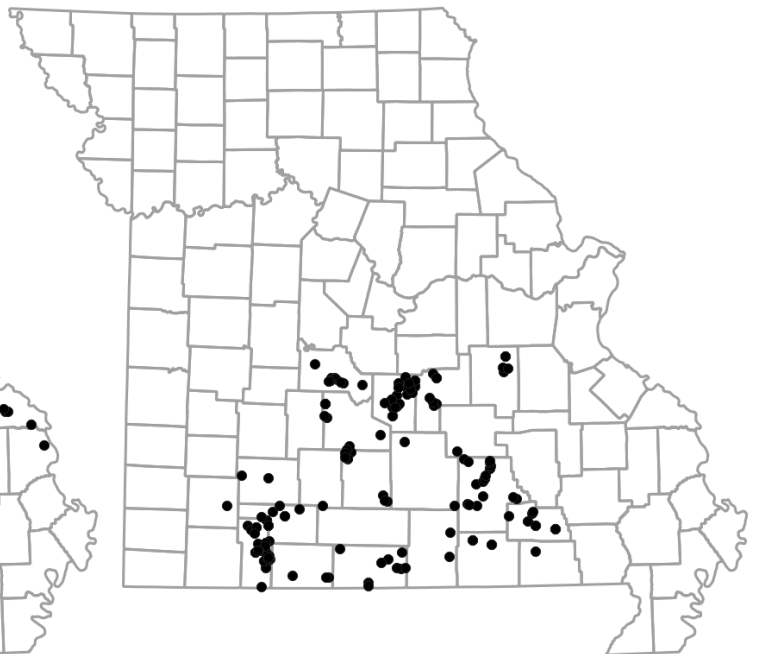
*Amphiuma tridactylum*  
Three-toed Amphiuma



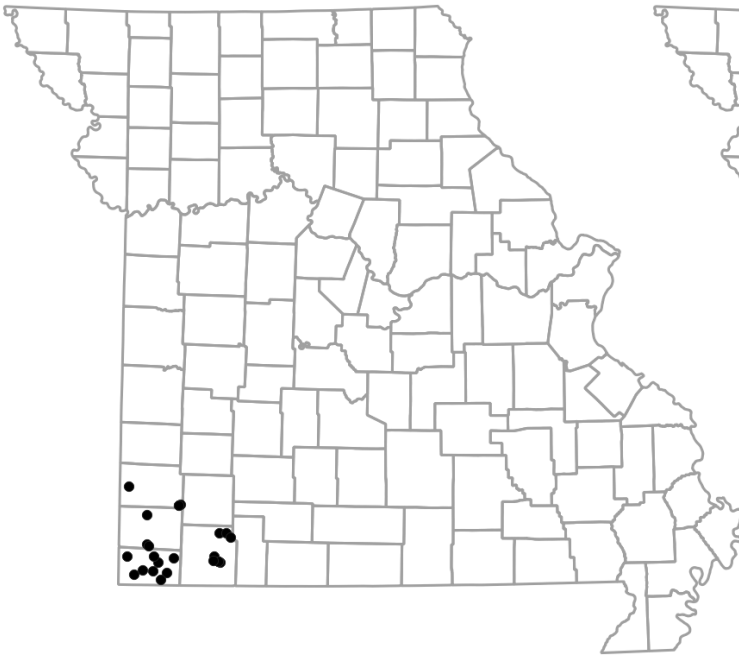
*Eurycea longicauda*  
Long-tailed Salamander



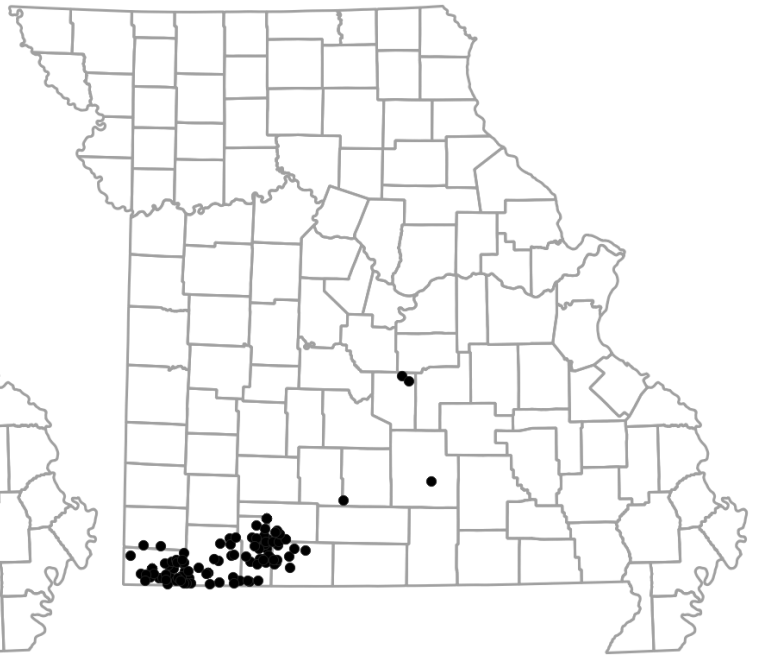
*Eurycea lucifuga*  
Cave Salamander



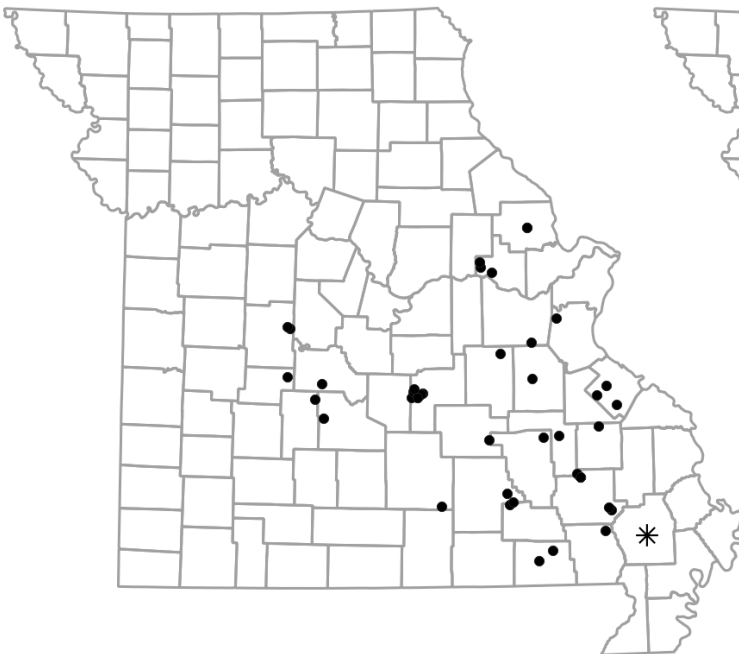
*Eurycea nerea*  
Northern Grotto Salamander



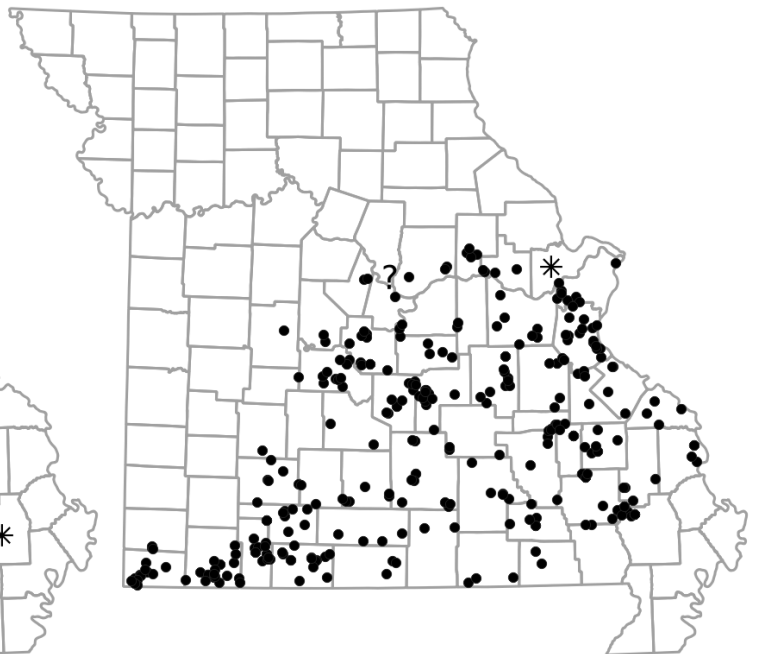
*Eurycea spelaea*  
Western Grotto Salamander



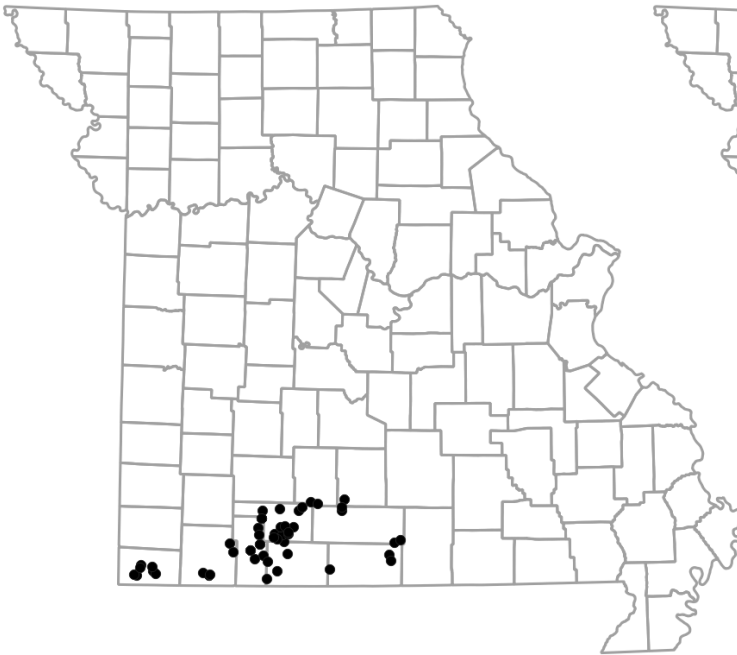
*Eurycea tynerensis*  
Oklahoma Salamander



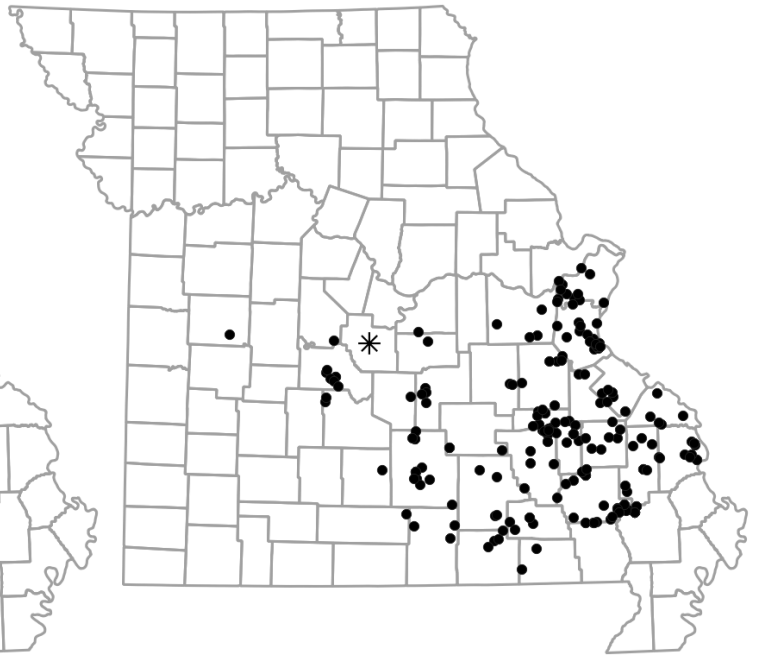
*Hemidactylum scutatum*  
Four-toed Salamander



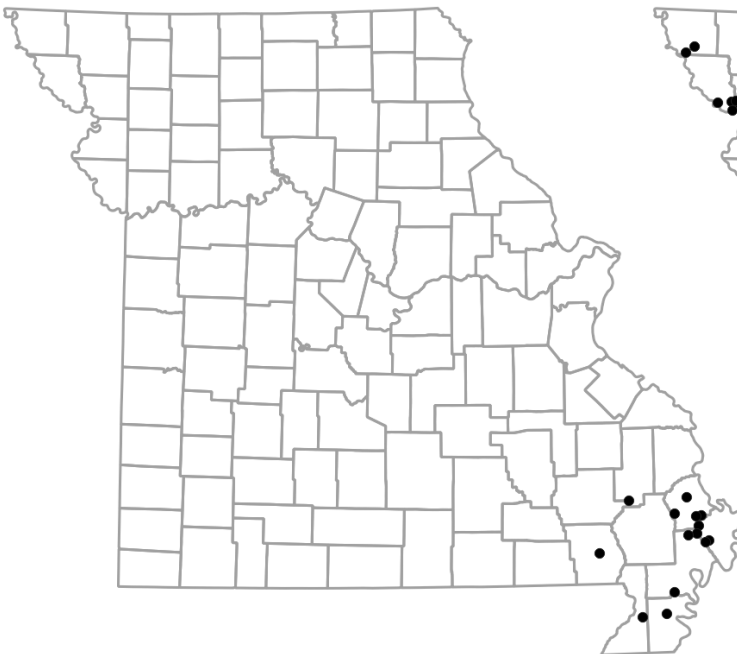
*Plethodon albagula*  
Western Slimy Salamander



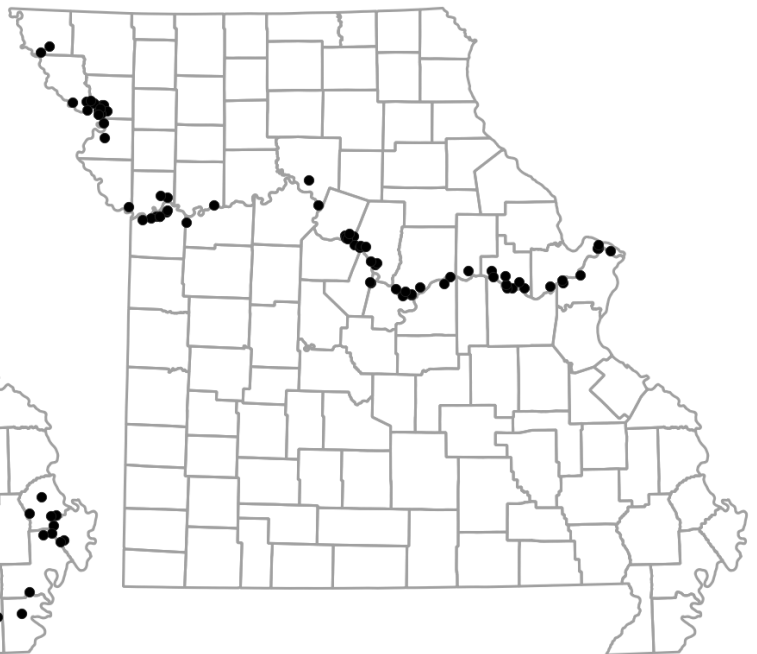
*Plethodon angusticlavius*  
Ozark Zigzag Salamander



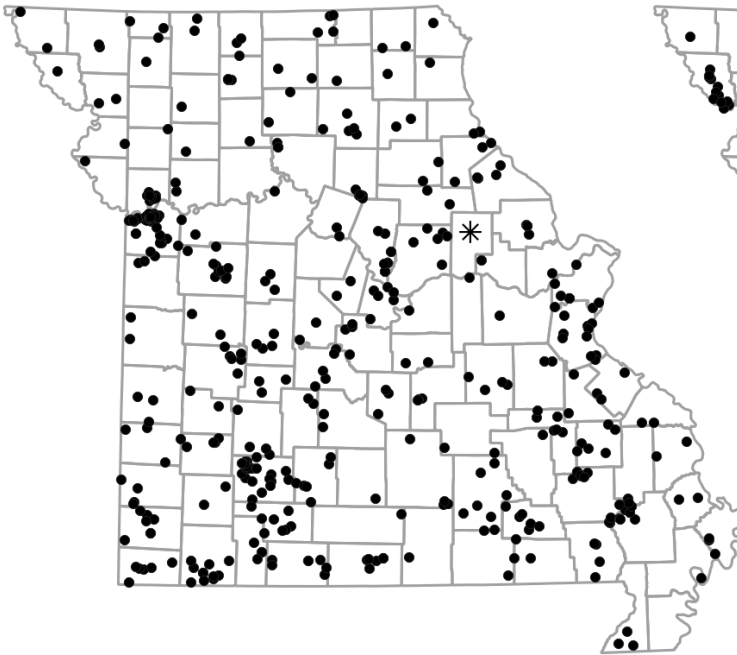
*Plethodon serratus*  
Southern Red-backed Salamander



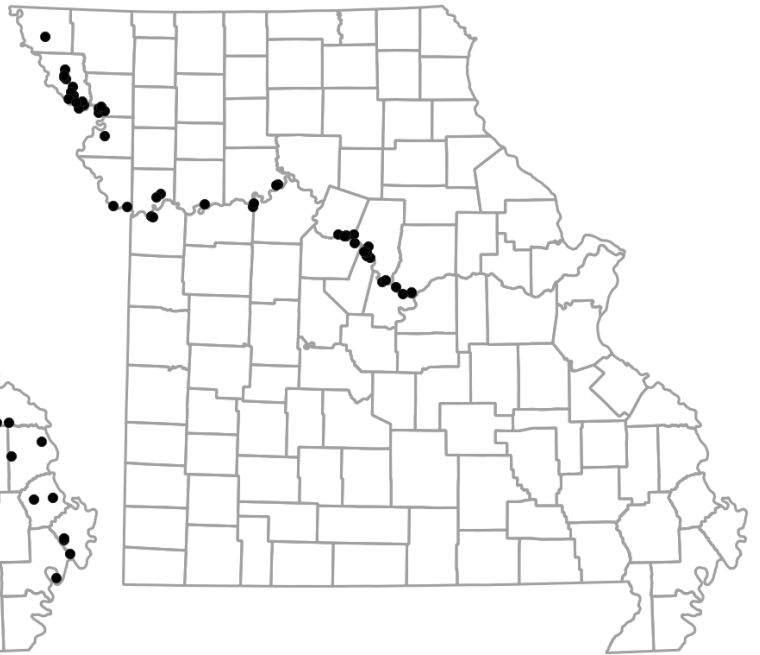
*Scaphiopus holbrookii*  
Eastern Spadefoot



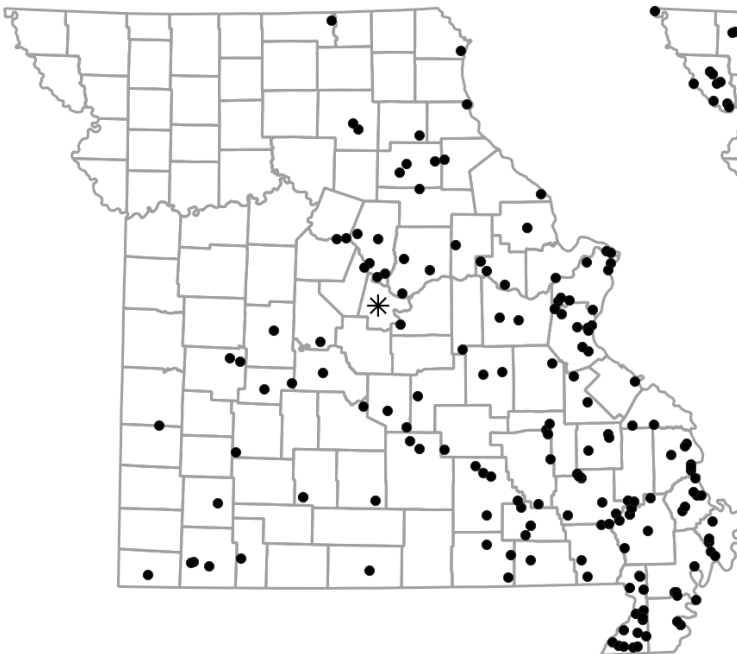
*Spea bombifrons*  
Plains Spadefoot



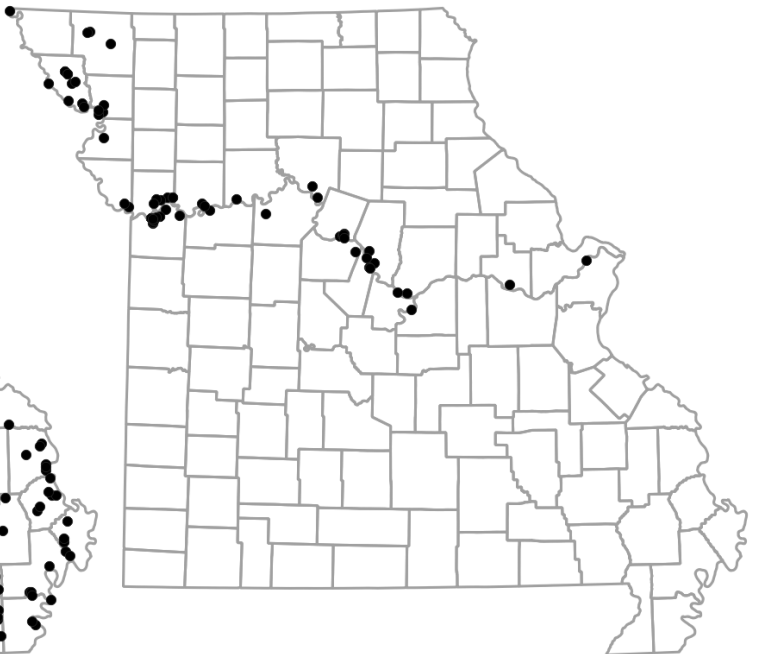
*Anaxyrus americanus*  
American Toad



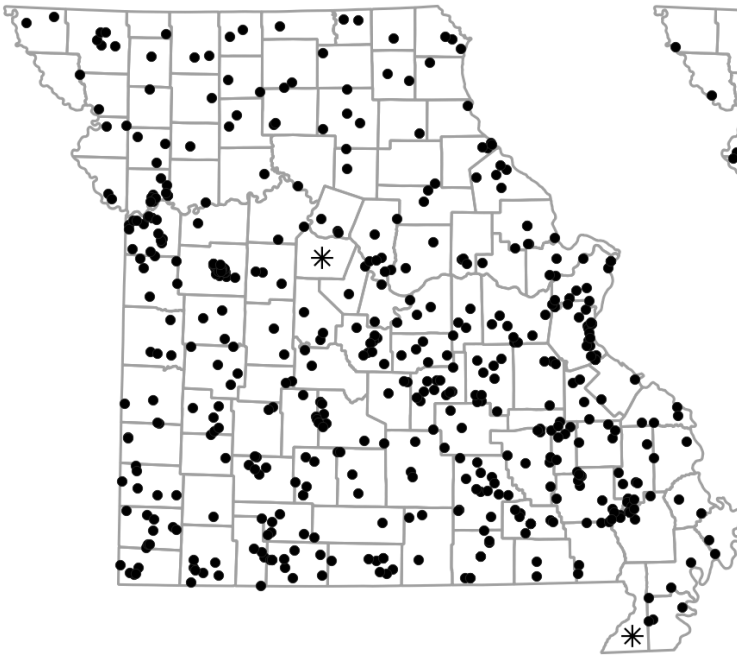
*Anaxyrus cognatus*  
Great Plains Toad



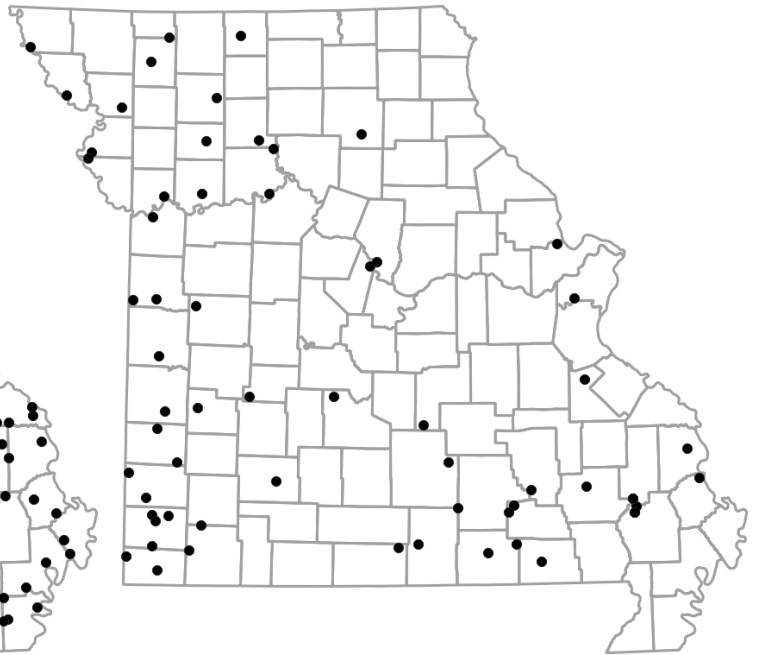
*Anaxyrus fowleri*  
Fowler's Toad



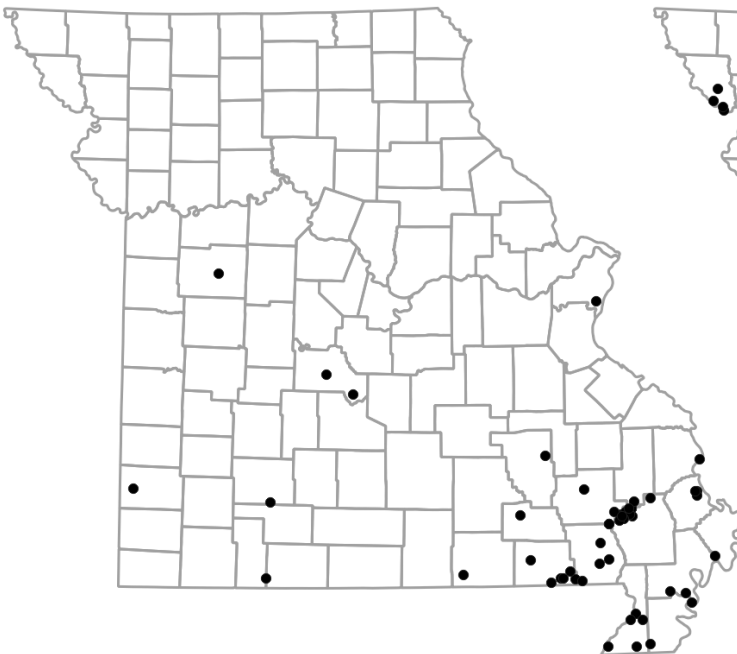
*Anaxyrus woodhousii*  
Rocky Mountain Toad



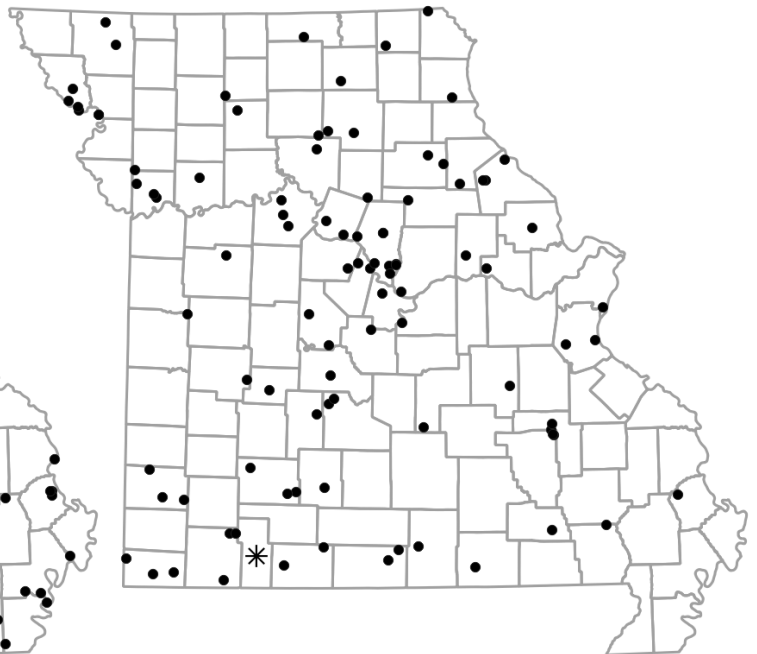
*Acris blanchardi*  
Blanchard's Cricket Frog



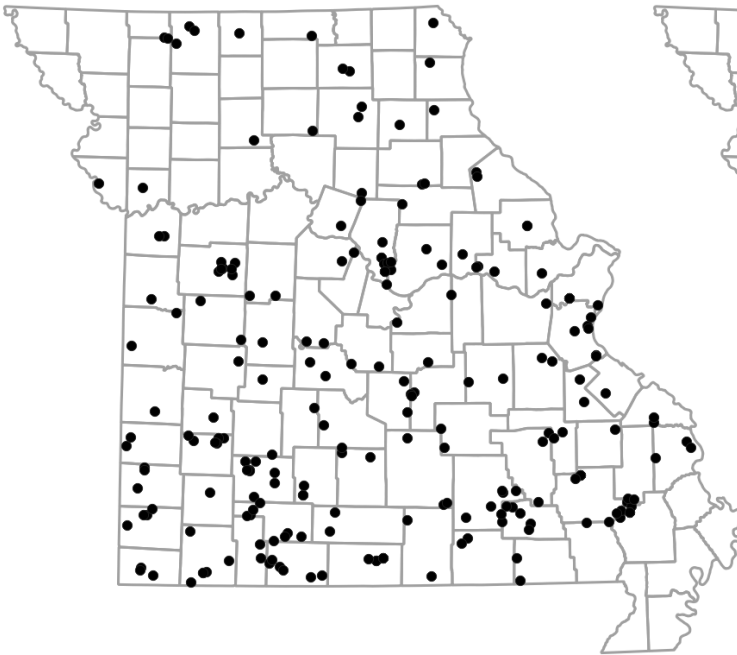
*Dryophytes chrysoscelis*  
Cope's Gray Treefrog



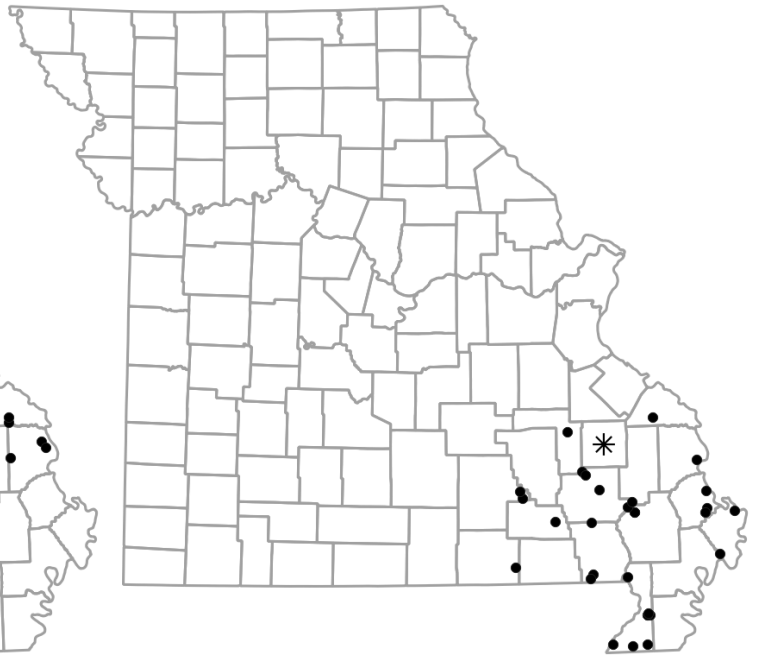
*Dryophytes cinereus*  
Green Treefrog



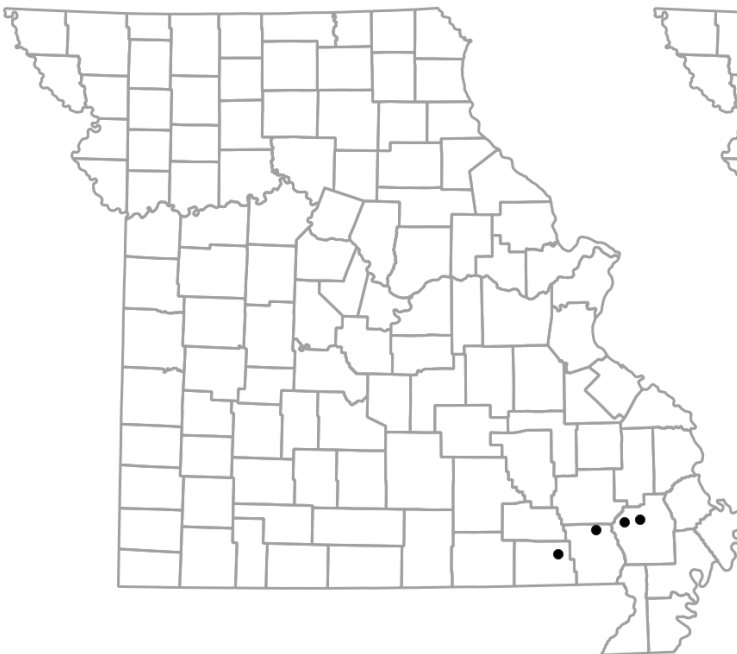
*Dryophytes versicolor*  
Gray Treefrog



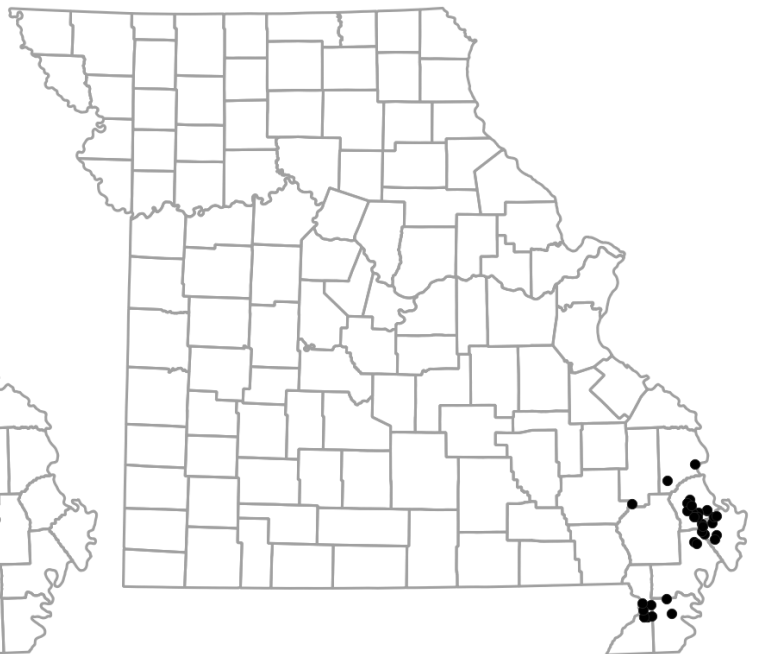
*Pseudacris crucifer*  
Spring Peeper



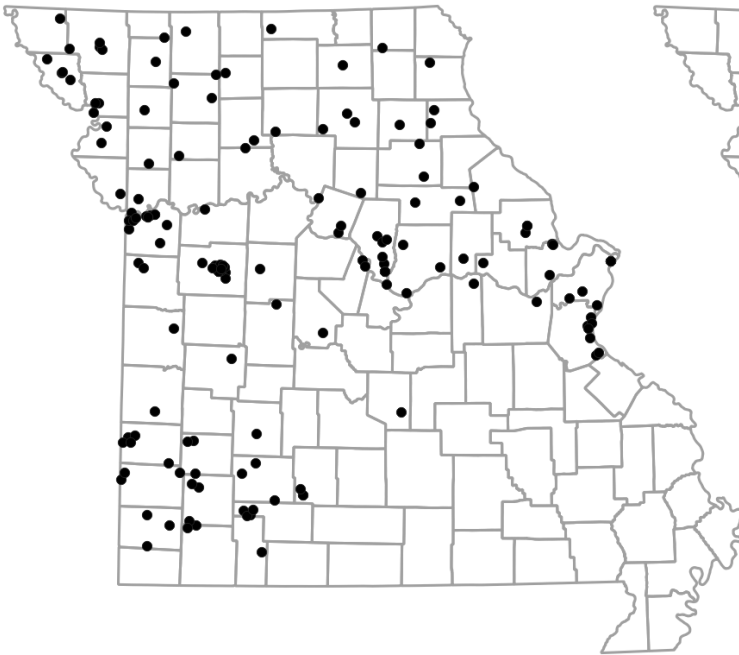
*Pseudacris feriarum*  
Upland Chorus Frog



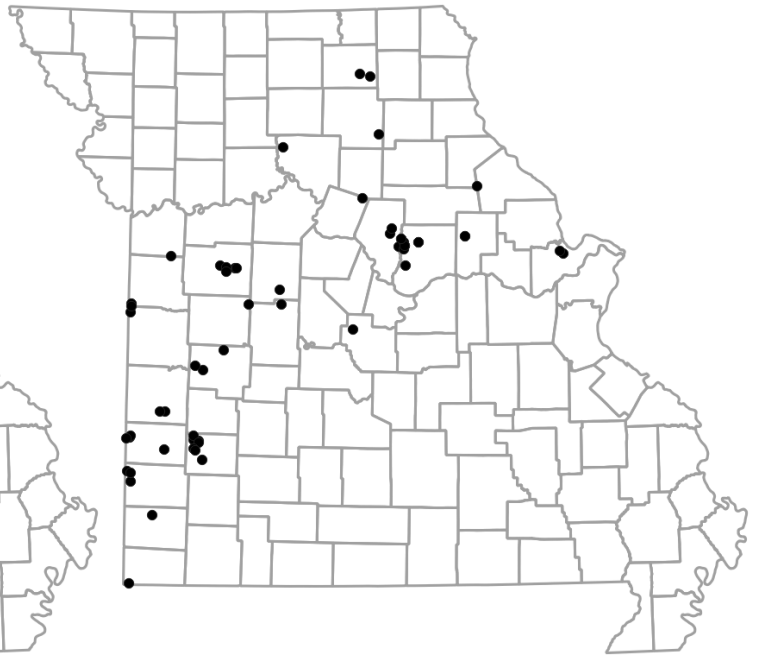
*Pseudacris fouquettei*  
Cajun Chorus Frog



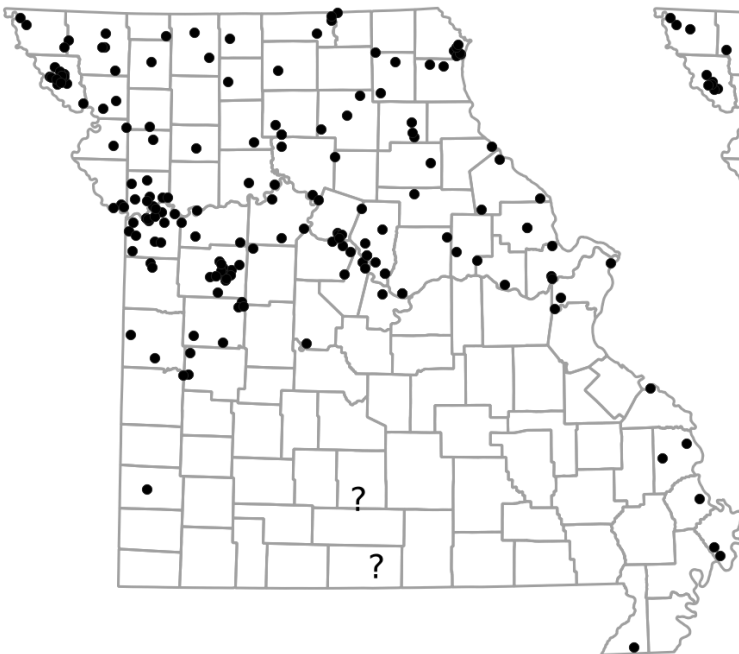
*Pseudacris illinoensis*  
Illinois Chorus Frog



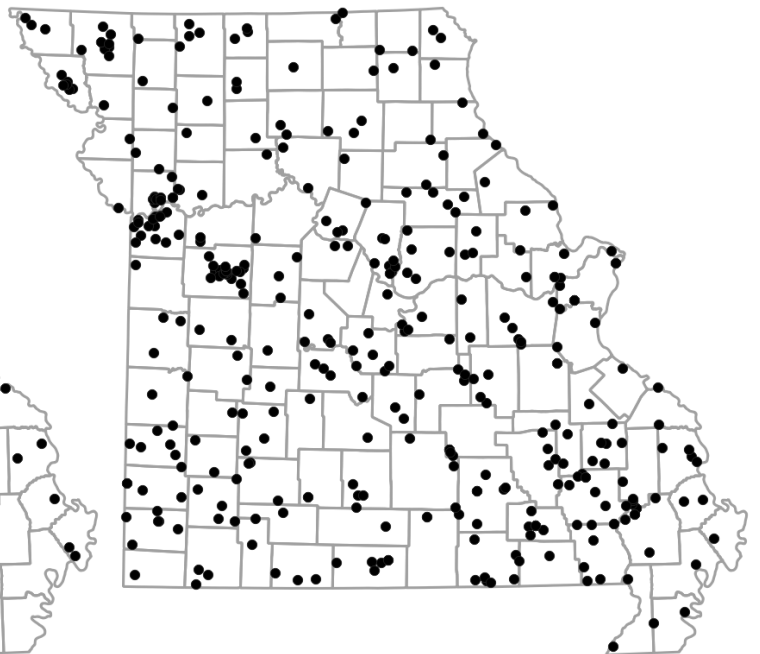
*Pseudacris maculata*  
Boreal Chorus Frog



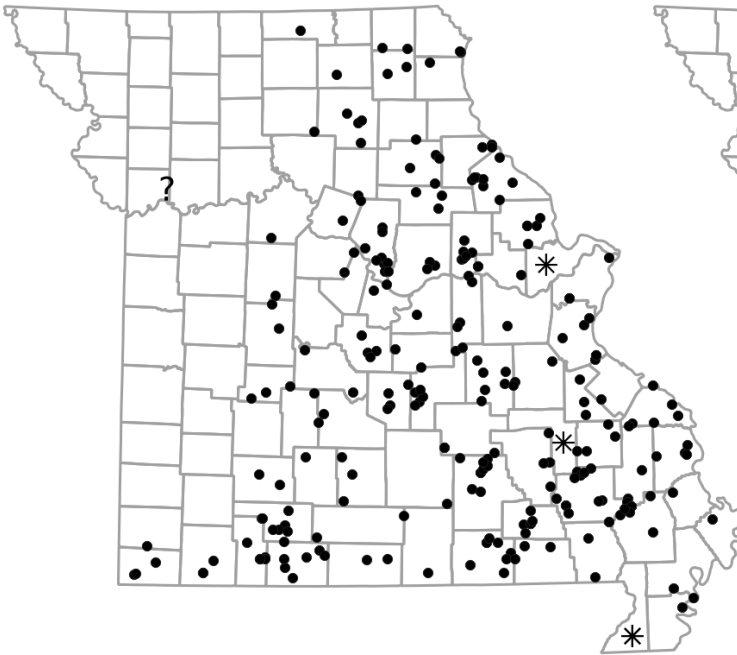
*Lithobates areolatus*  
Northern Crawfish Frog



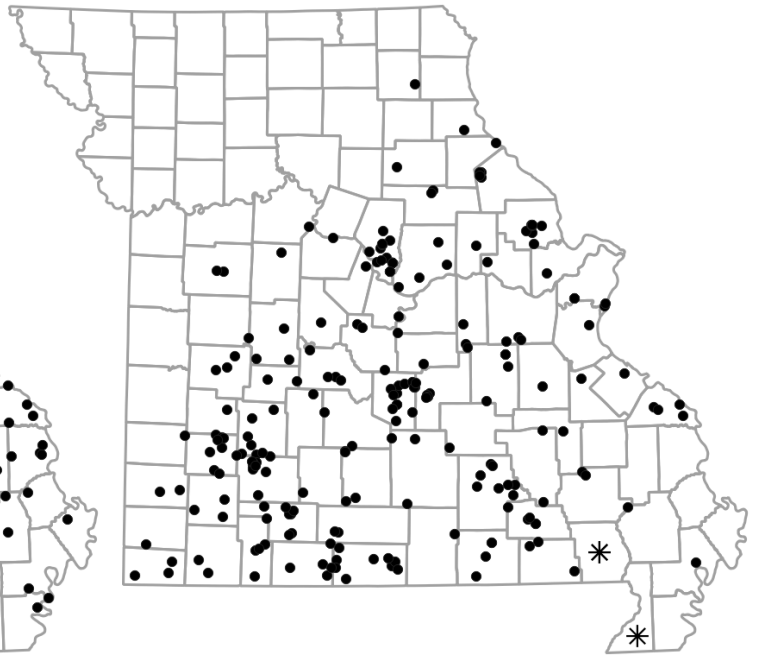
*Lithobates blairi*  
Plains Leopard Frog



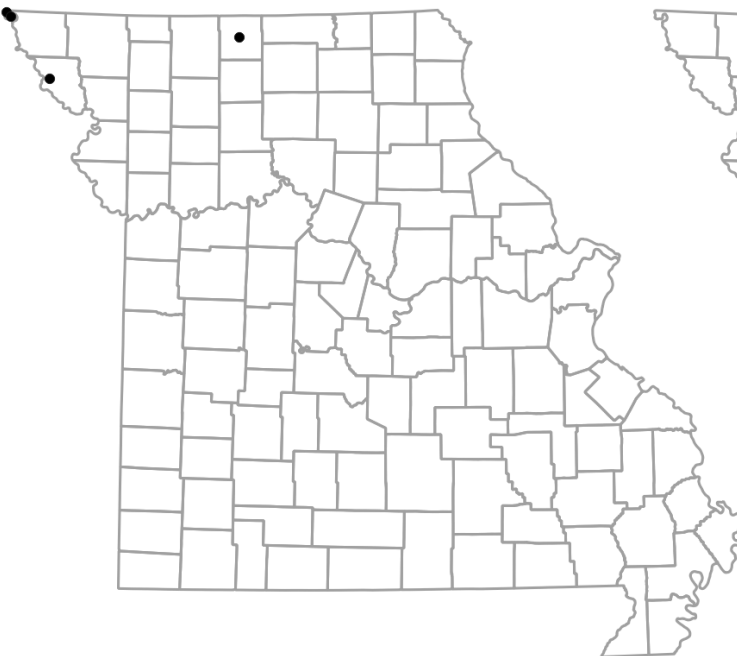
*Lithobates catesbeianus*  
North American Bullfrog



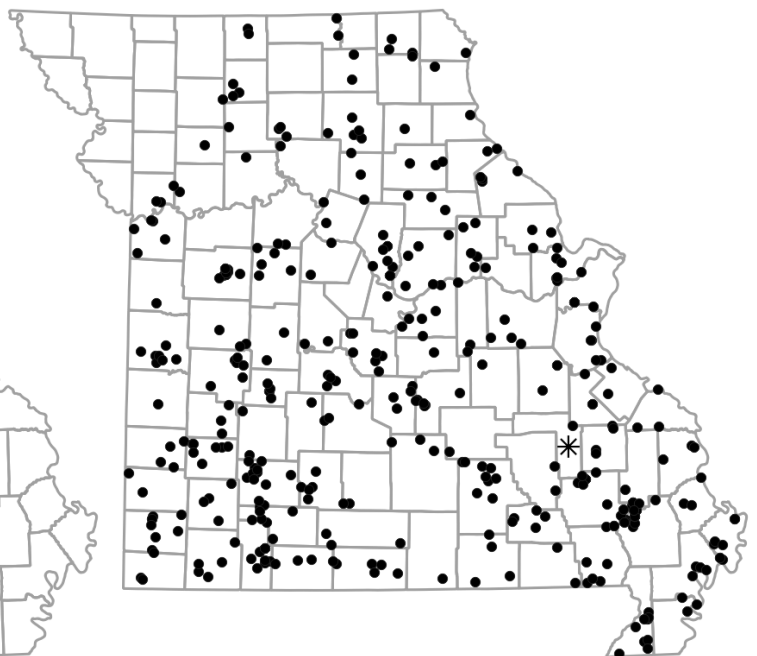
*Lithobates clamitans*  
North American Green Frog



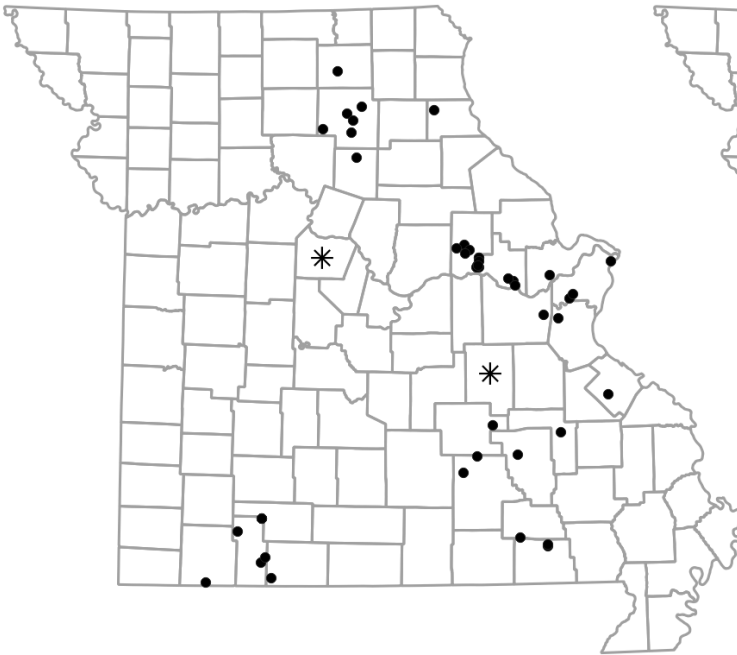
*Lithobates palustris*  
Pickerel Frog



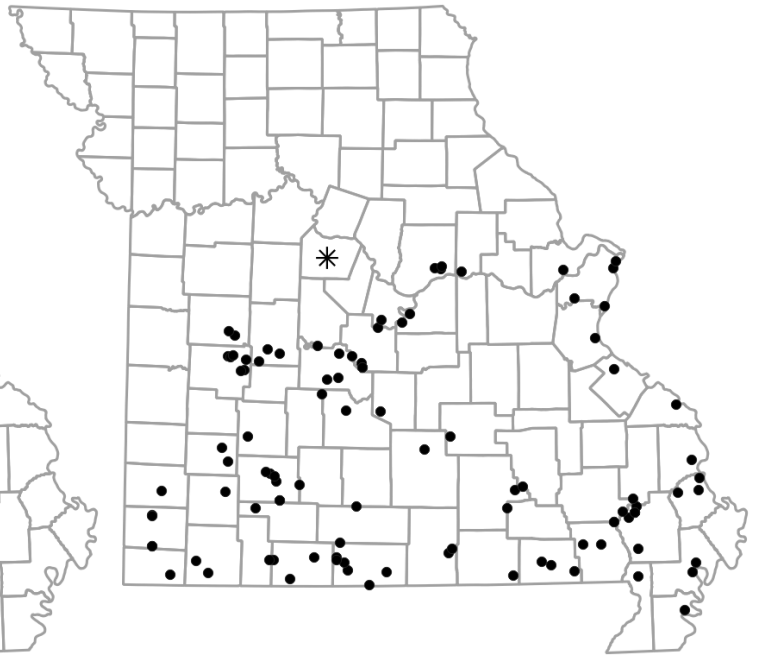
*Lithobates pipiens*  
Northern Leopard Frog



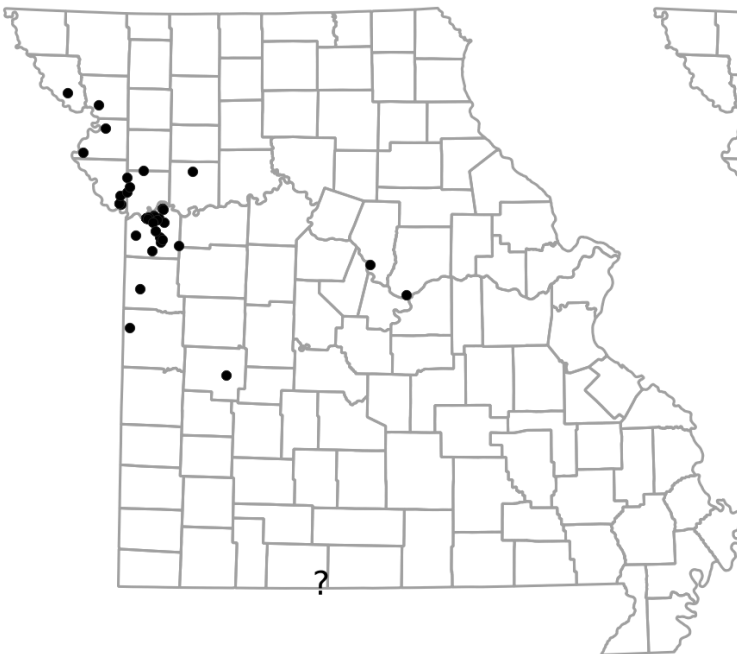
*Lithobates sphenoccephalus*  
Coastal Plains Leopard Frog



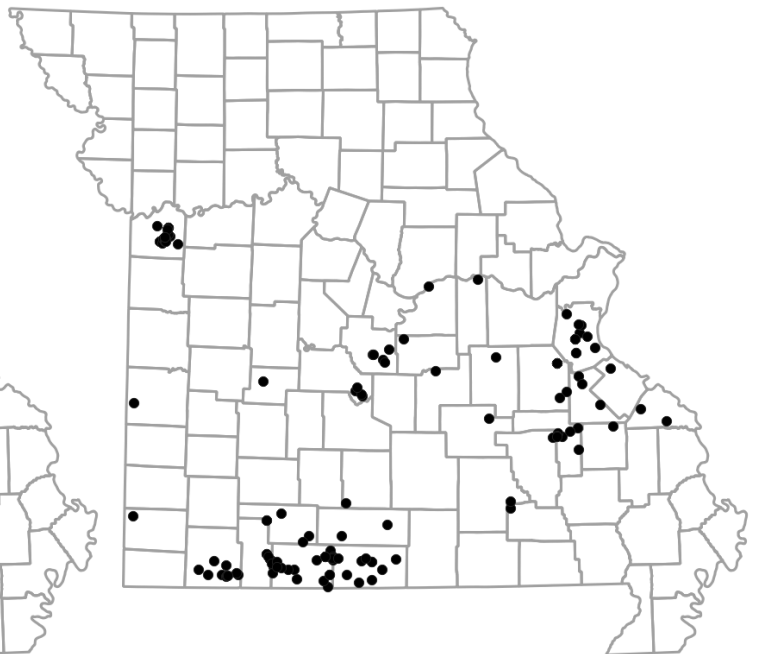
*Lithobates sylvaticus*  
Wood Frog



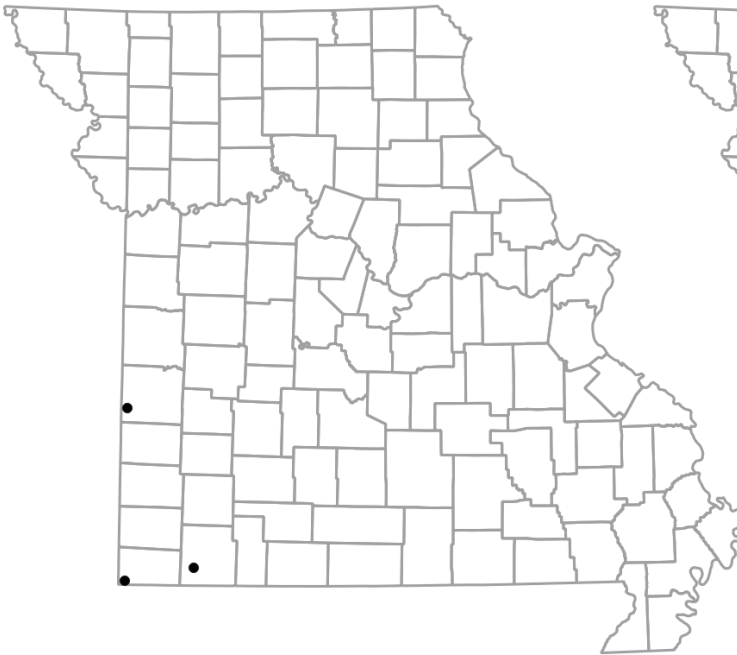
*Gastrophryne carolinensis*  
Eastern Narrow-mouthed Toad



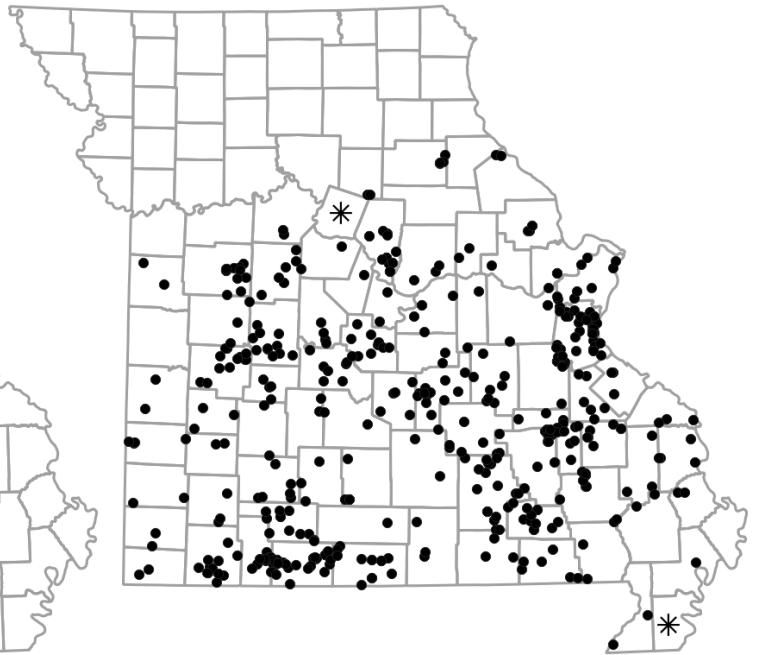
*Gastrophryne olivacea*  
Western Narrow-mouthed Toad



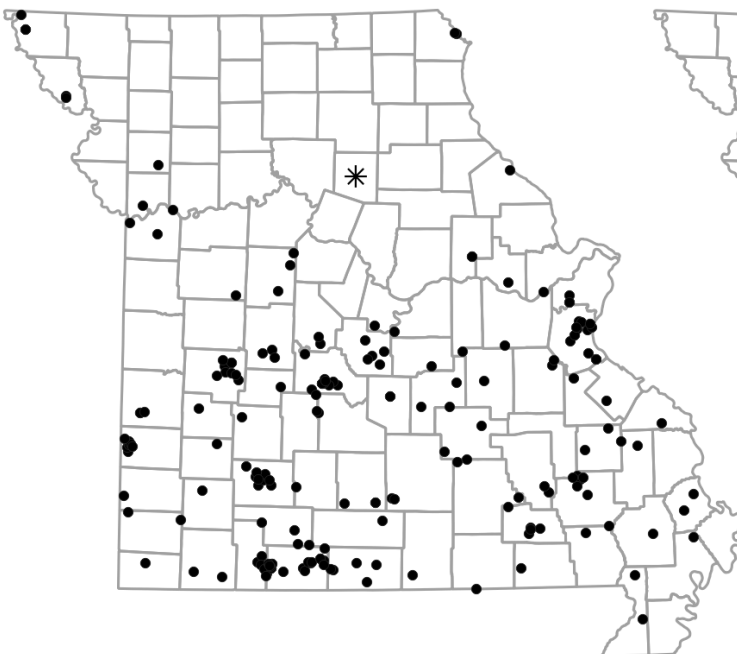
*Crotaphytus collaris*  
Eastern Collared Lizard



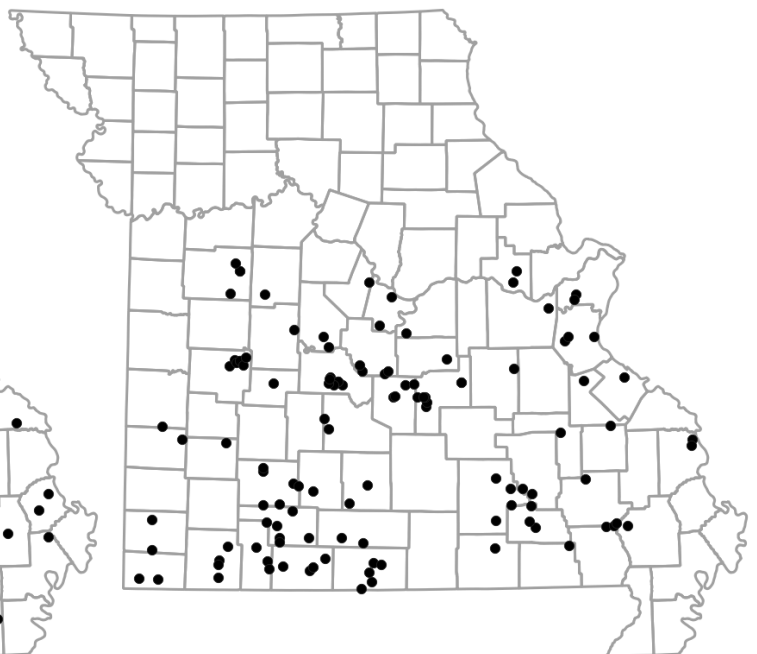
*Phrynosoma cornutum*  
Texas Horned Lizard



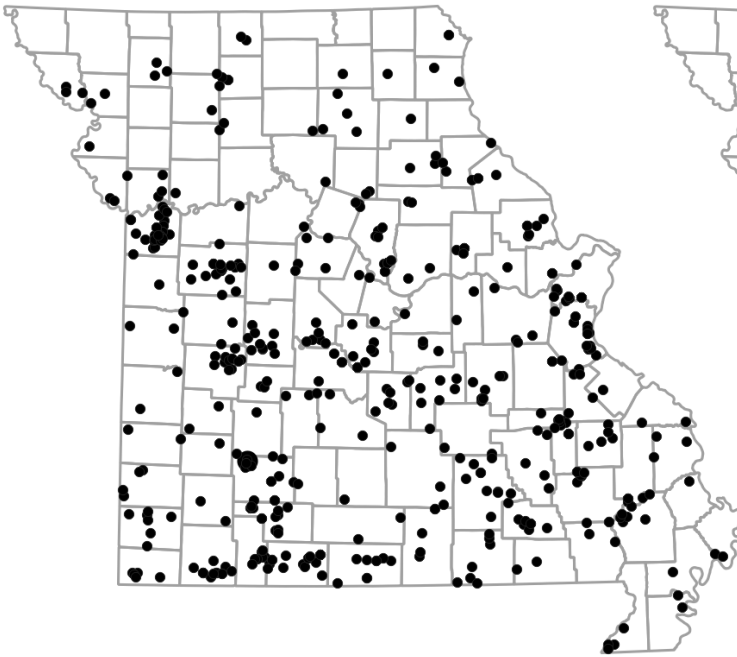
*Sceloporus consobrinus*  
Prairie Lizard



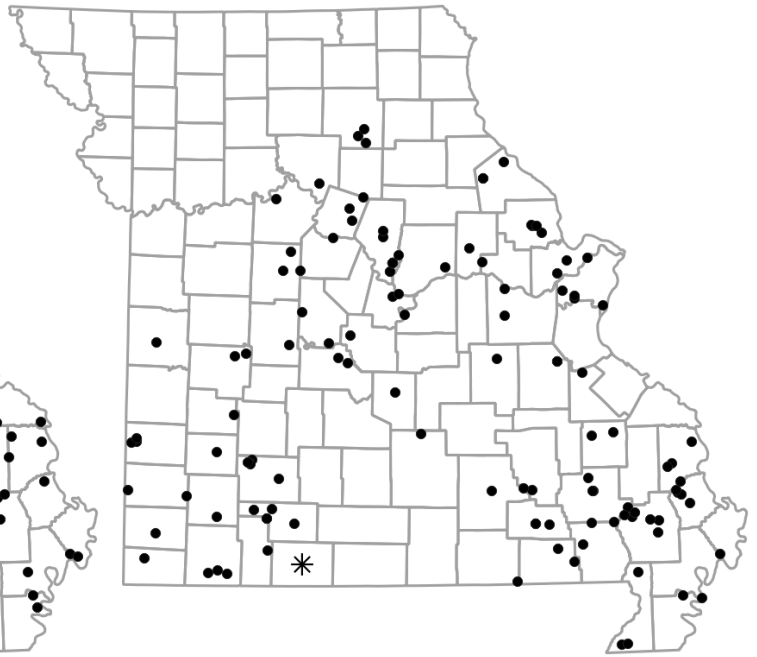
*Aspidoscelis sexlineatus*  
Prairie Racerunner



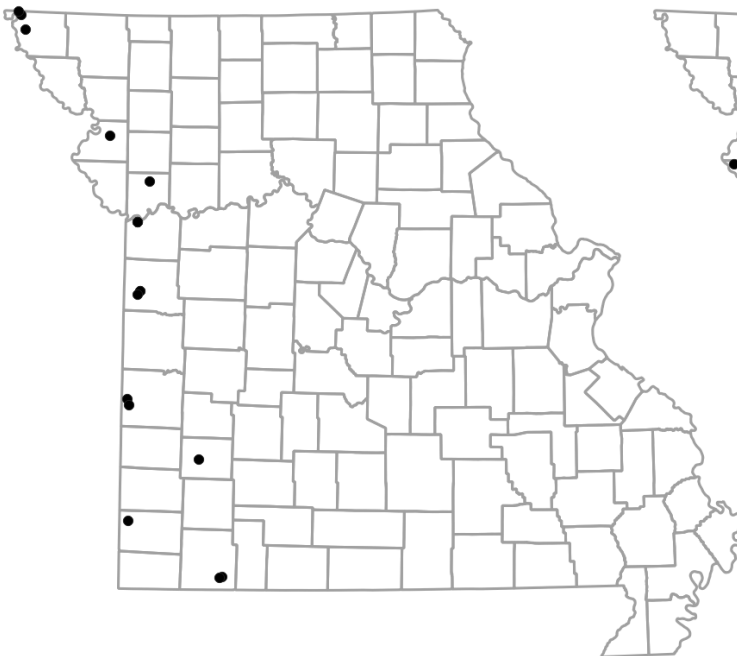
*Plestiodon anthracinus*  
Southern Coal Skink



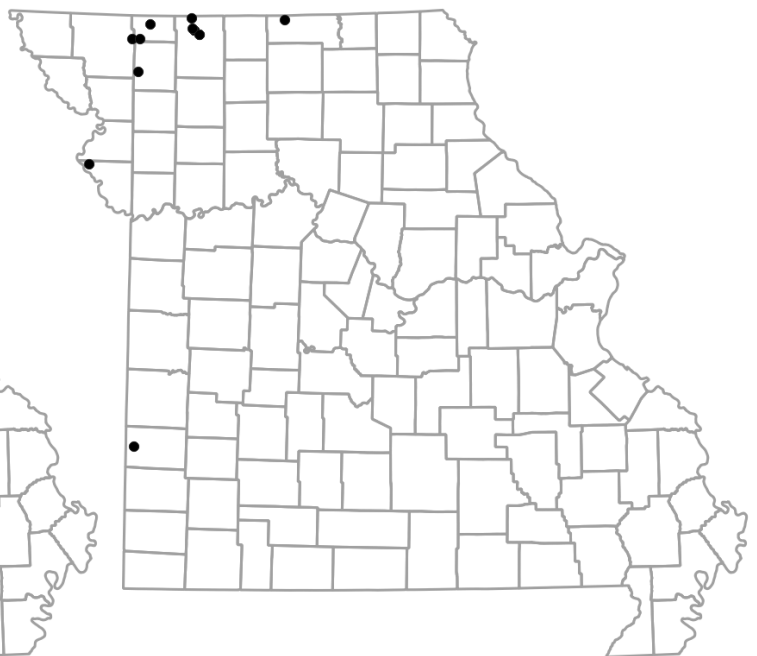
*Plestiodon fasciatus*  
Common Five-lined Skink



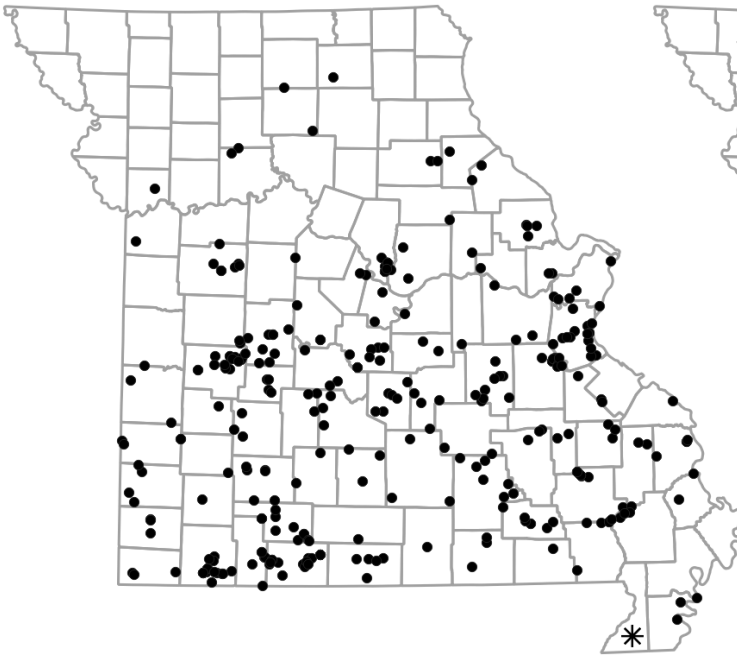
*Plestiodon laticeps*  
Broad-headed Skink



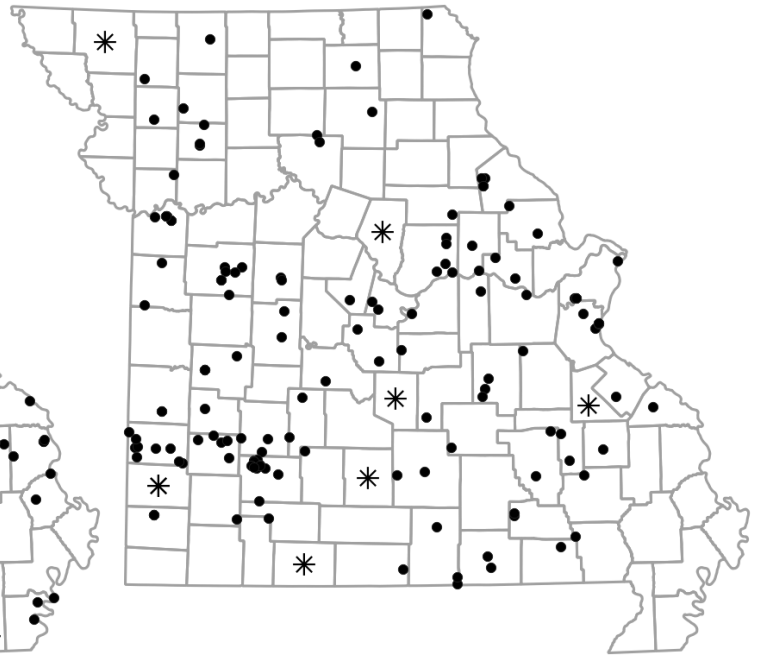
*Plestiodon obsoletus*  
Great Plains Skink



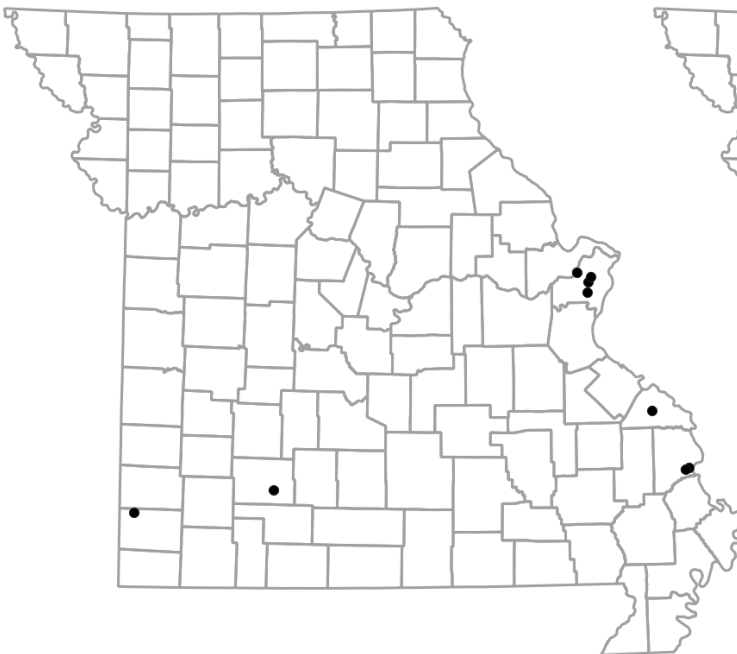
*Plestiodon septentrionalis*  
Prairie Skink



*Scincella lateralis*  
Little Brown Skink



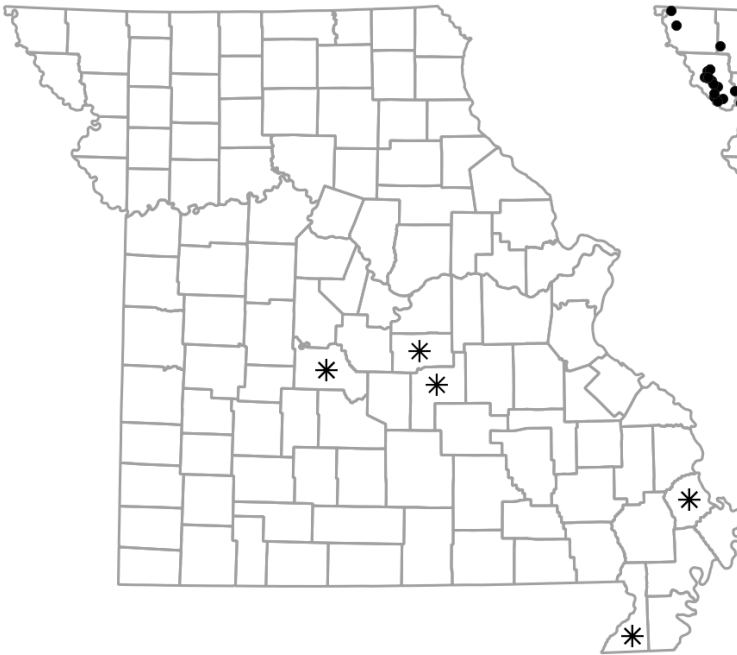
*Ophisaurus attenuatus*  
Western Slender Glass Lizard



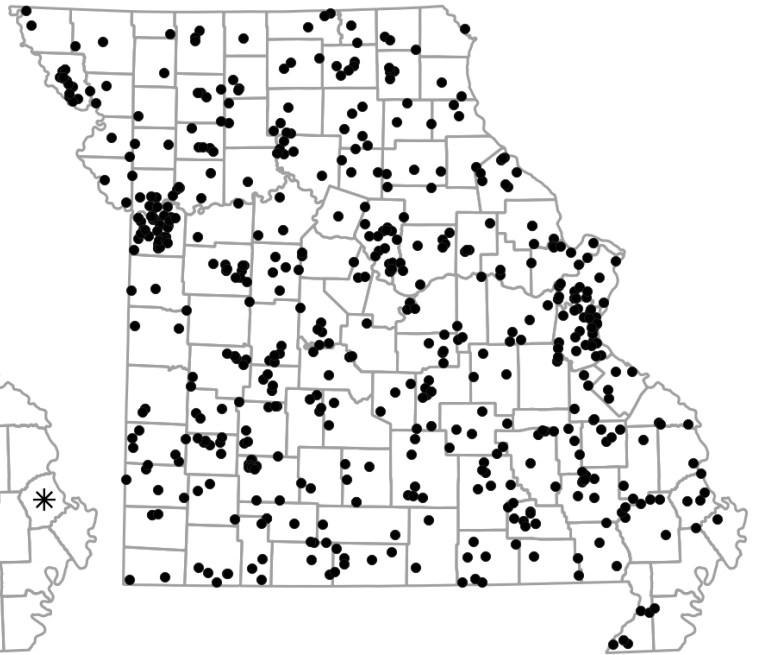
*Hemidactylus turcicus*  
Mediterranean Gecko



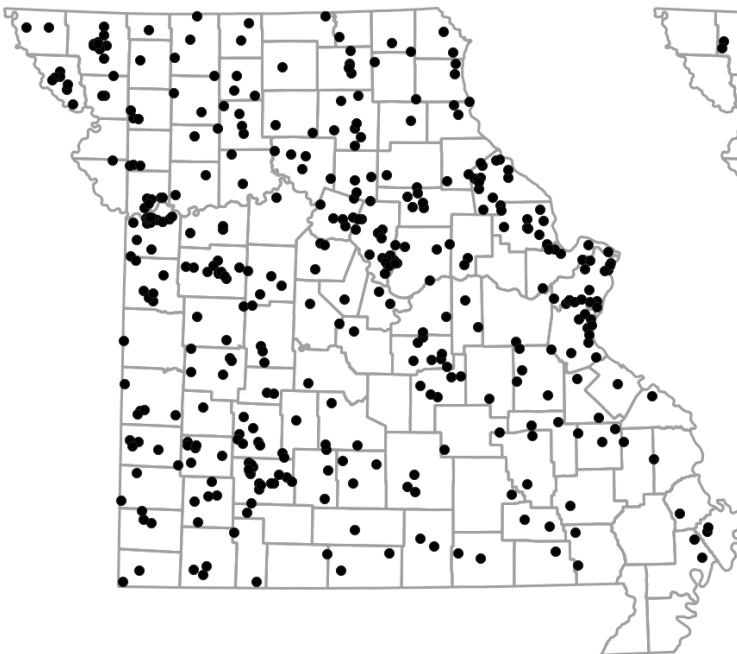
*Podarcis siculus*  
Italian Wall Lizard



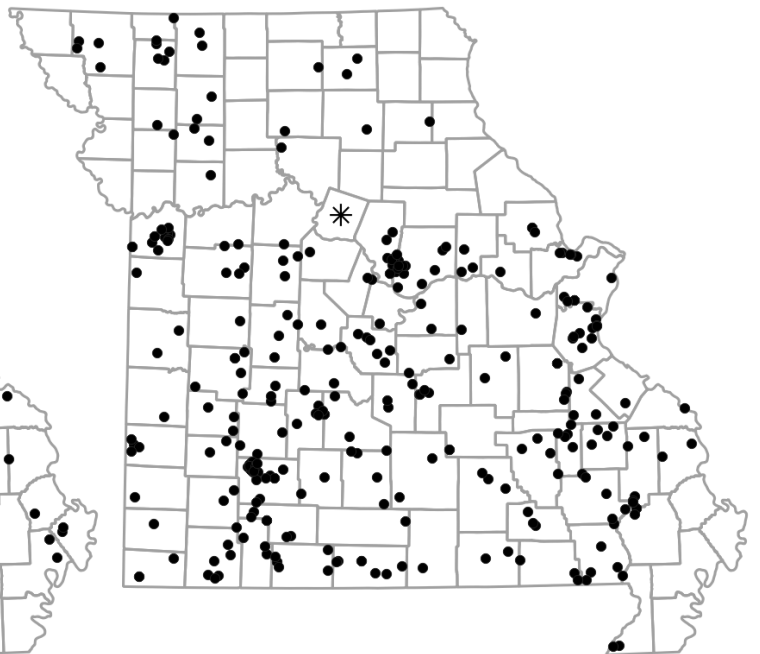
*Cemophora coccinea*  
Northern Scarletsnake



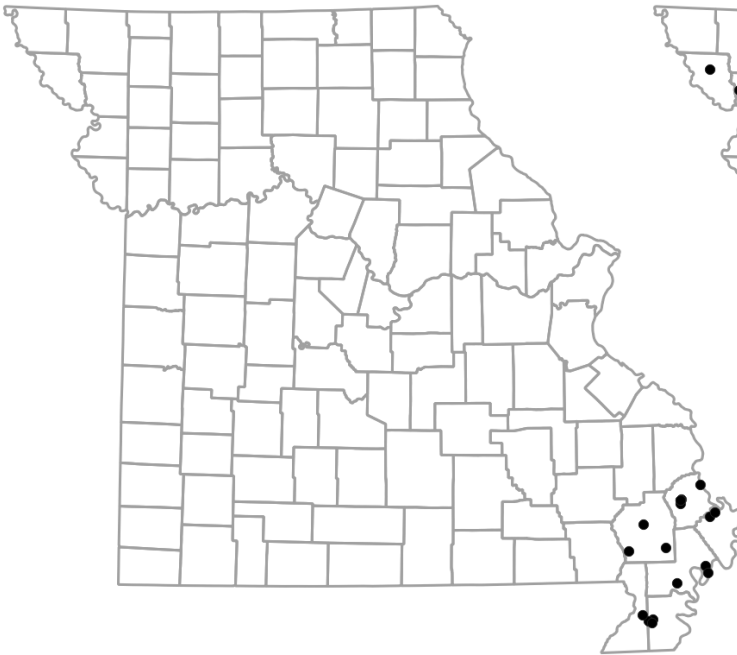
*Coluber constrictor*  
North American Racer



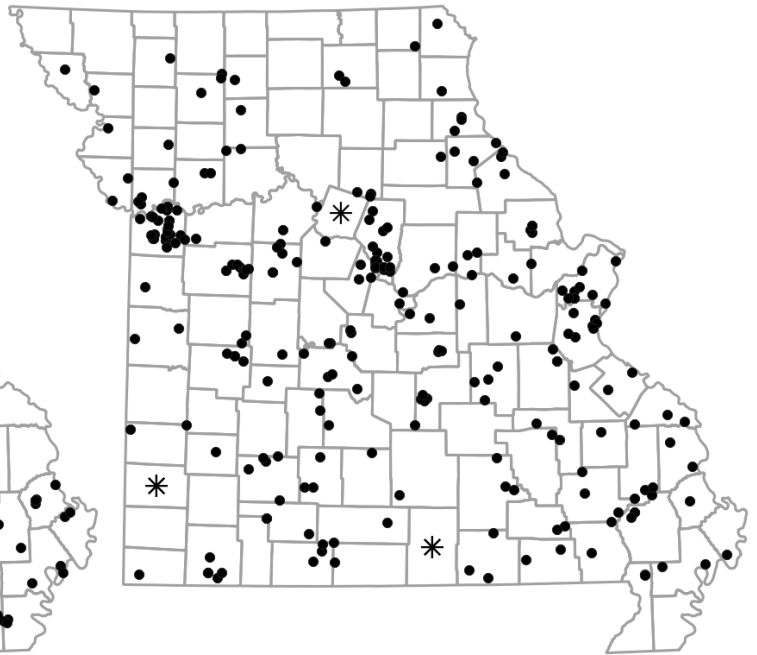
*Lampropeltis calligaster*  
Prairie Kingsnake



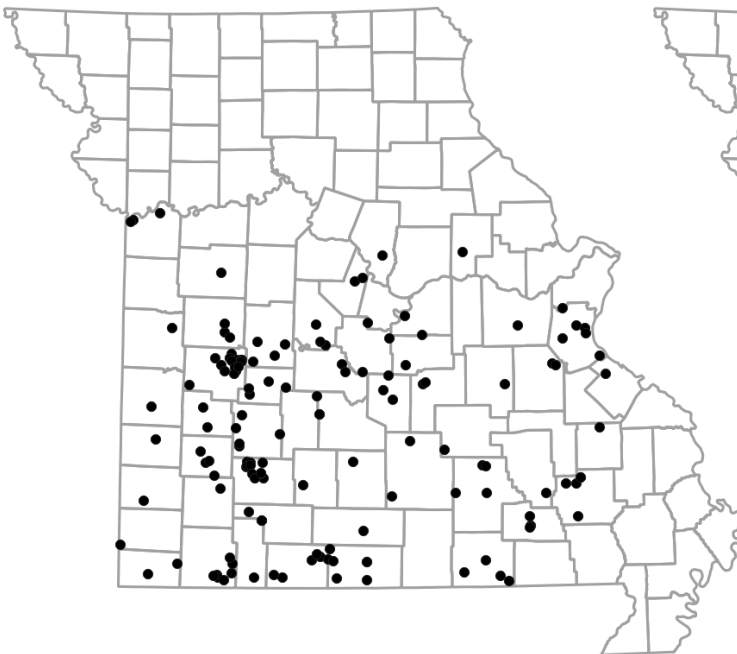
*Lampropeltis holbrooki*  
Speckled Kingsnake



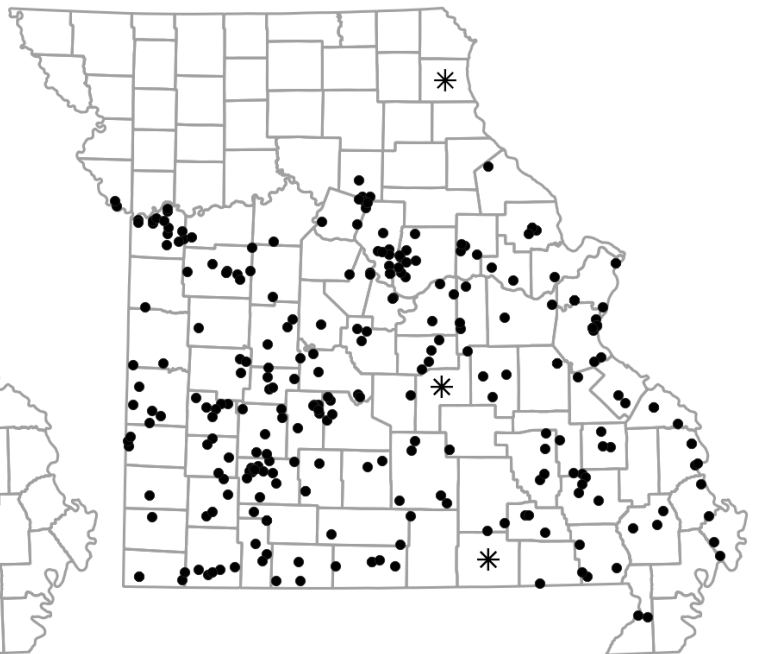
*Lampropeltis nigra*  
Eastern Black Kingsnake



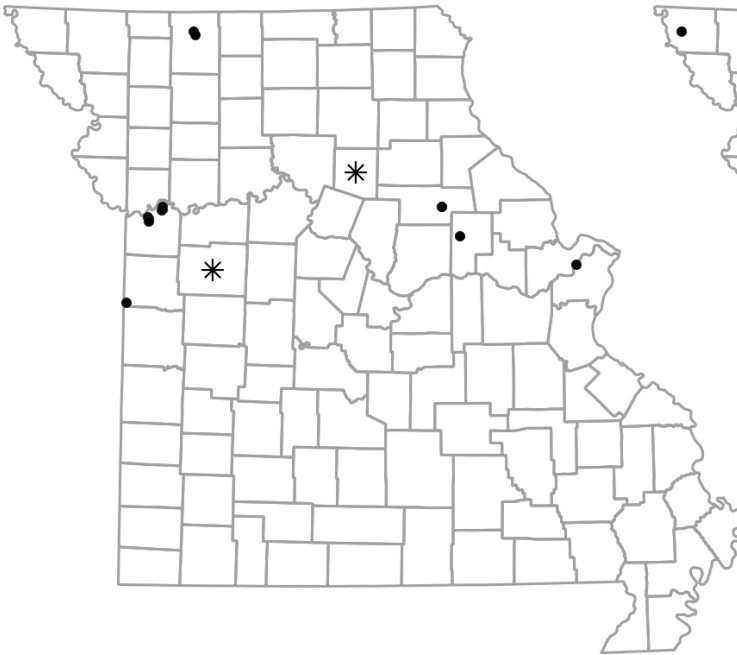
*Lampropeltis triangulum*  
Eastern Milksnake



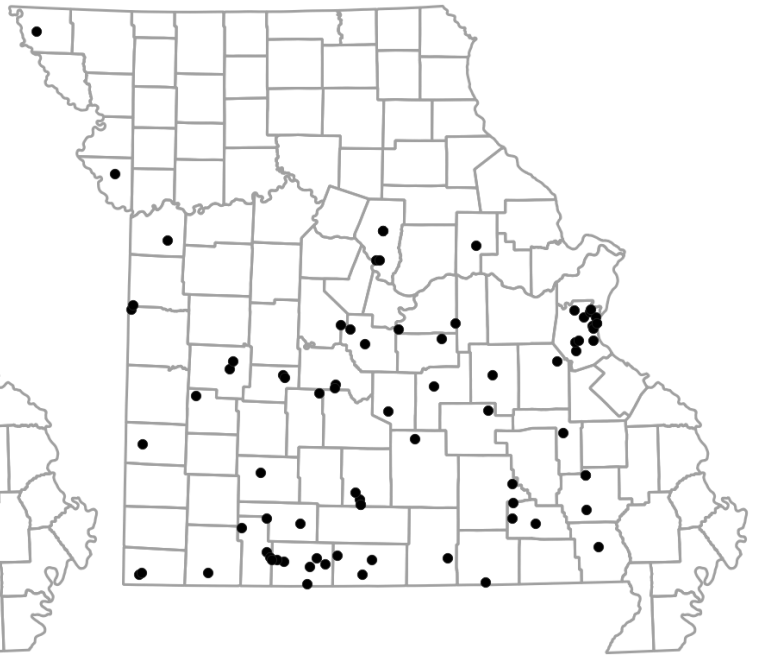
*Masticophis flagellum*  
Eastern Coachwhip



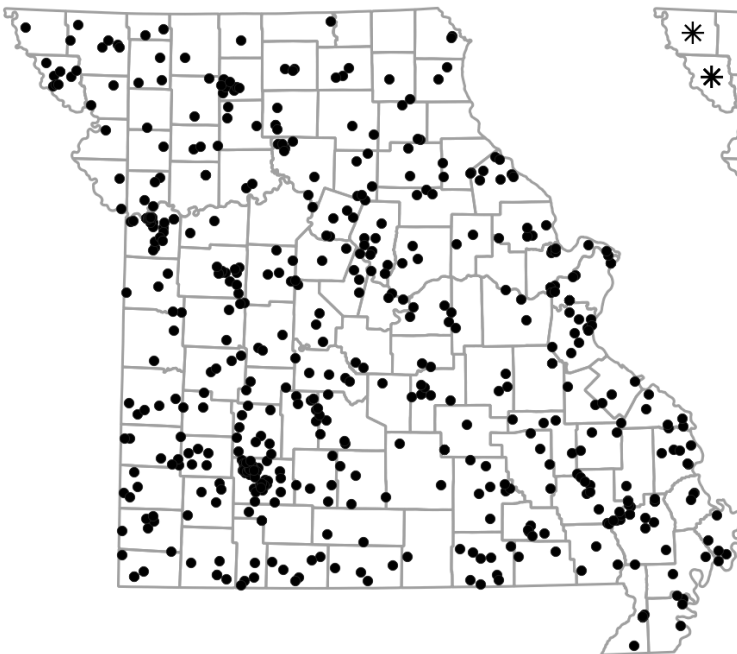
*Opheodryx aestivus*  
Northern Rough Greensnake



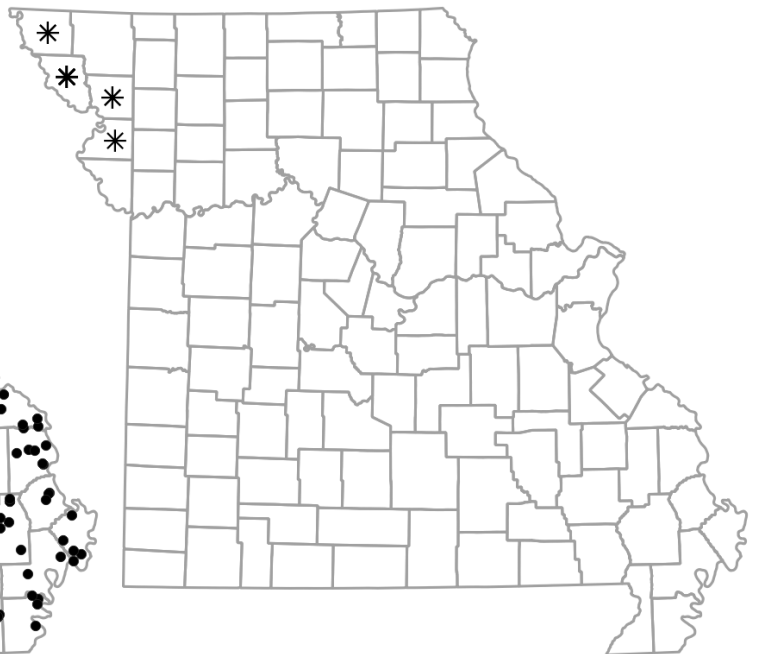
*Opheodrys vernalis*  
Smooth Greensnake



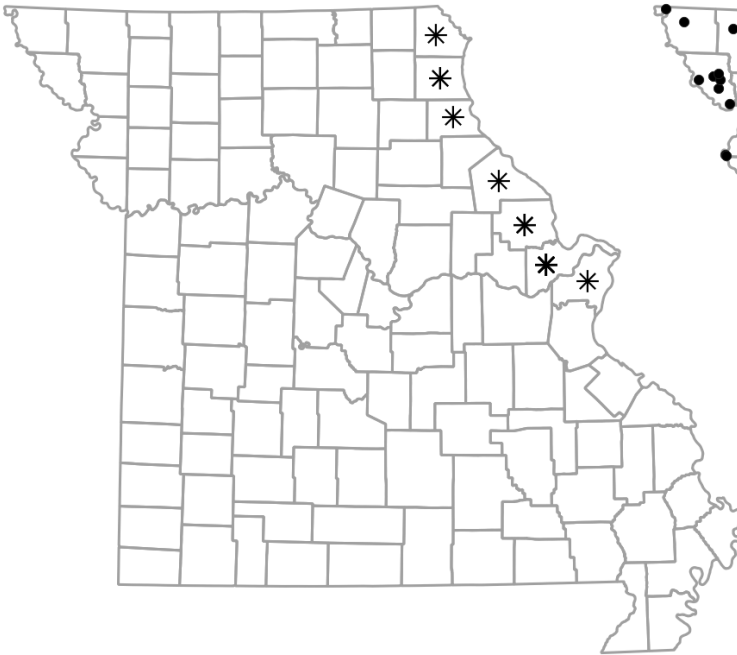
*Pantherophis emoryi*  
Great Plains Ratsnake



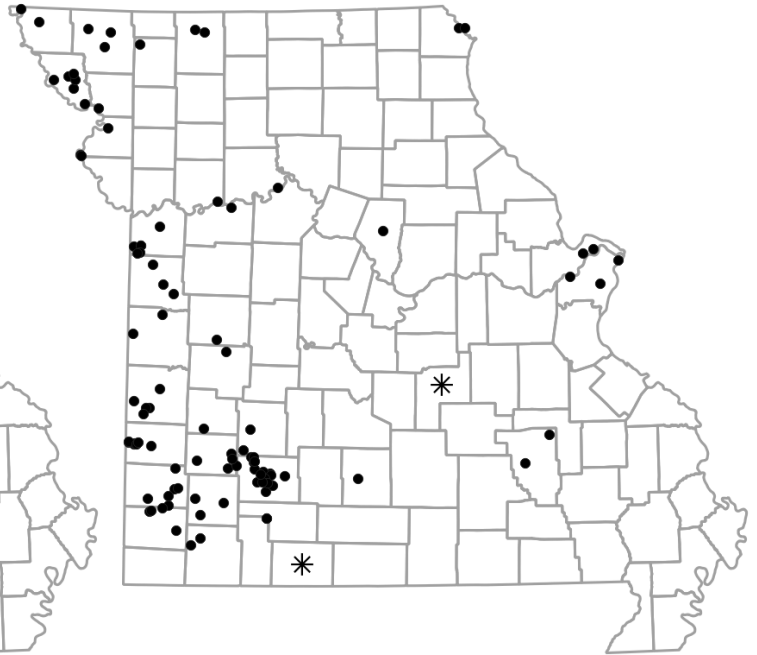
*Pantherophis obsoletus*  
Western Ratsnake



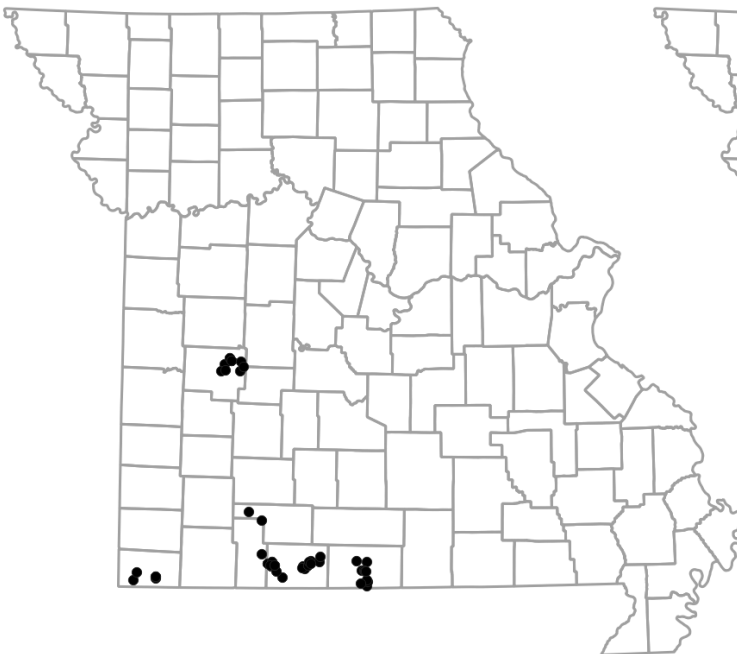
*Pantherophis ramspotti*  
Western Foxsnake



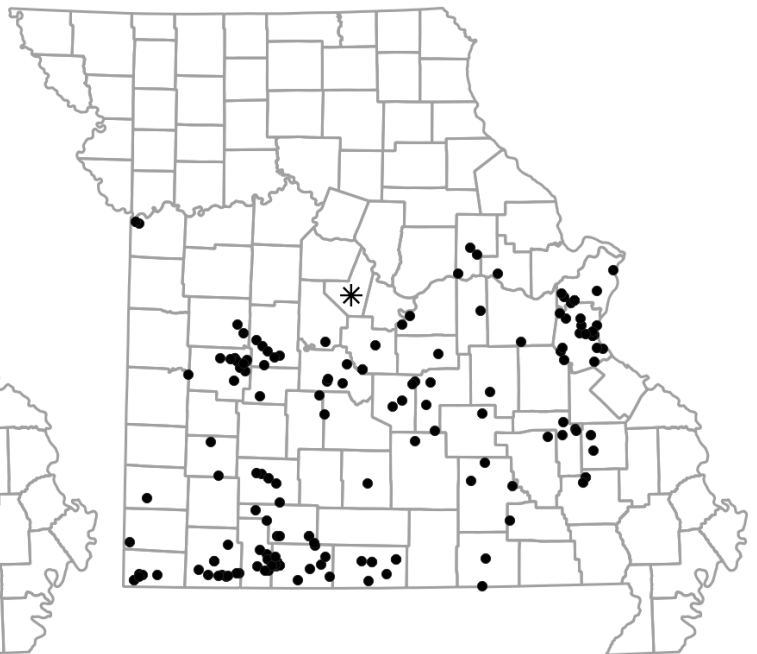
*Pantherophis vulpinus*  
Eastern Foxsnake



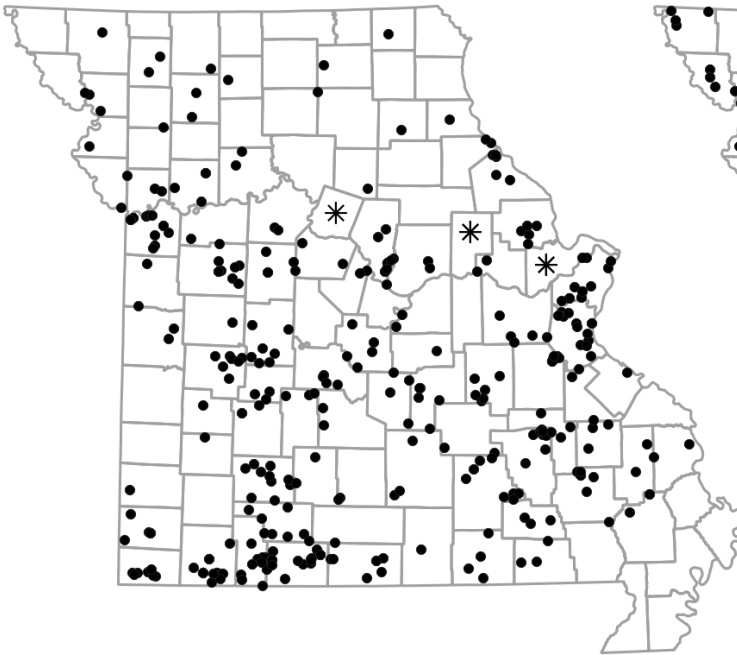
*Pituophis catenifer*  
Bullsnake



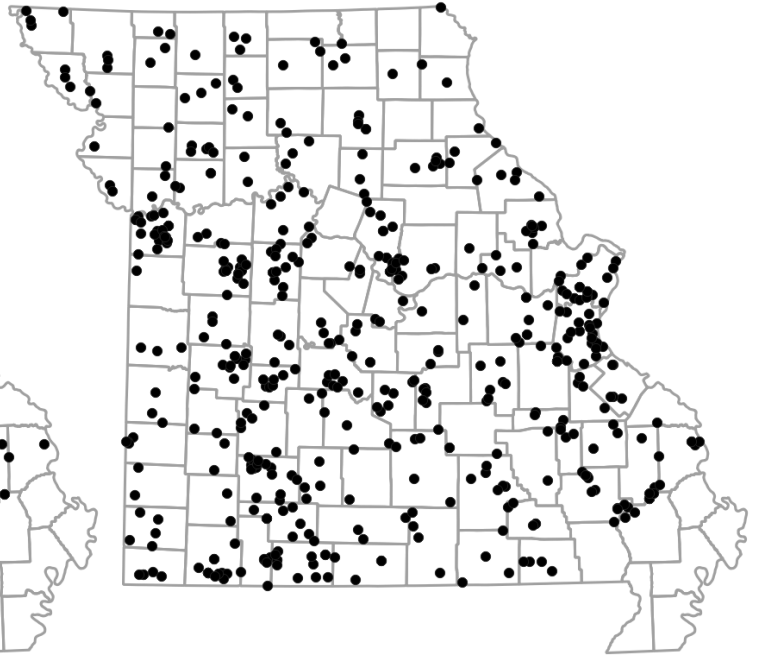
*Sonora episcopa*  
Great Plains Groundsnake



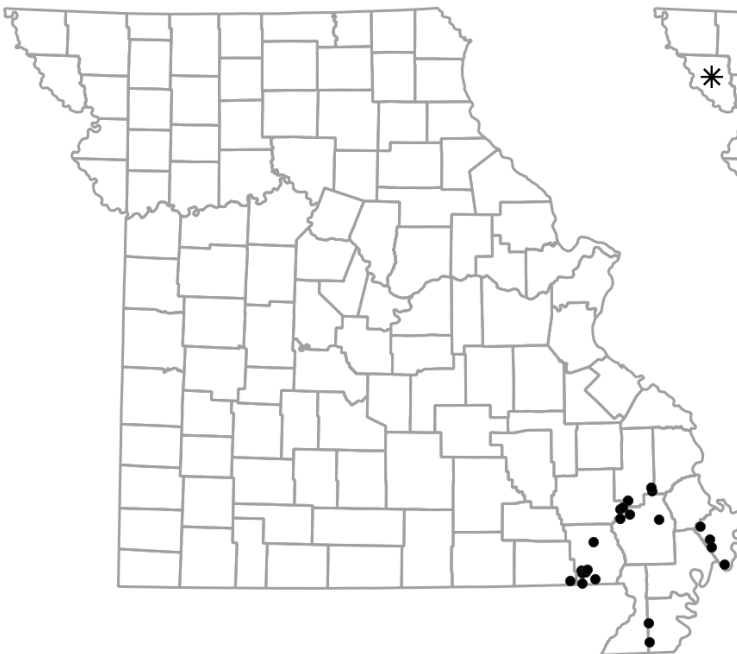
*Tantilla gracilis*  
Flat-headed Snake



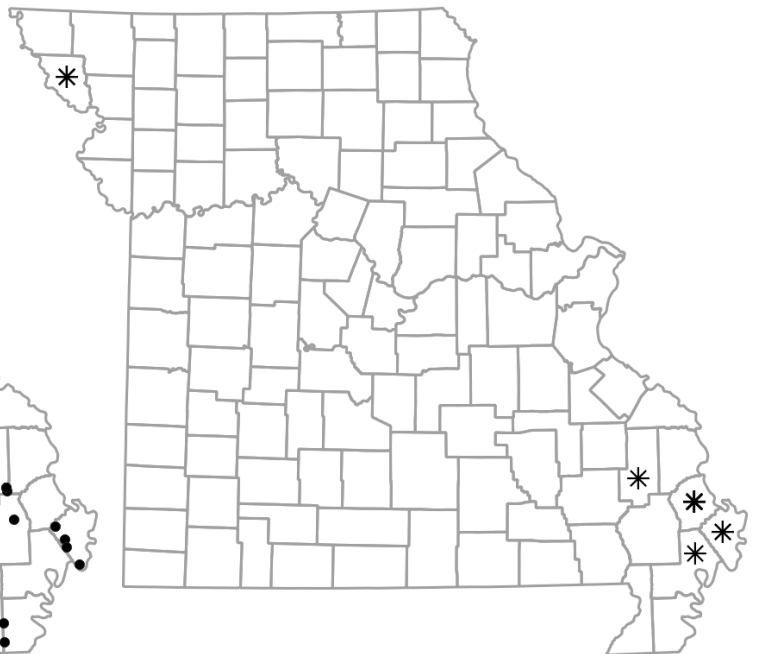
*Carphophis vermis*  
Western Wormsnake



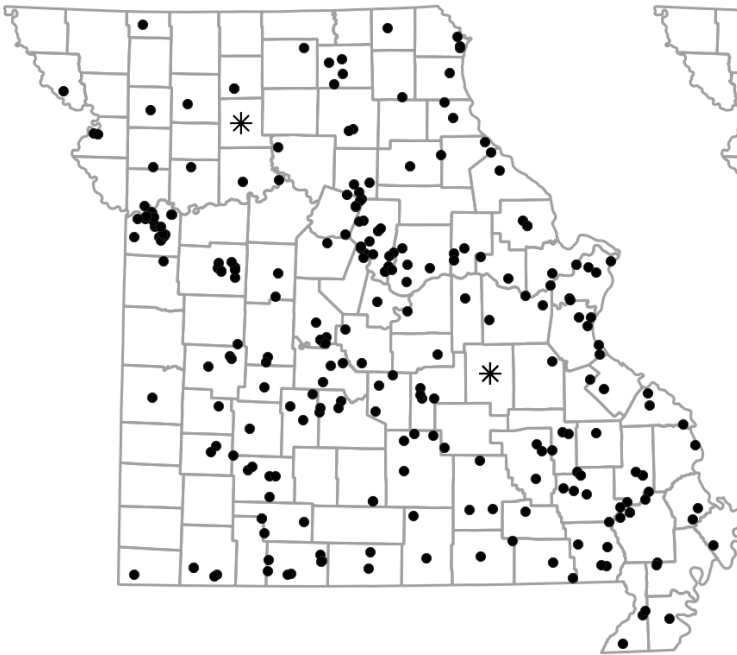
*Diadophis punctatus*  
Ring-necked Snake



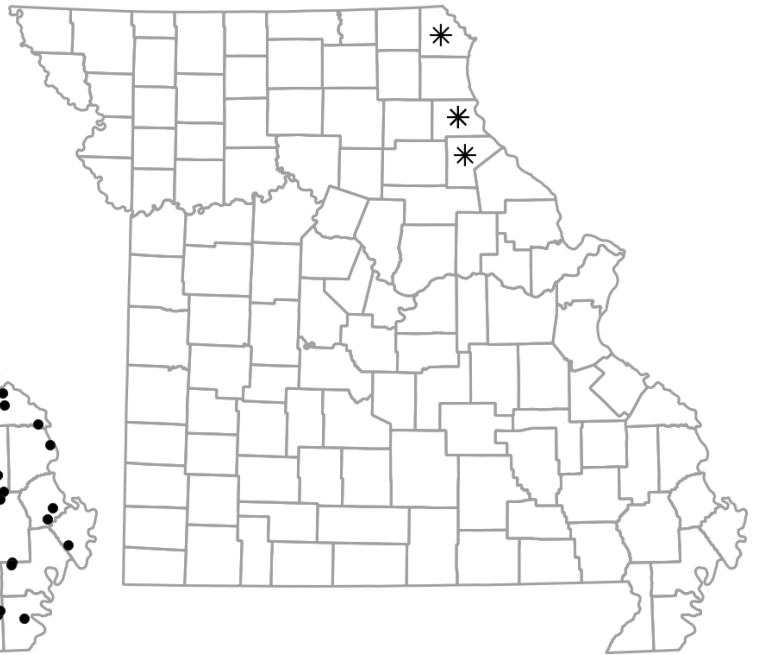
*Farancia abacura*  
Western Mudsnake



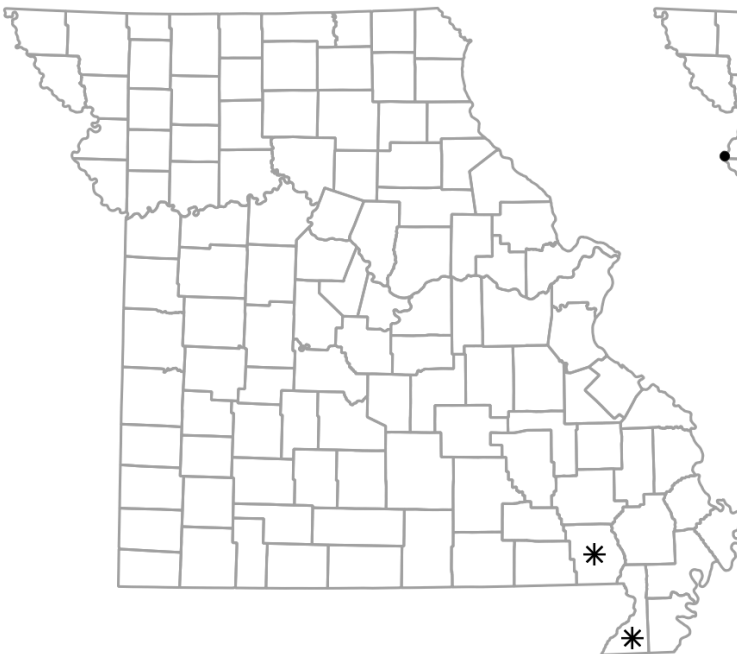
*Heterodon nasicus*  
Western Hog-nosed Snake



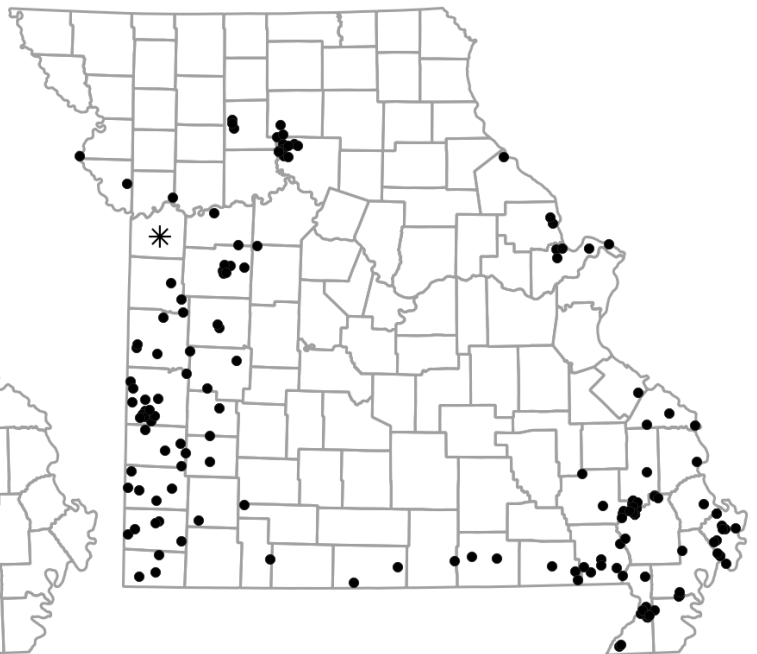
*Heterodon platirhinos*  
Eastern Hog-nosed Snake



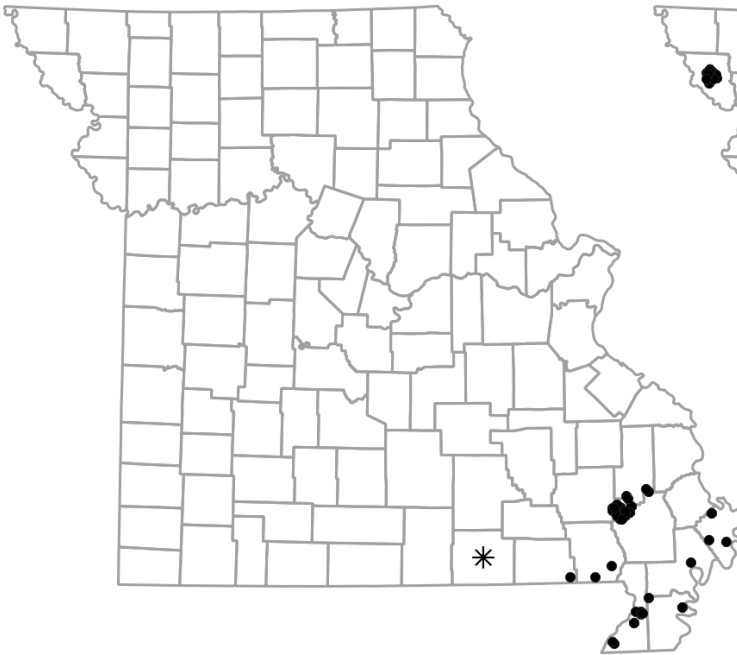
*Clonophis kirtlandii*  
Kirtland's Snake



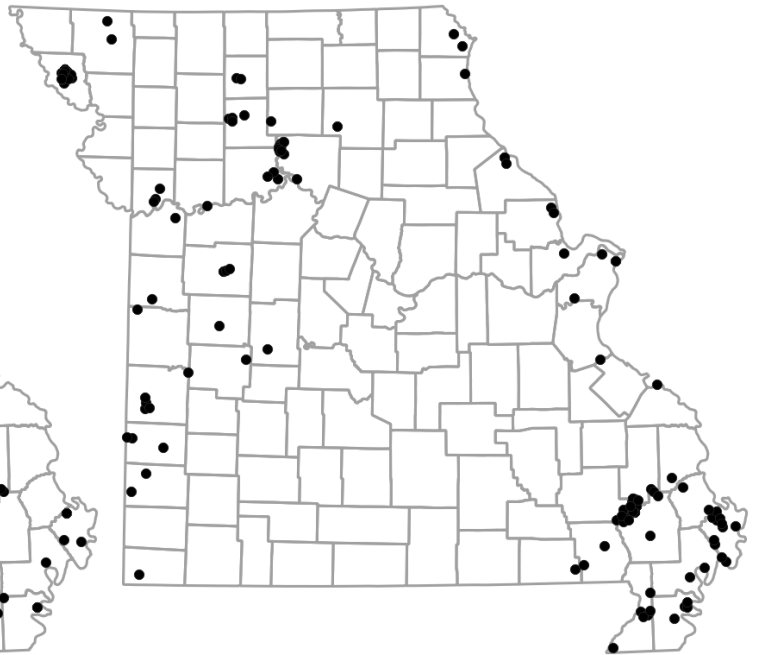
*Nerodia cyclopion*  
Mississippi Green Watersnake



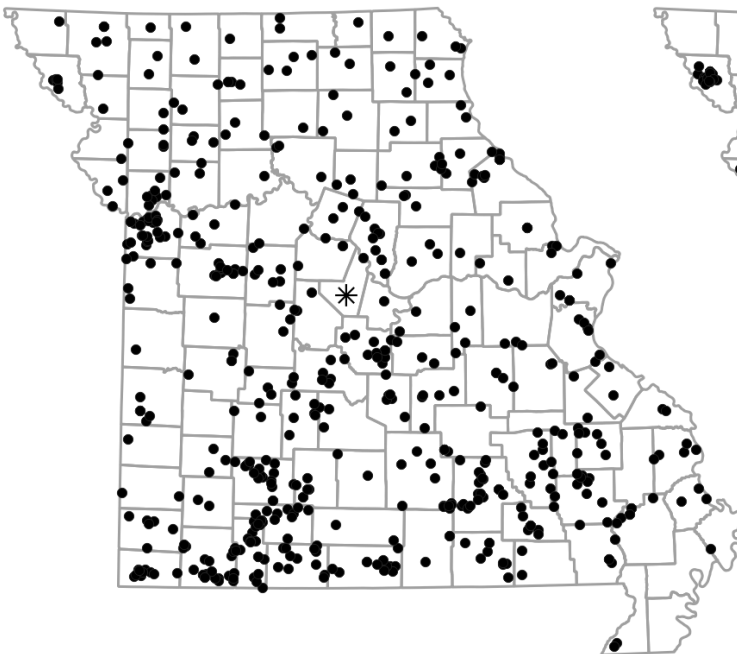
*Nerodia erythrogaster*  
Yellow-bellied Watersnake



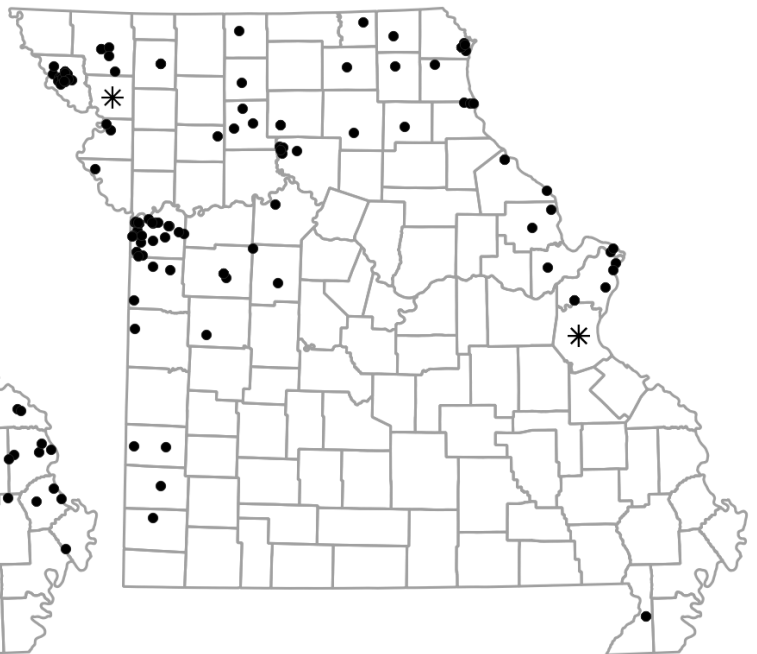
*Nerodia fasciata*  
Broad-banded Watersnake



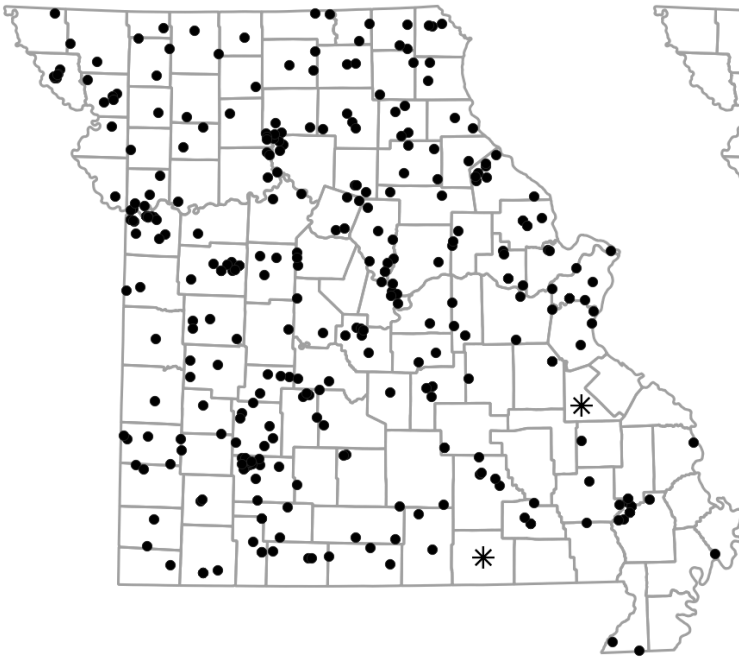
*Nerodia rhombifer*  
Northern Diamond-backed Watersnake



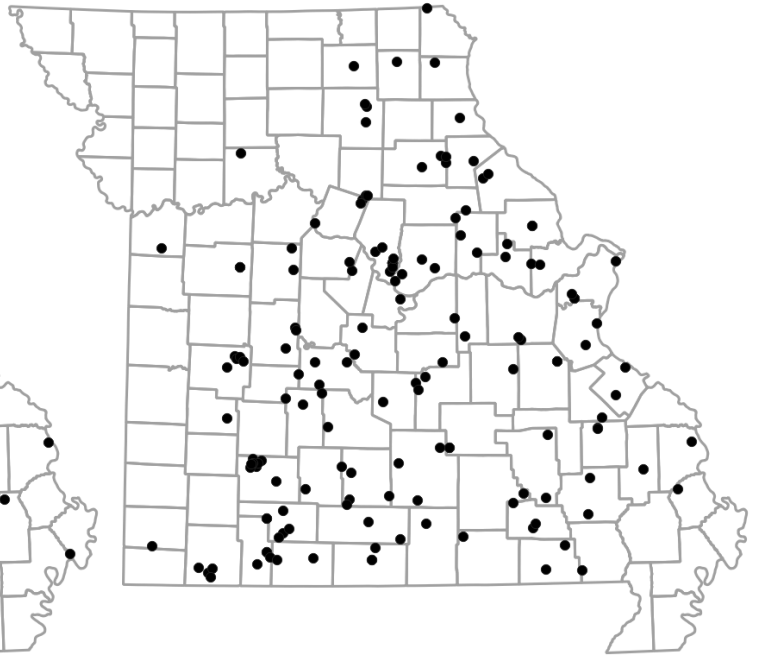
*Nerodia sipedon*  
Common Watersnake



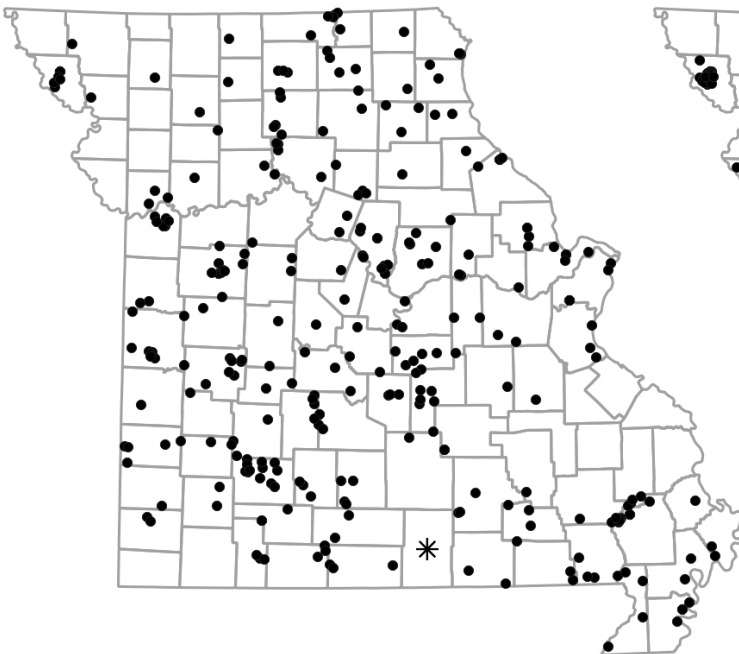
*Regina grahamii*  
Graham's Crawfish Snake



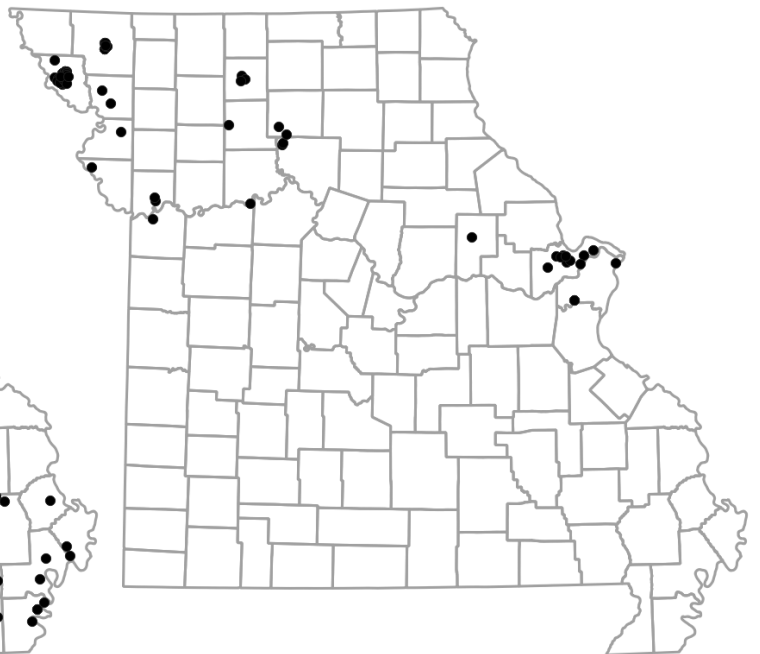
*Storeria dekayi*  
DeKay's Brownsnake



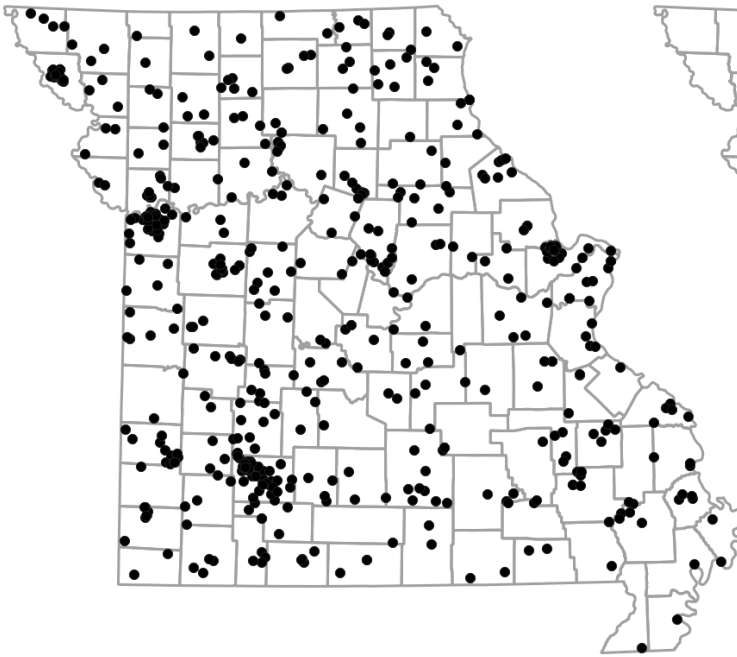
*Storeria occipitomaculata*  
Red-bellied Snake



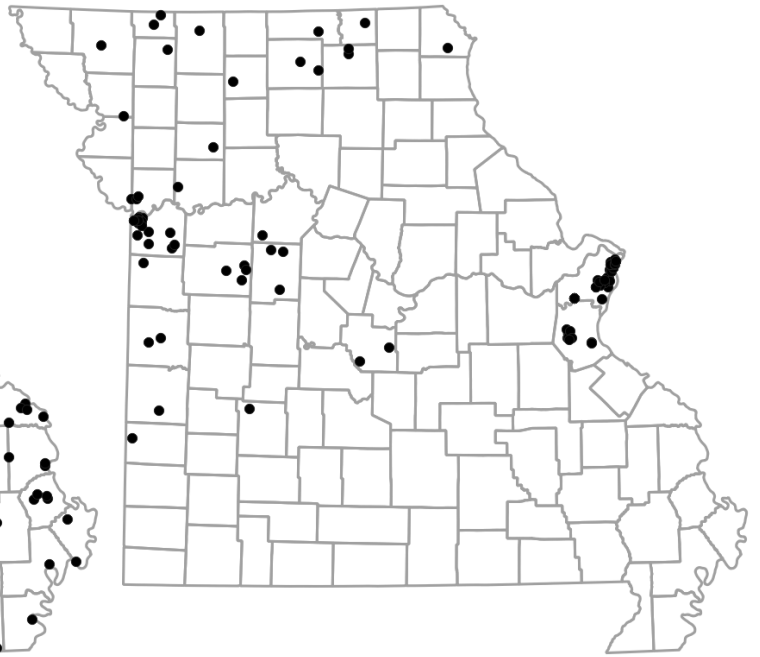
*Thamnophis proximus*  
Orange-striped Ribbonsnake



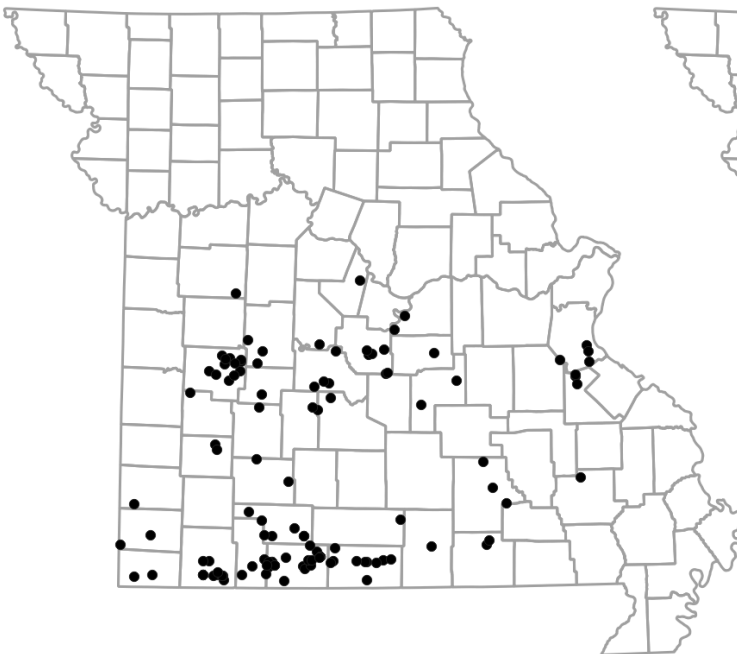
*Thamnophis radix*  
Plains Gartersnake



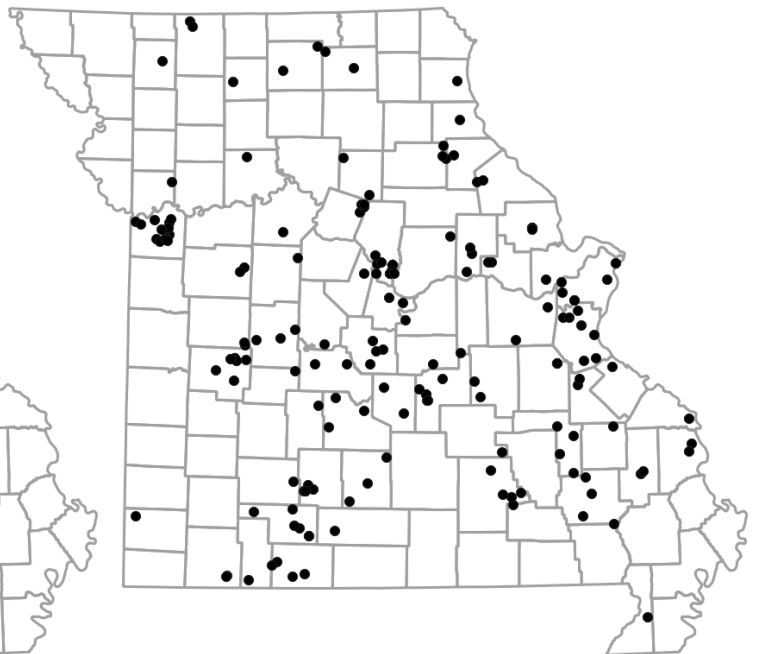
*Thamnophis sirtalis*  
Common Gartersnake



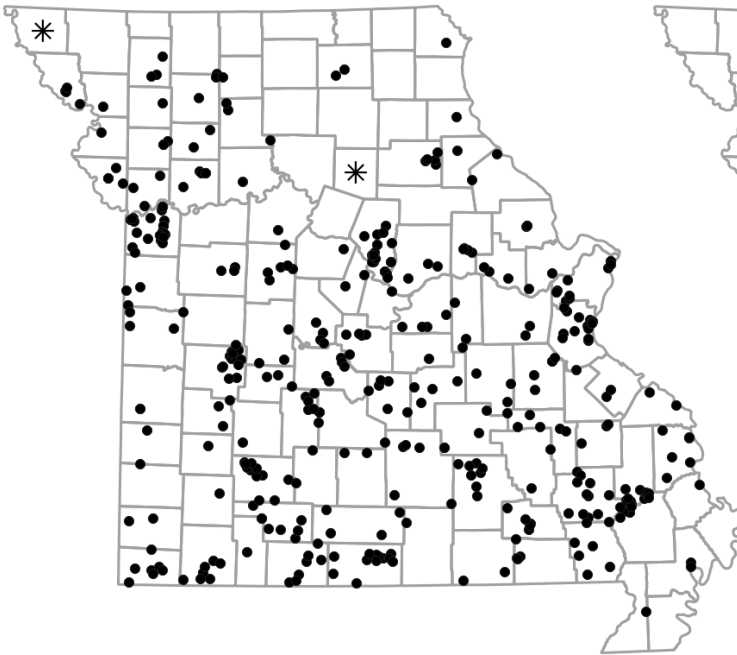
*Tropidoclonion lineatum*  
Lined Snake



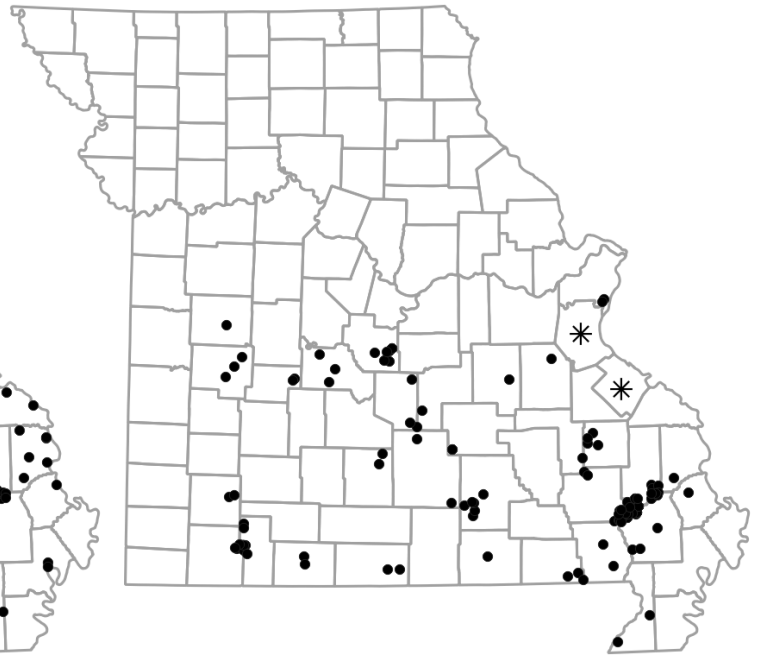
*Virginia striatula*  
Rough Earthsnake



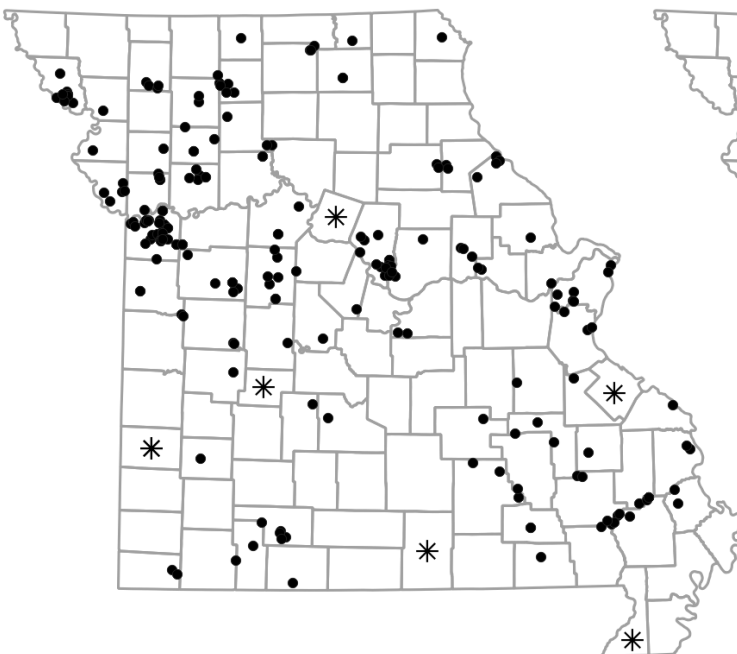
*Virginia valeriae*  
Western Smooth Earthsnake



*Agkistrodon contortrix*  
Eastern Copperhead



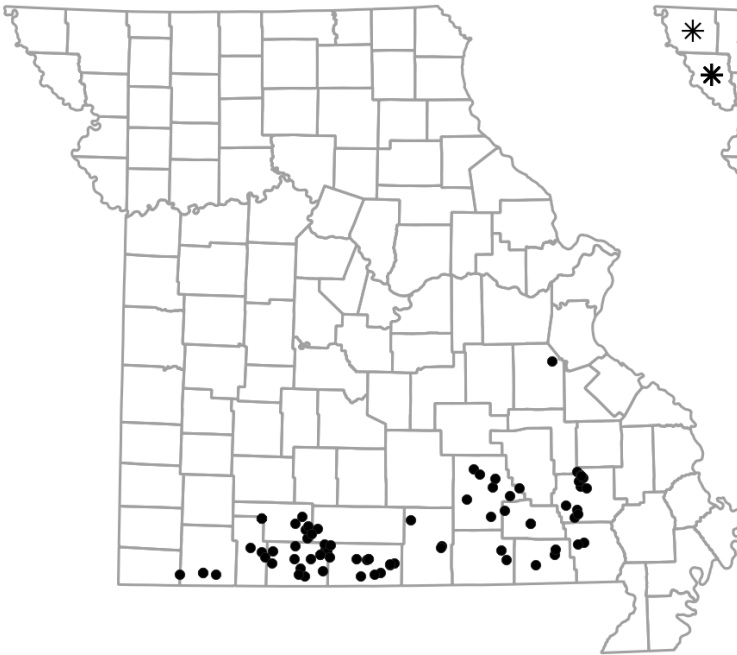
*Agkistrodon piscivorus*  
Northern Cottonmouth



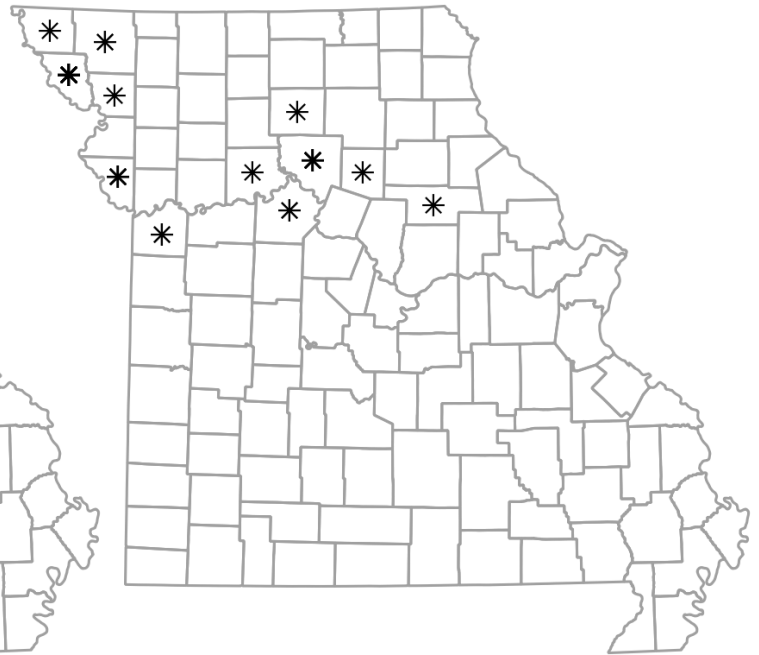
*Crotalus horridus*  
Timber Rattlesnake



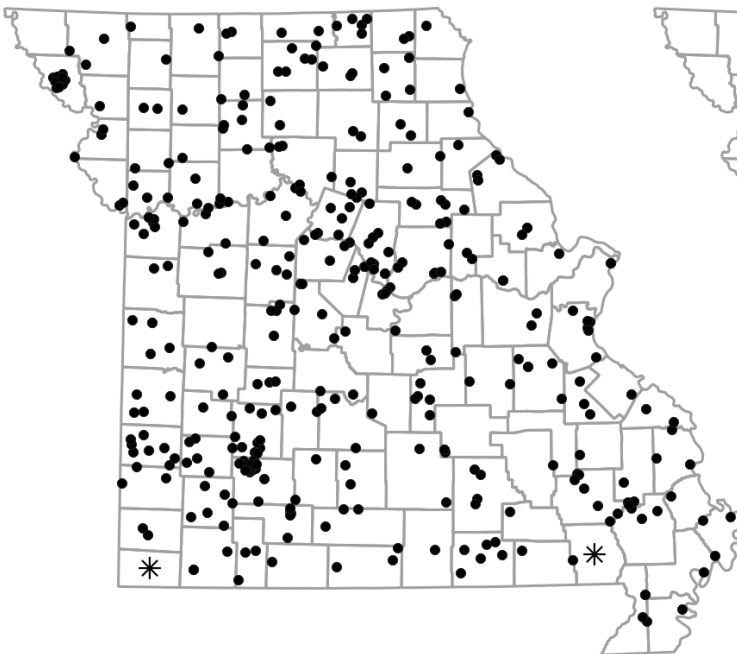
*Sistrurus catenatus*  
Eastern Massasauga



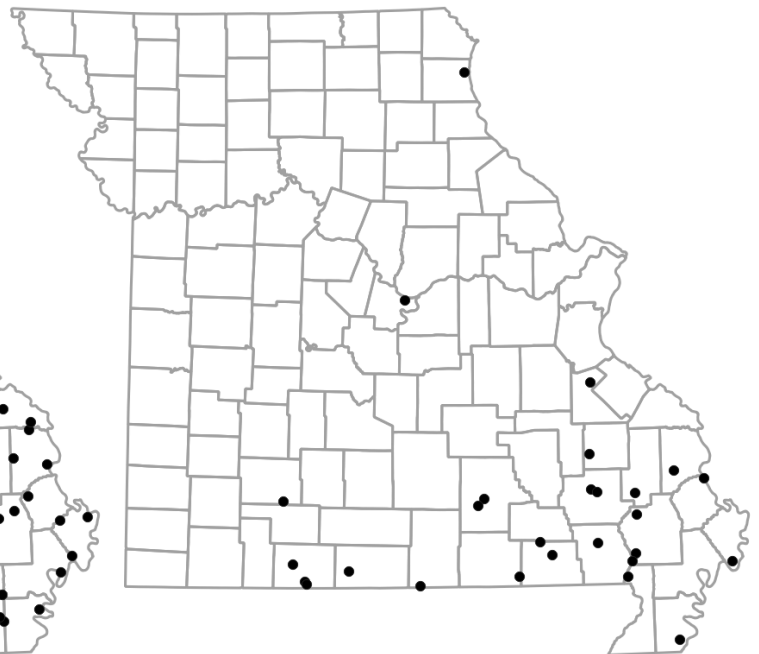
*Sistrurus miliarius*  
Western Pygmy Rattlesnake



*Sistrurus tergeminus*  
Prairie Massasauga

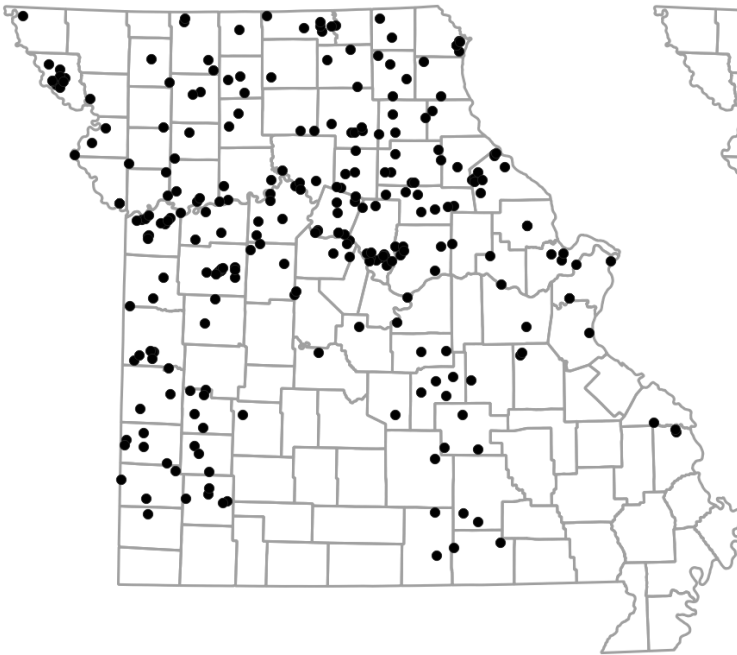


*Chelydra serpentina*  
North American Snapping Turtle

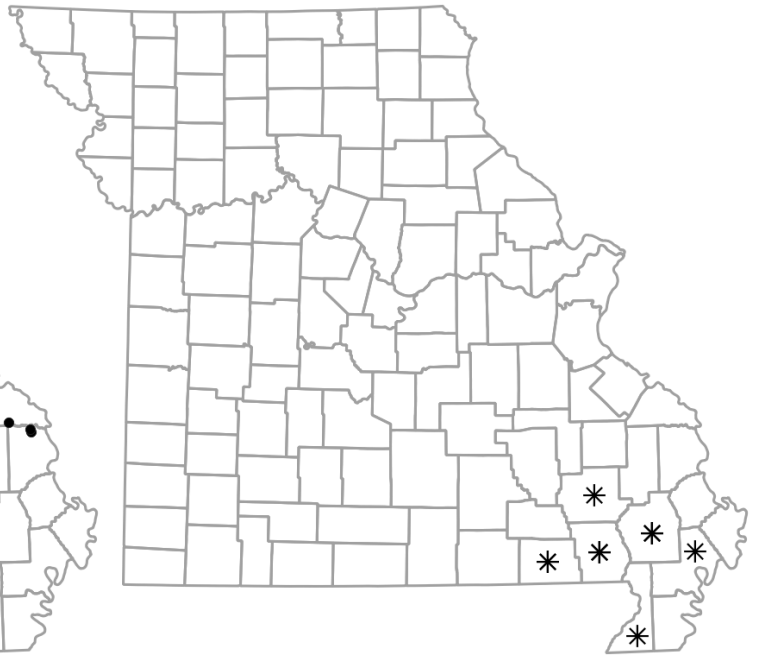


*Macrochelys temminckii*  
Western Alligator Snapping Turtle

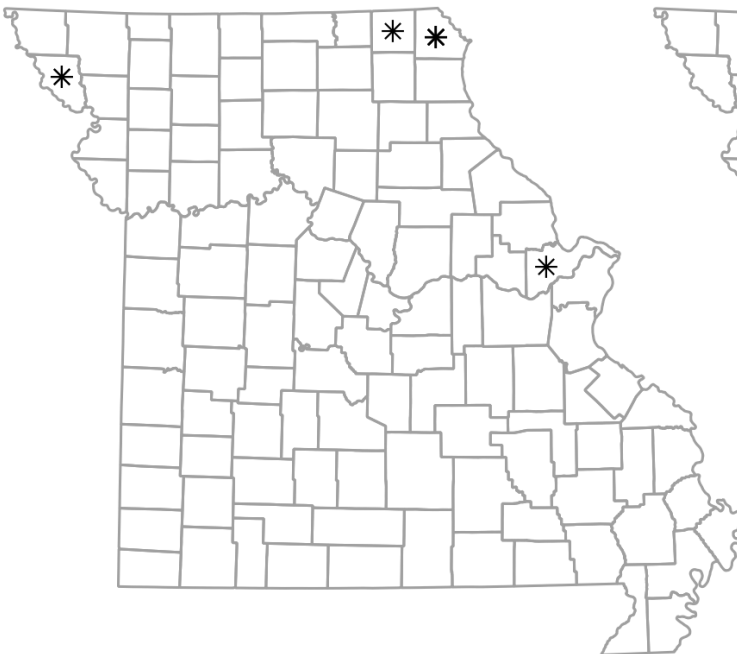




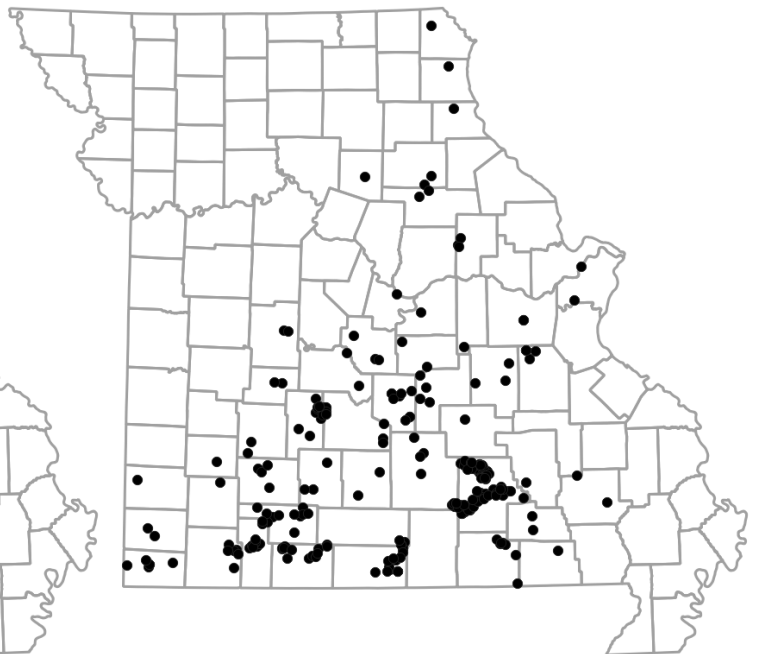
*Chrysemys picta*  
Western Painted Turtle



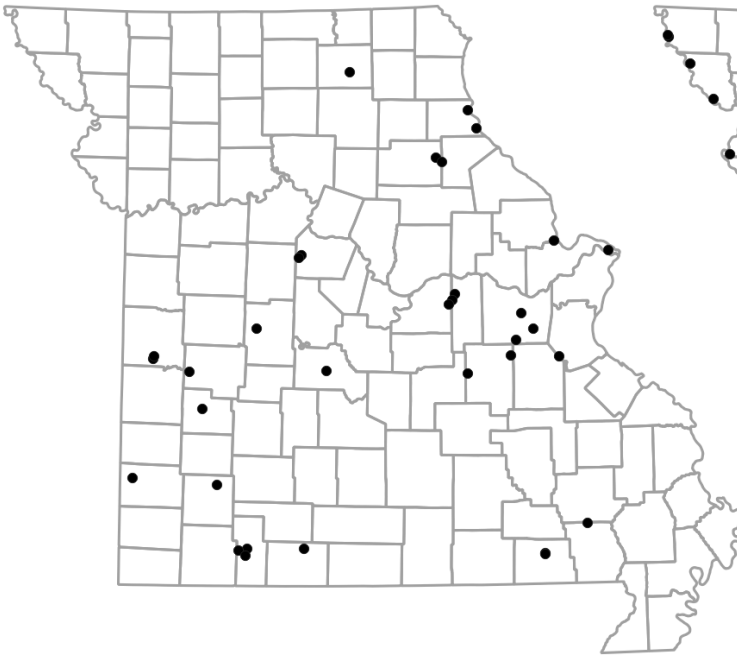
*Deirochelys reticularia*  
Western Chicken Turtle



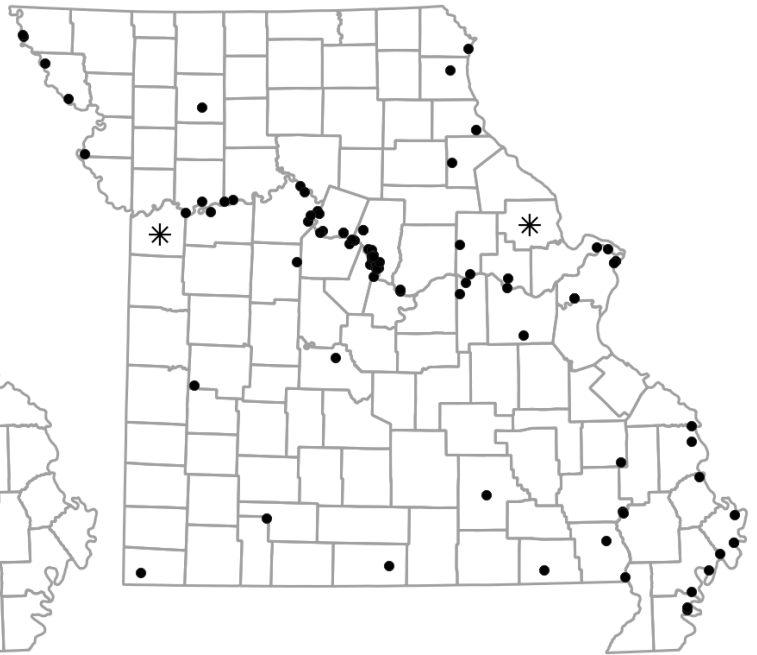
*Emydoidea blandingii*  
Blanding's Turtle



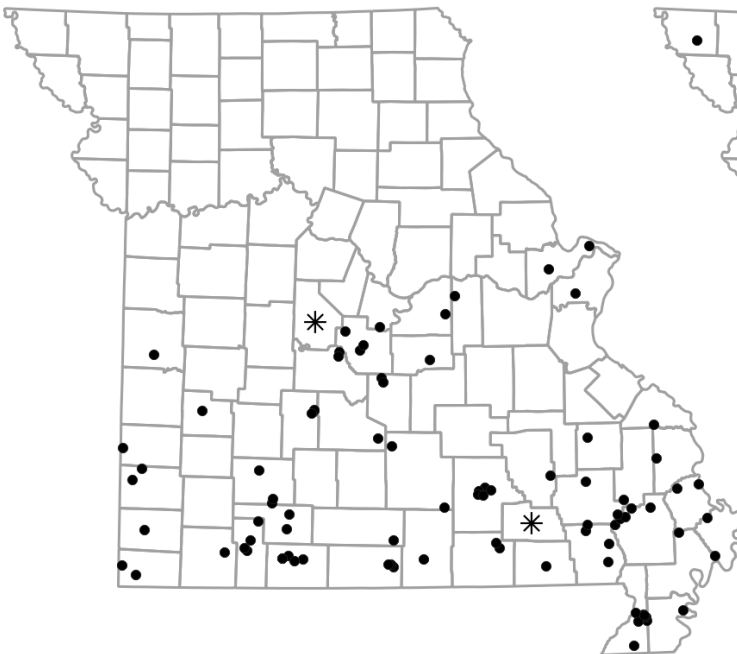
*Graptemys geographica*  
Northern Map Turtle



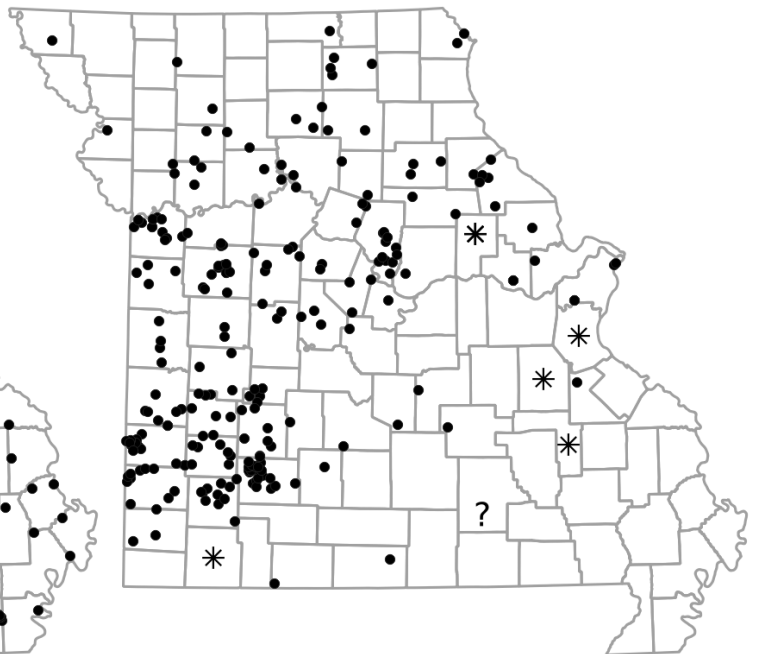
*Graptemys ouachitensis*  
Ouachita Map Turtle



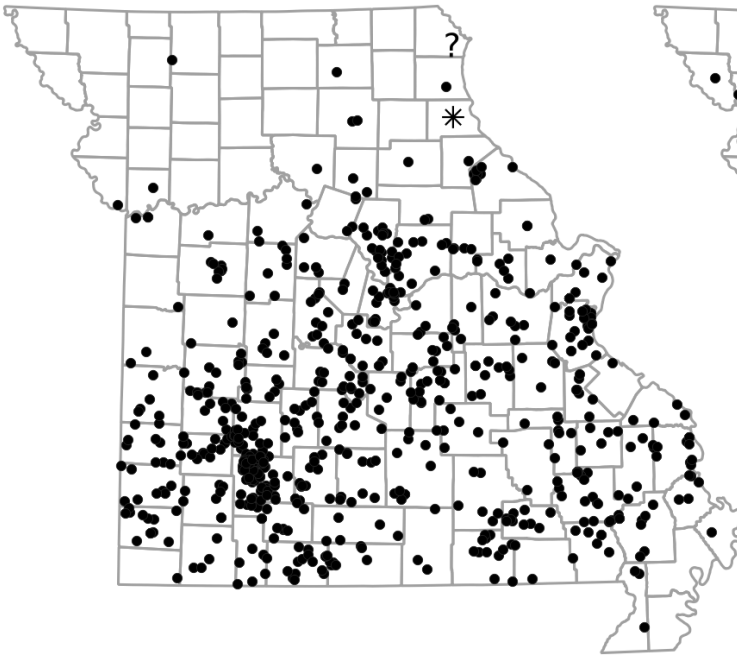
*Graptemys pseudogeographica*  
False Map Turtle



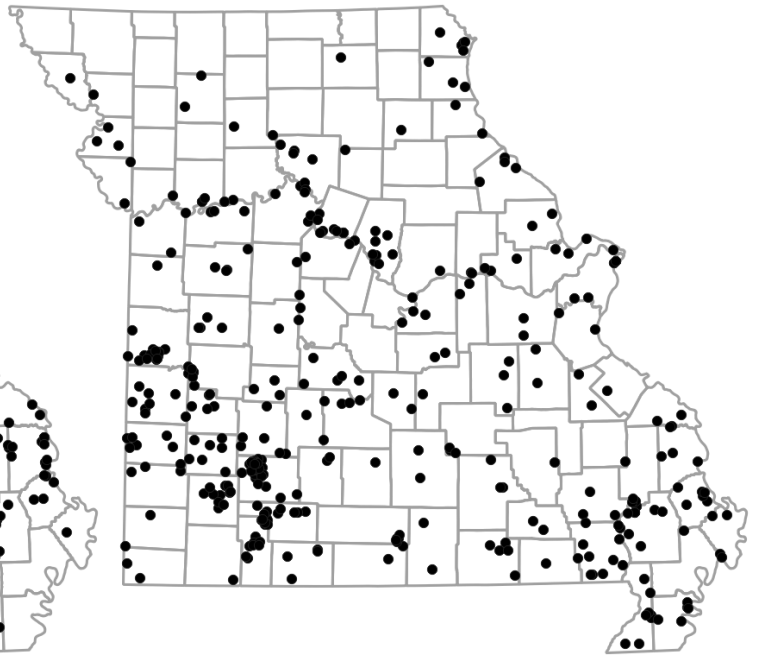
*Pseudemys concinna*  
Eastern River Cooter



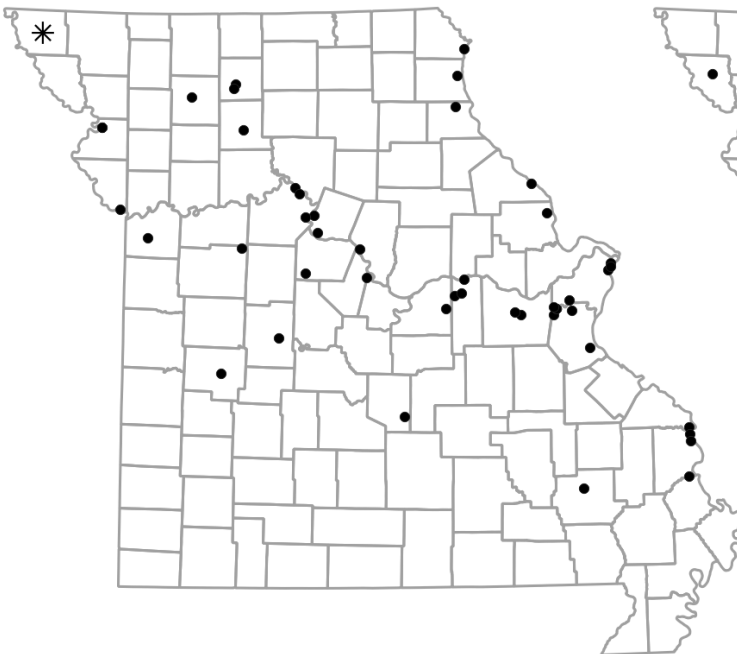
*Terrapene ornata*  
Ornate Box Turtle



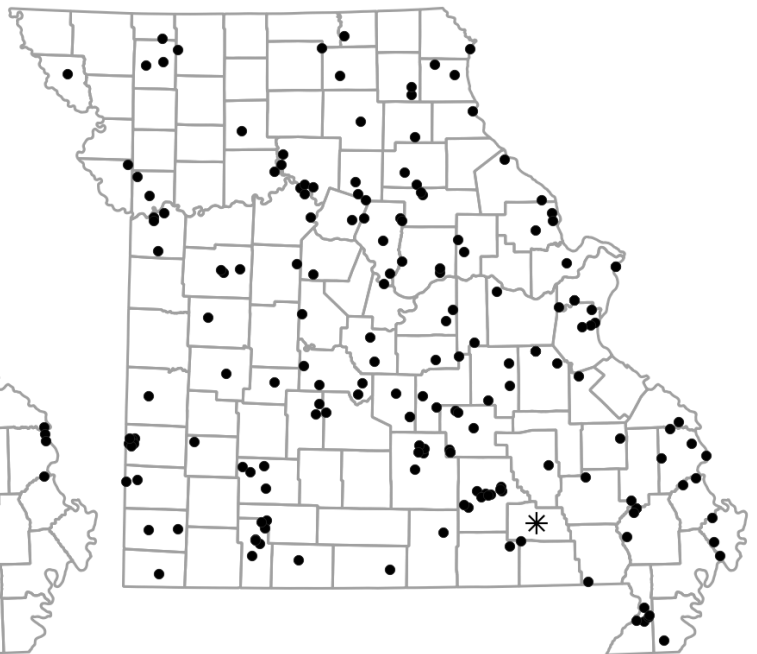
*Terrapene triunguis*  
Three-toed Box Turtle



*Trachemys scripta*  
Red-eared Slider

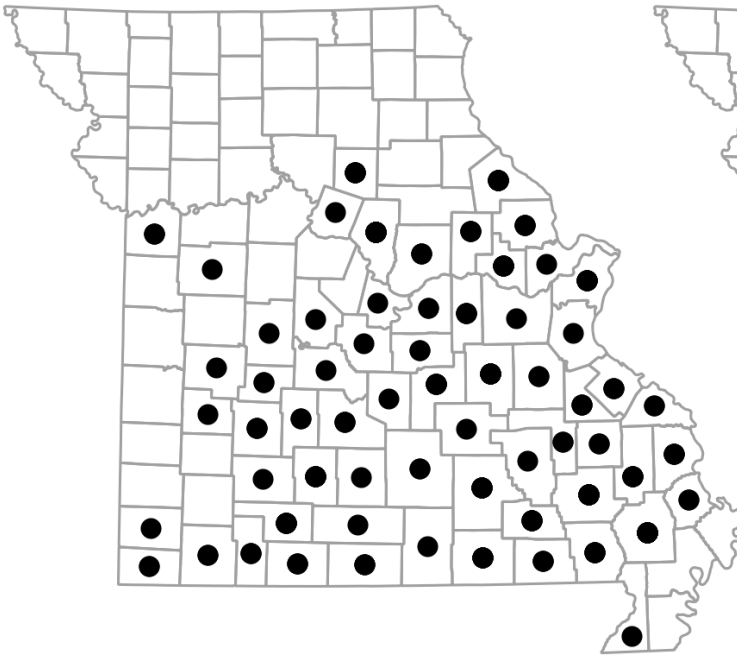


*Apalone mutica*  
Midland Smooth Softshell

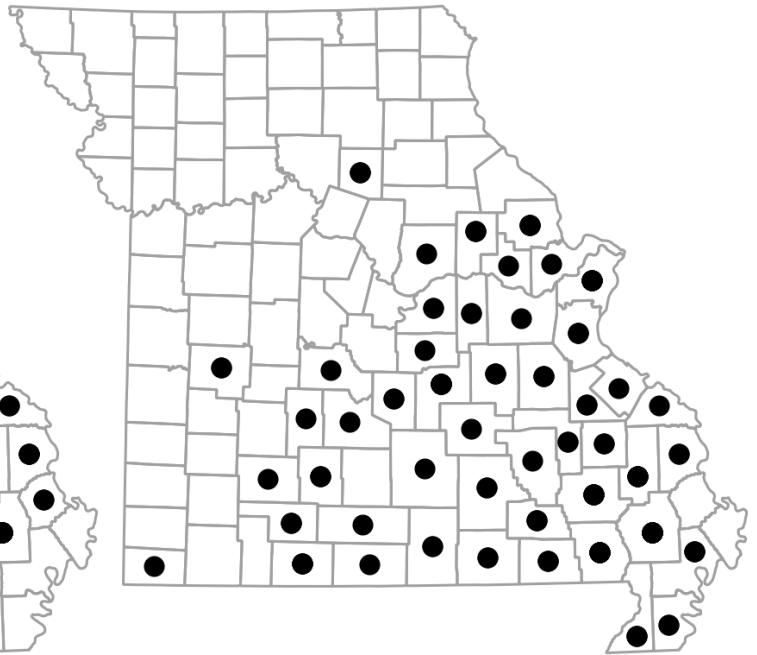


*Apalone spinifera*  
Northern Spiny Softshell

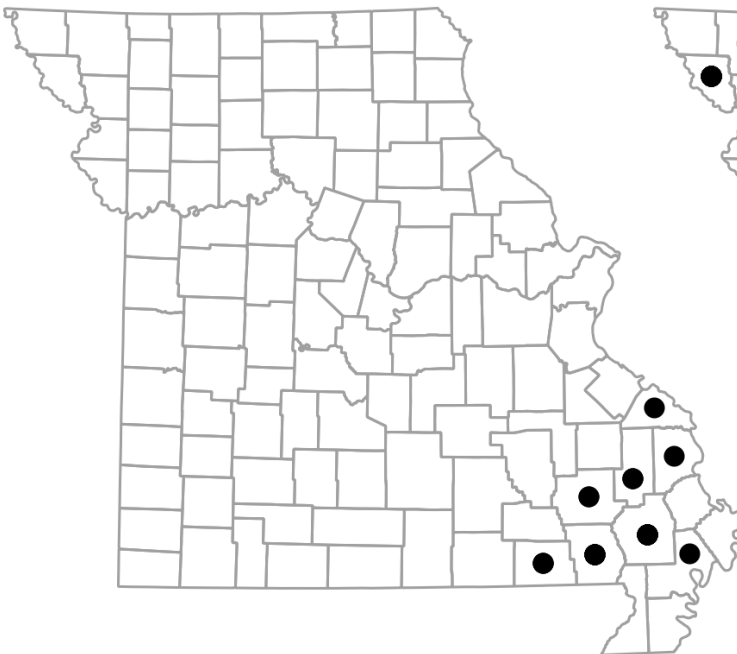




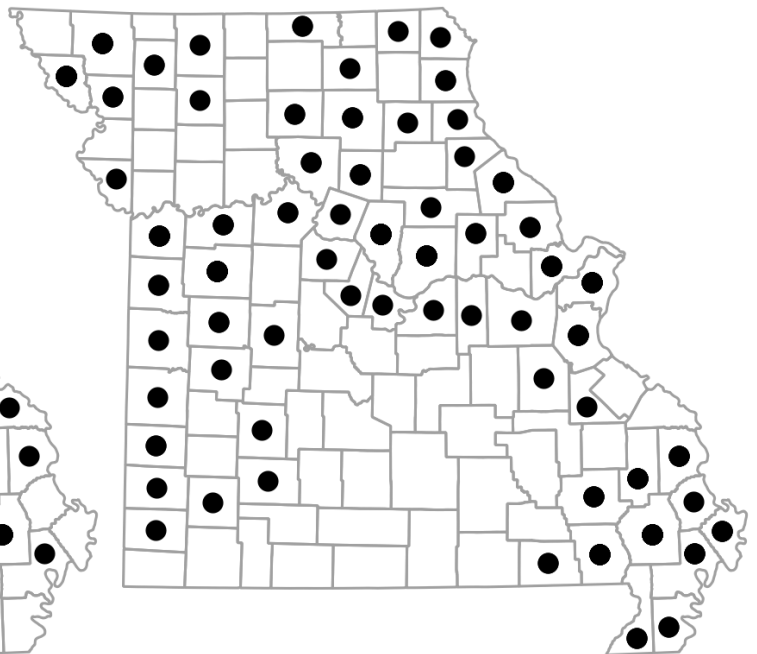
*Ambystoma maculatum*  
Spotted Salamander



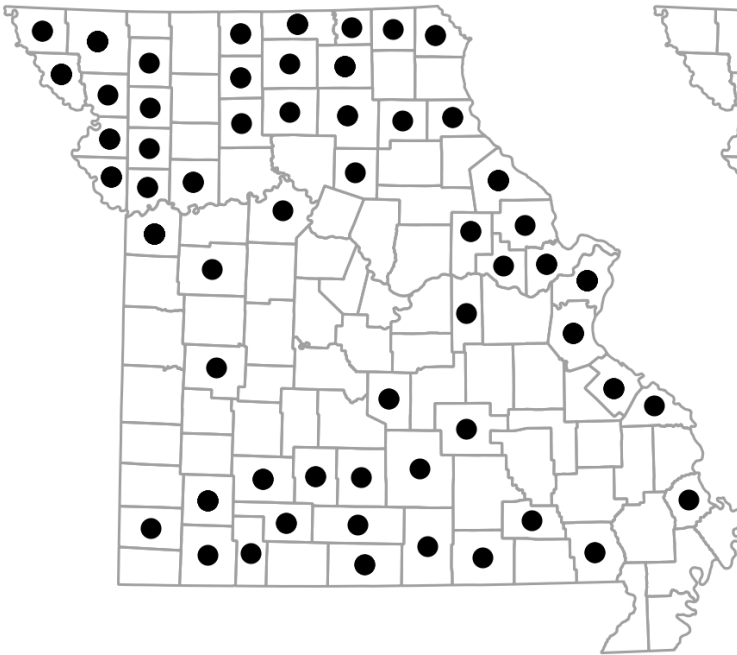
*Ambystoma opacum*  
Marbled Salamander



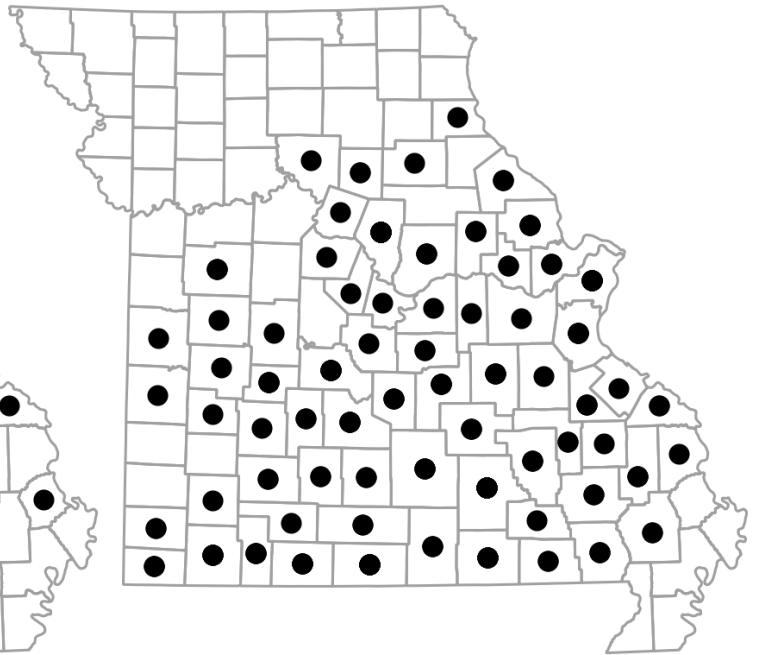
*Ambystoma talpoideum*  
Mole Salamander



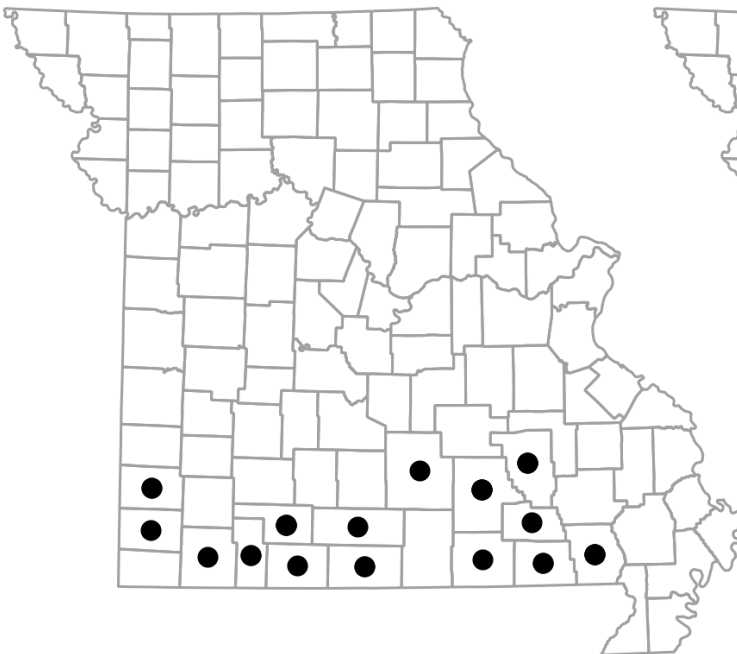
*Ambystoma texanum*  
Small-mouthed Salamander



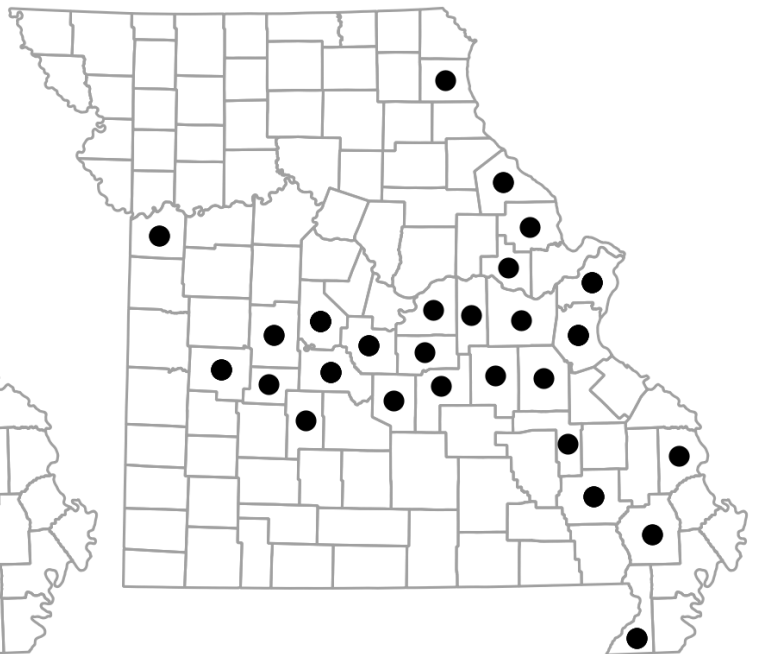
*Ambystoma tigrinum*  
Eastern Tiger Salamander



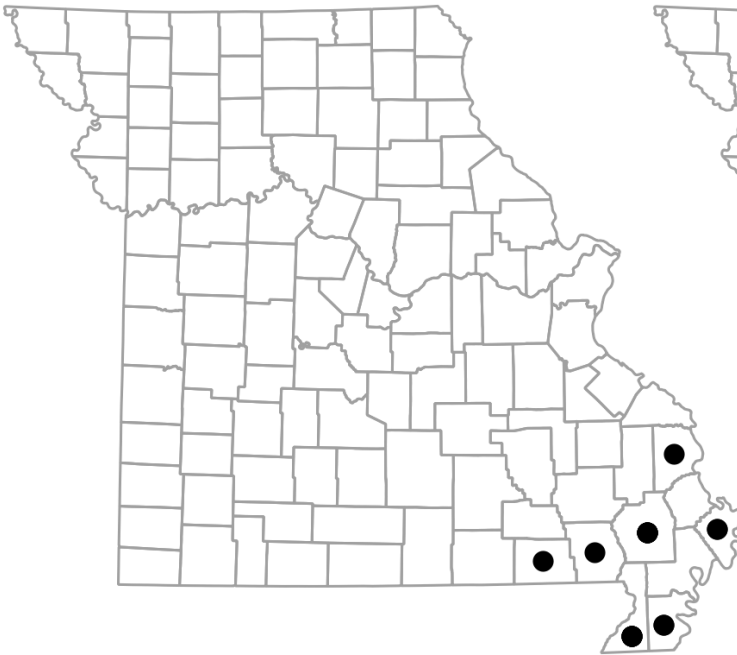
*Notophthalmus viridescens*  
Central Newt



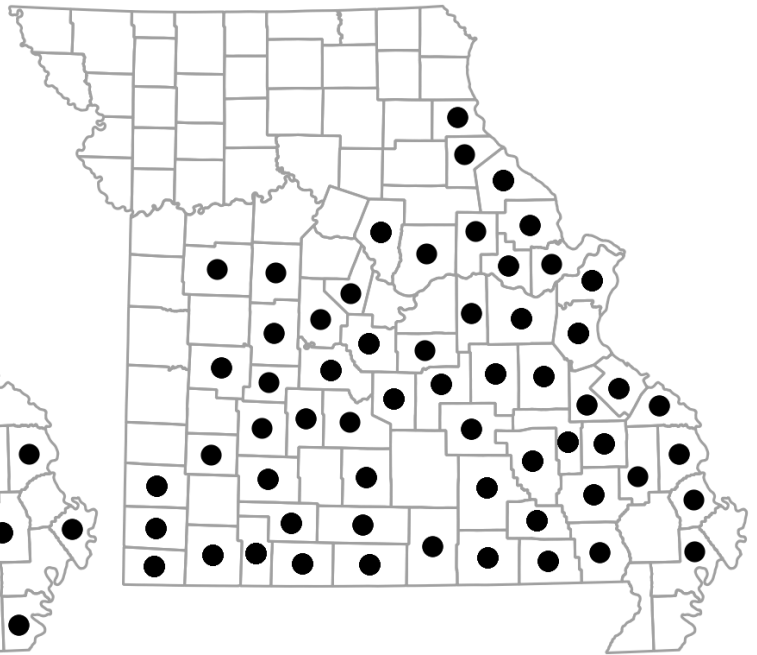
*Necturus louisianensis*  
Red River Mudpuppy



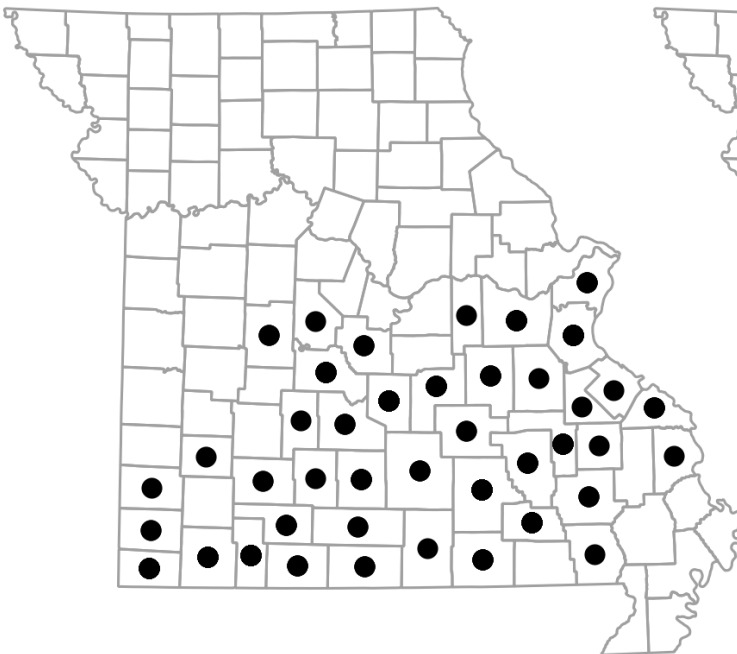
*Necturus maculosus*  
Mudpuppy



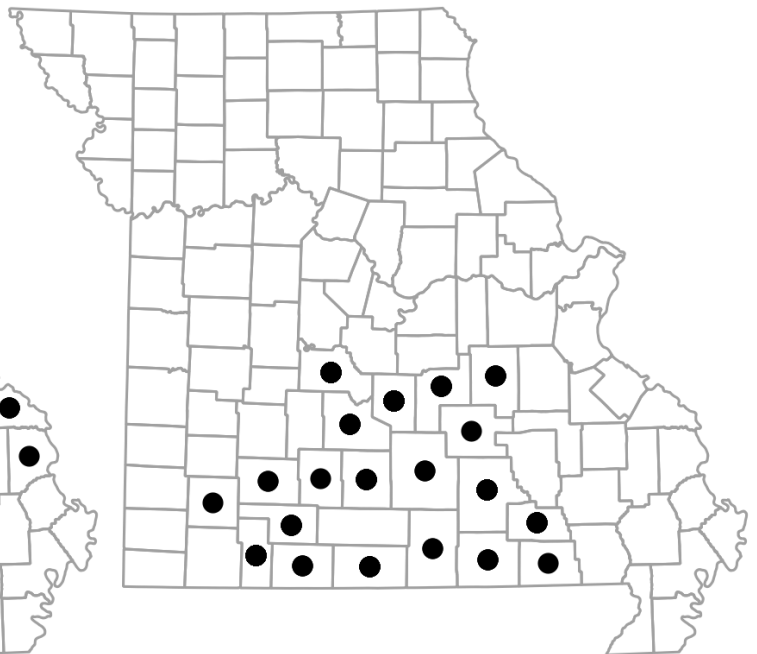
*Amphiuma tridactylum*  
Three-toed Amphiuma



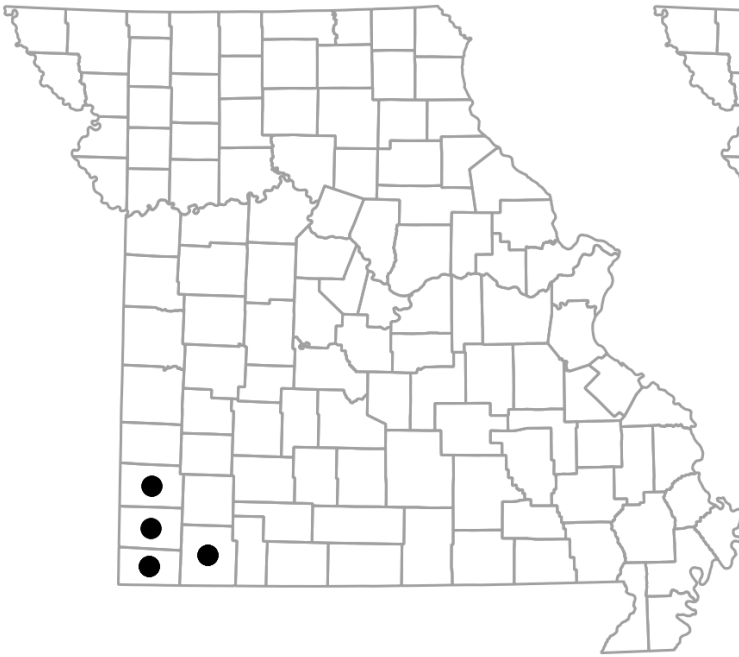
*Eurycea longicauda*  
Long-tailed Salamander



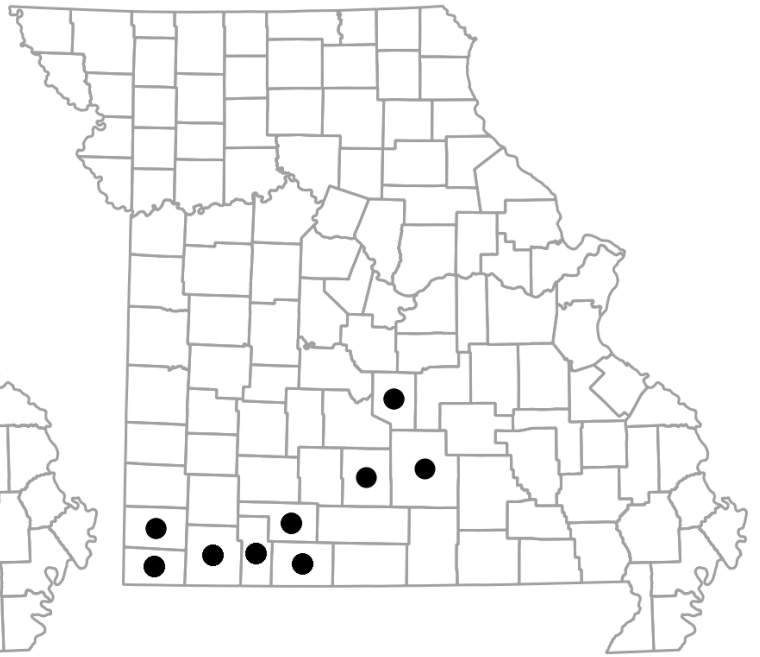
*Eurycea lucifuga*  
Cave Salamander



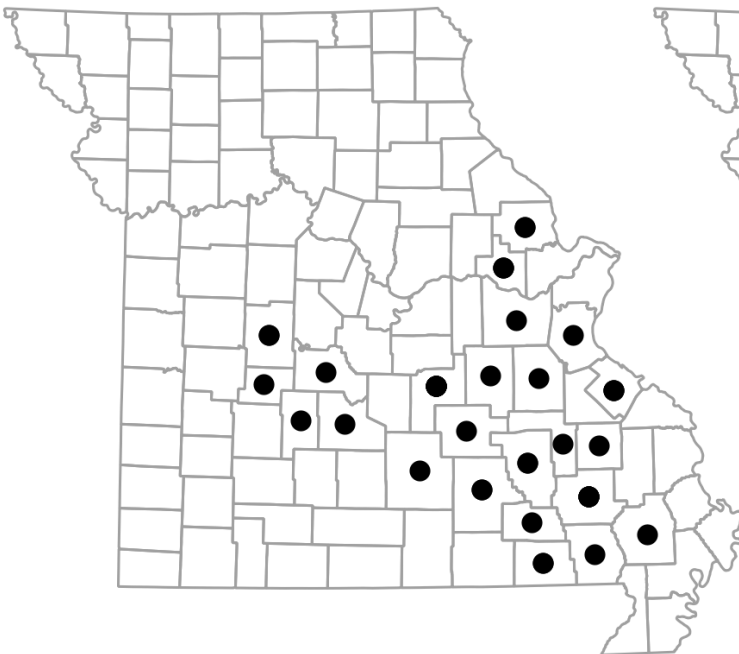
*Eurycea nerea*  
Northern Grotto Salamander



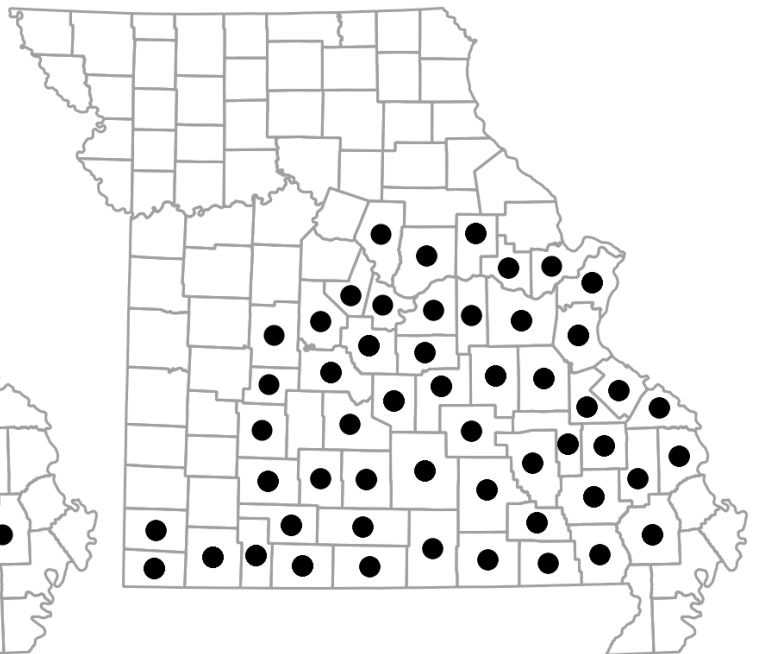
*Eurycea spelaea*  
Western Grotto Salamander



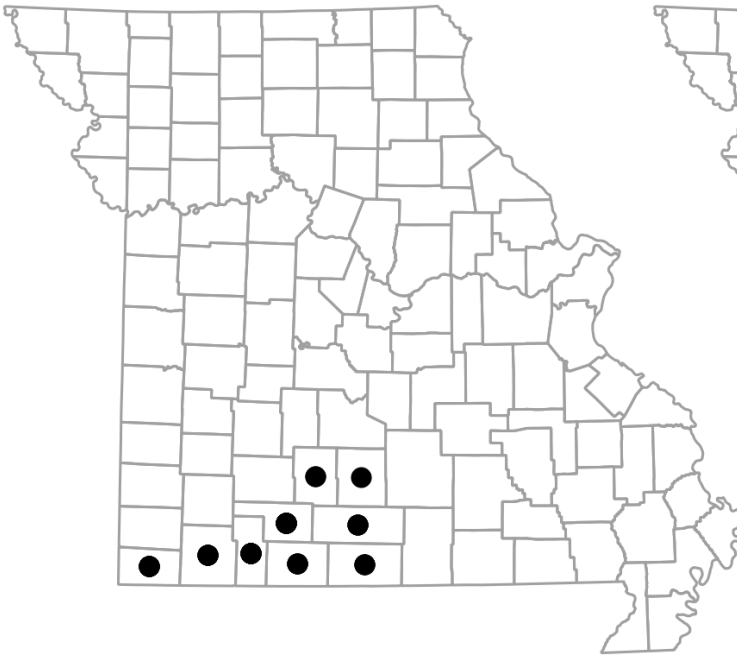
*Eurycea tynerensis*  
Oklahoma Salamander



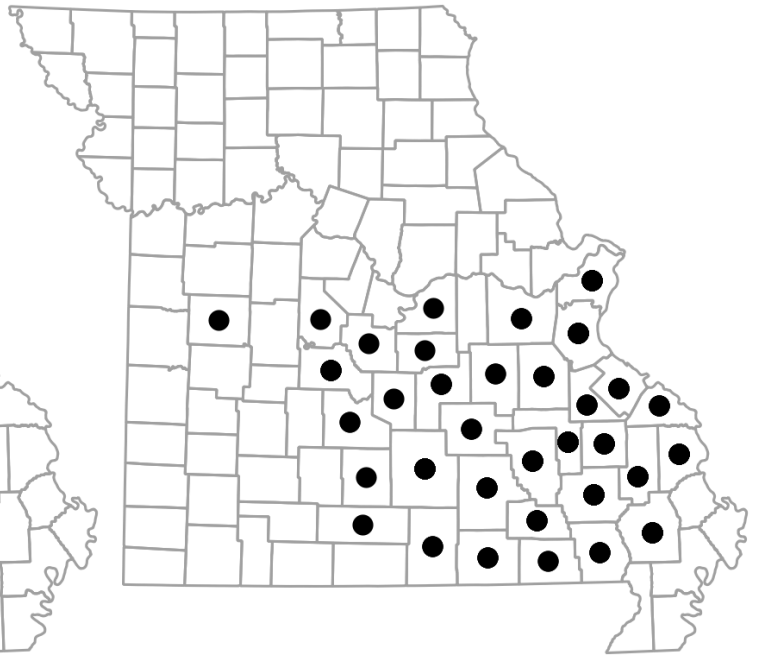
*Hemidactylium scutatum*  
Four-toed Salamander



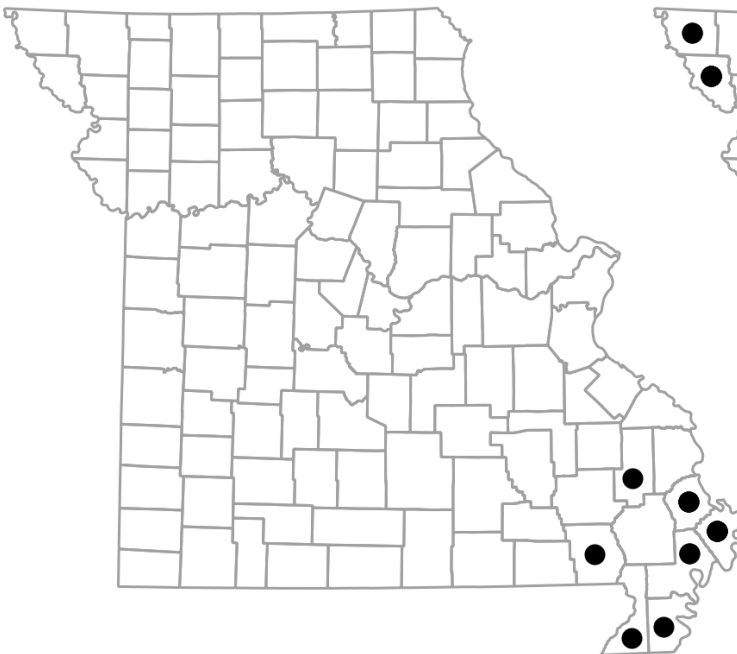
*Plethodon albagula*  
Western Slimy Salamander



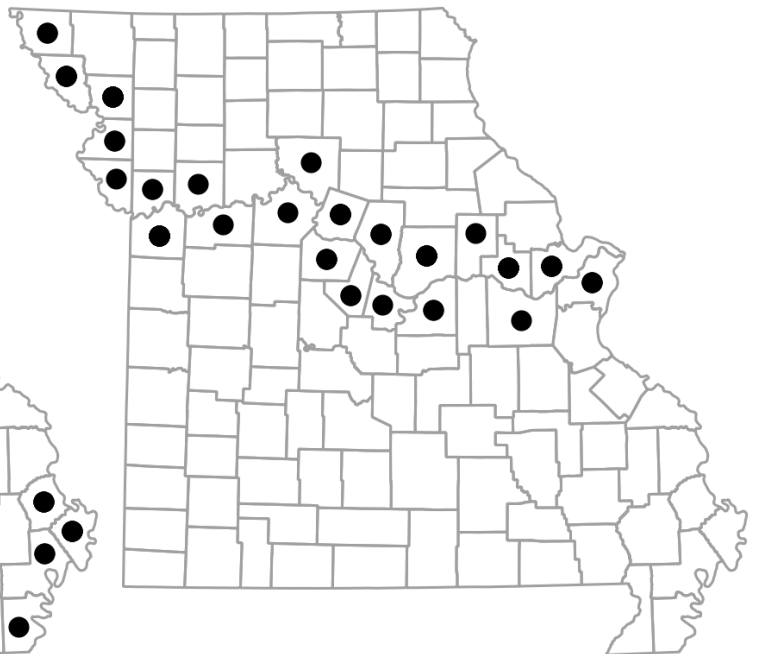
*Plethodon angusticlavius*  
Ozark Zigzag Salamander



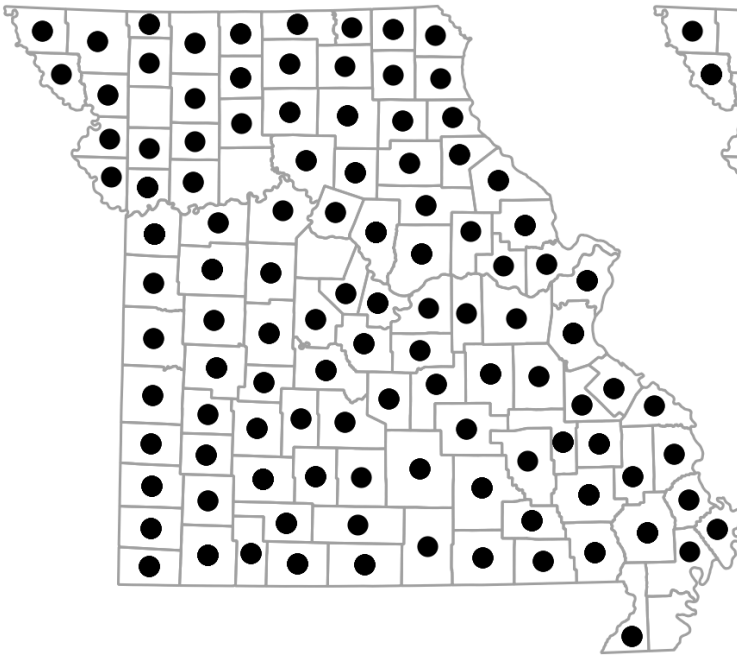
*Plethodon serratus*  
Southern Red-backed Salamander



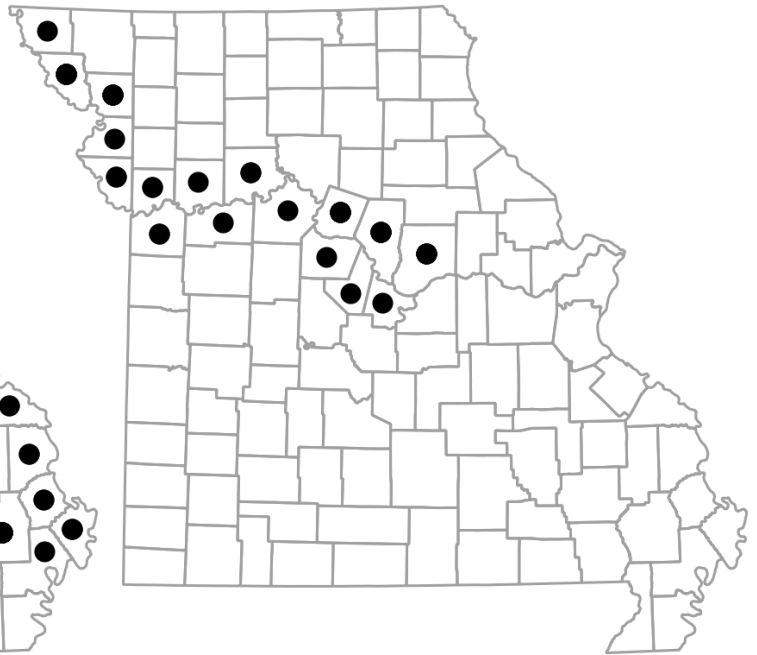
*Scaphiopus holbrookii*  
Eastern Spadefoot



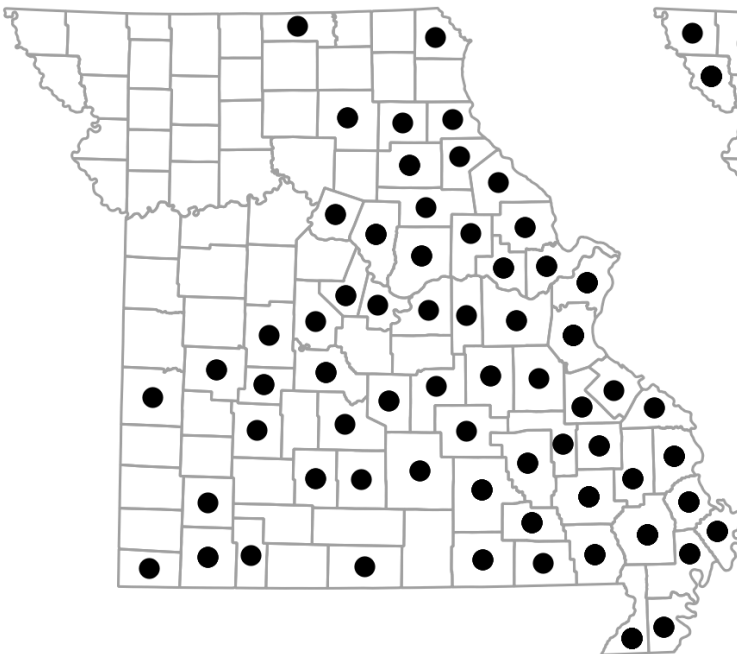
*Spea bombifrons*  
Plains Spadefoot



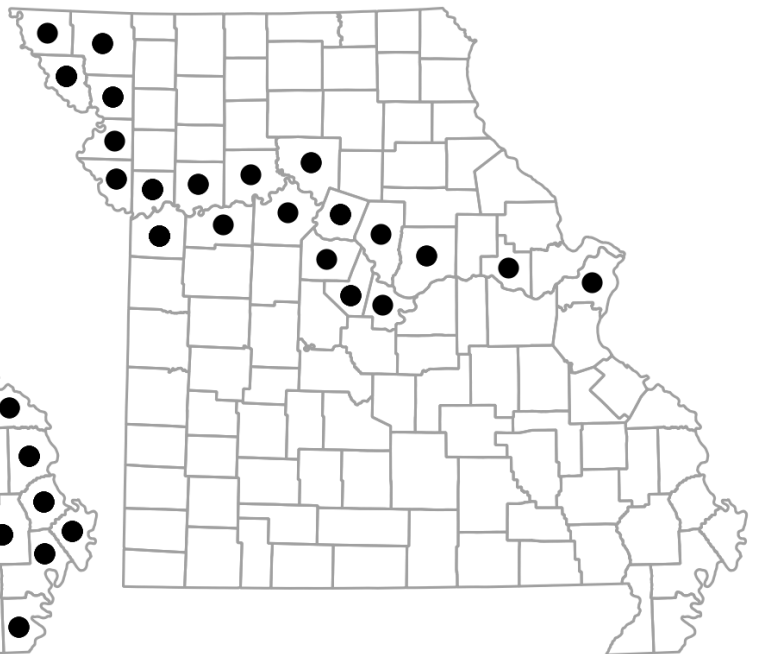
*Anaxyrus americanus*  
American Toad



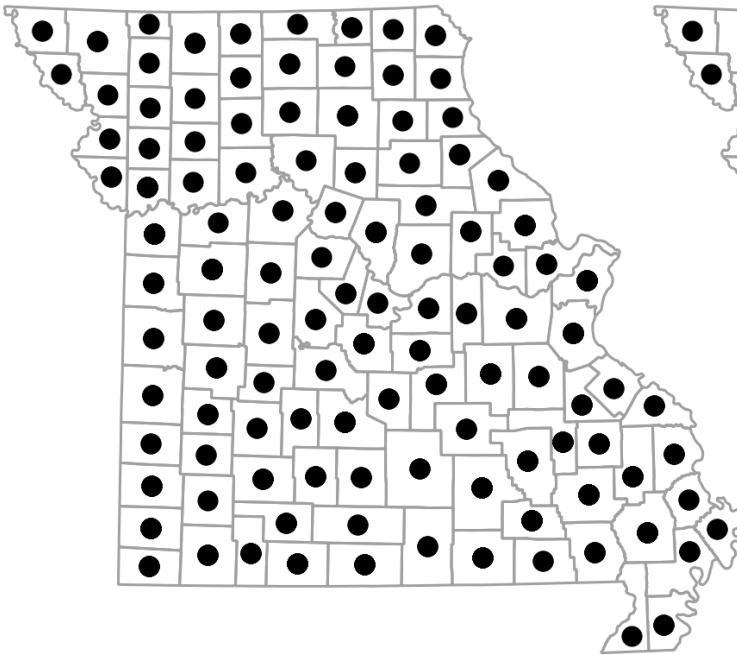
*Anaxyrus cognatus*  
Great Plains Toad



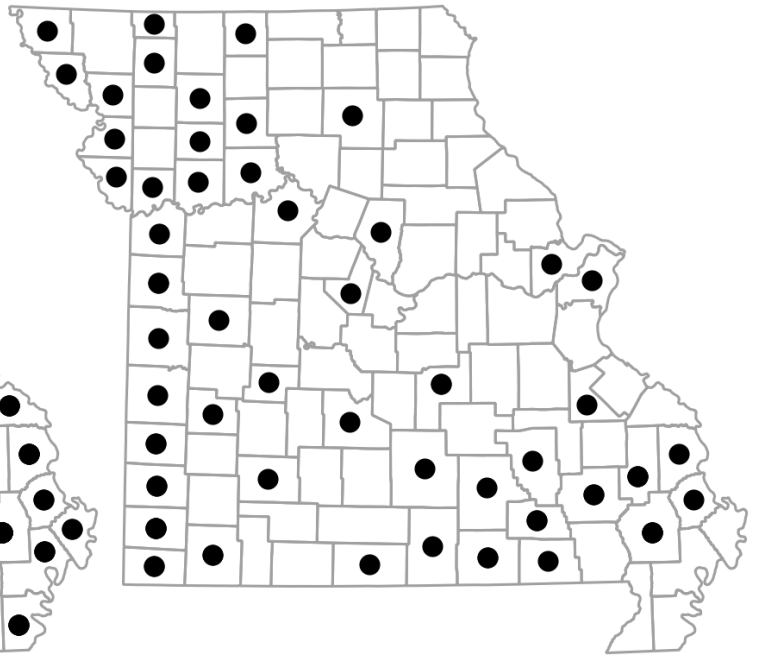
*Anaxyrus fowleri*  
Fowler's Toad



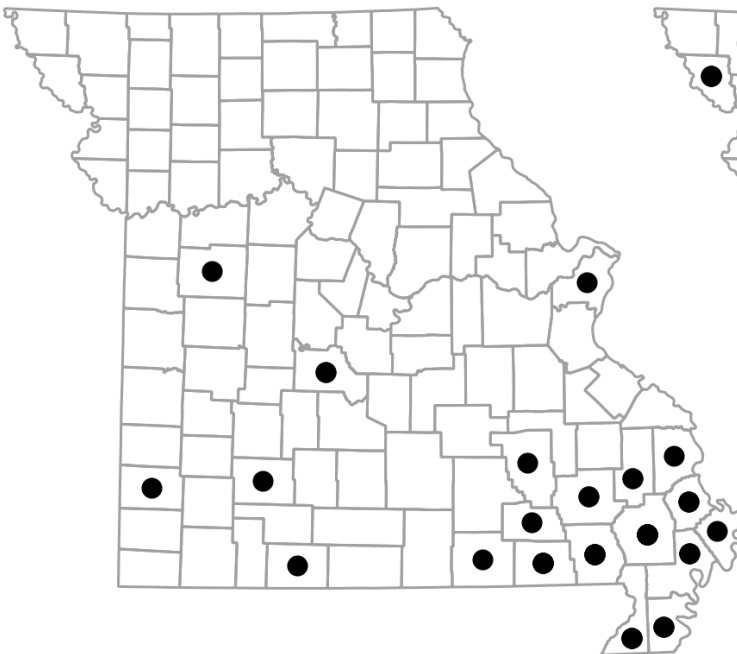
*Anaxyrus woodhousii*  
Rocky Mountain Toad



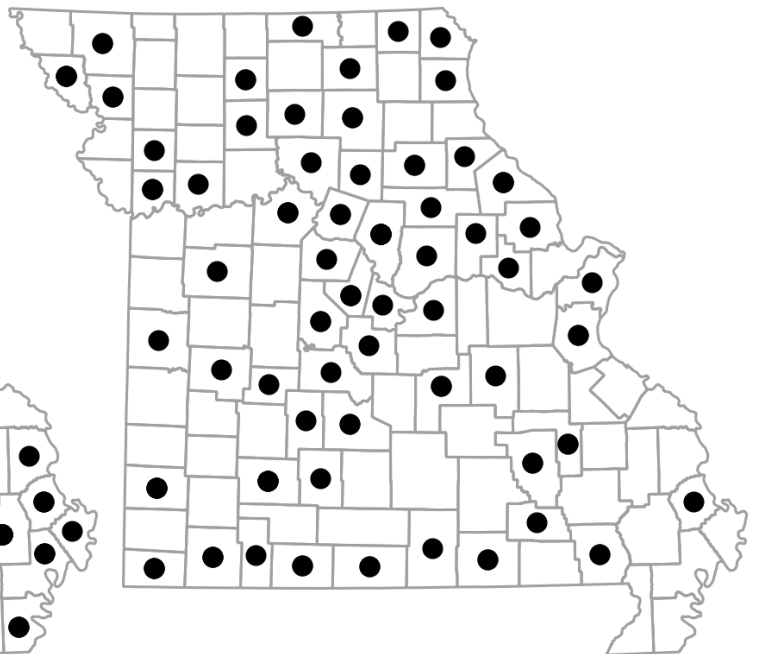
*Acris blanchardi*  
Blanchard's Cricket Frog



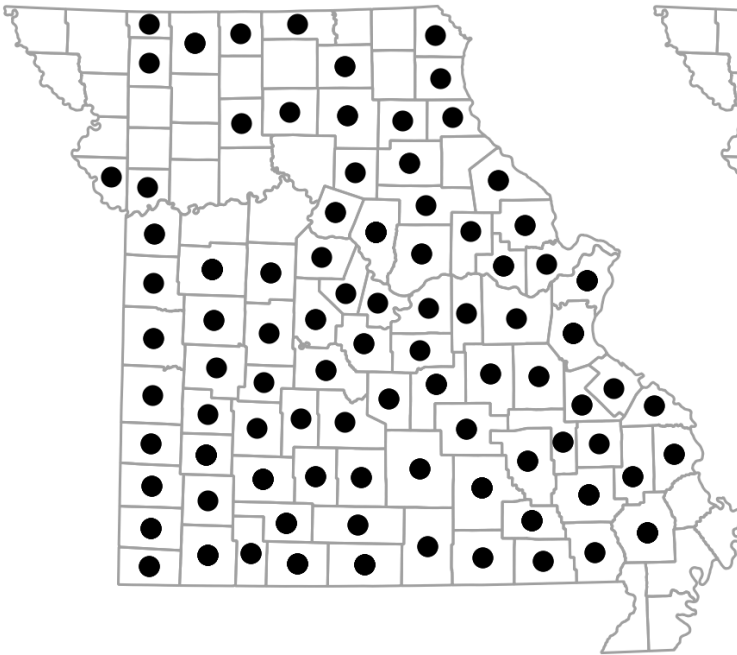
*Dryophytes chrysoscelis*  
Cope's Gray Treefrog



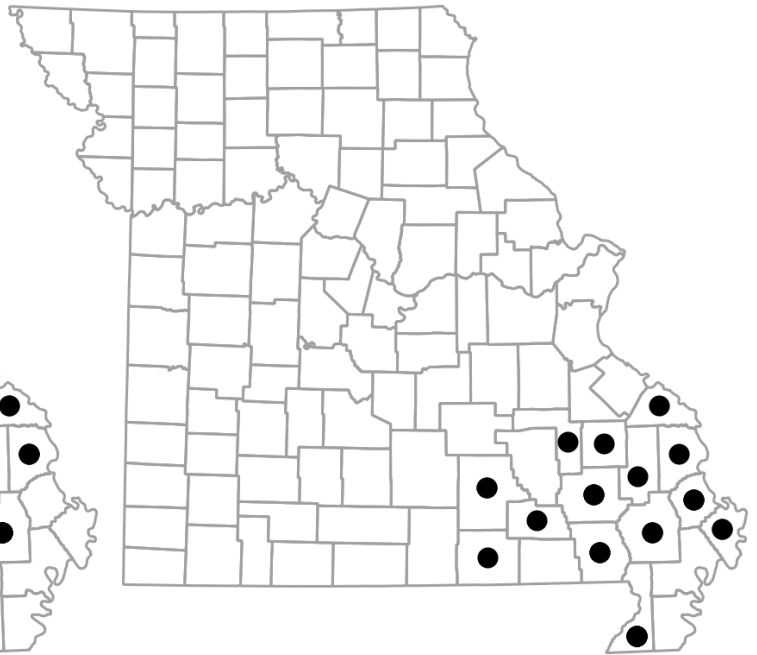
*Dryophytes cinereus*  
Green Treefrog



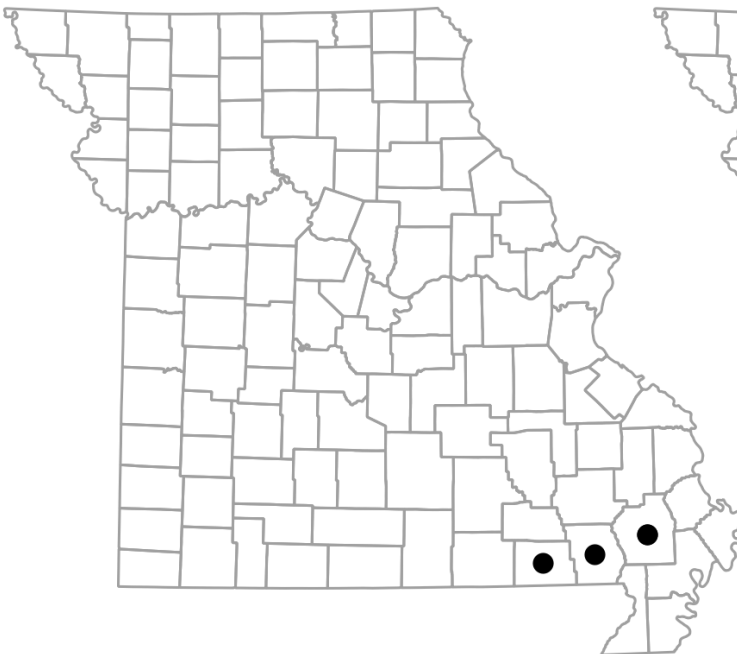
*Dryophytes versicolor*  
Gray Treefrog



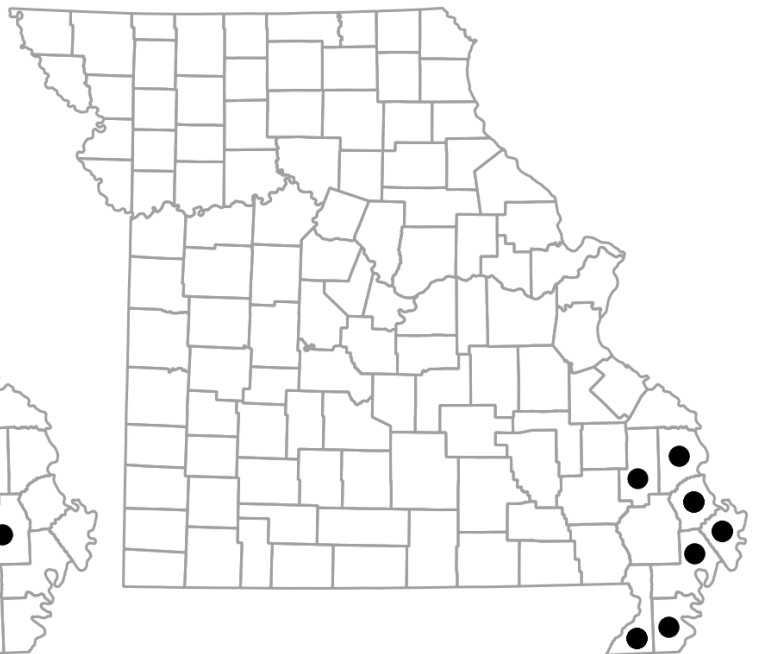
*Pseudacris crucifer*  
Spring Peeper



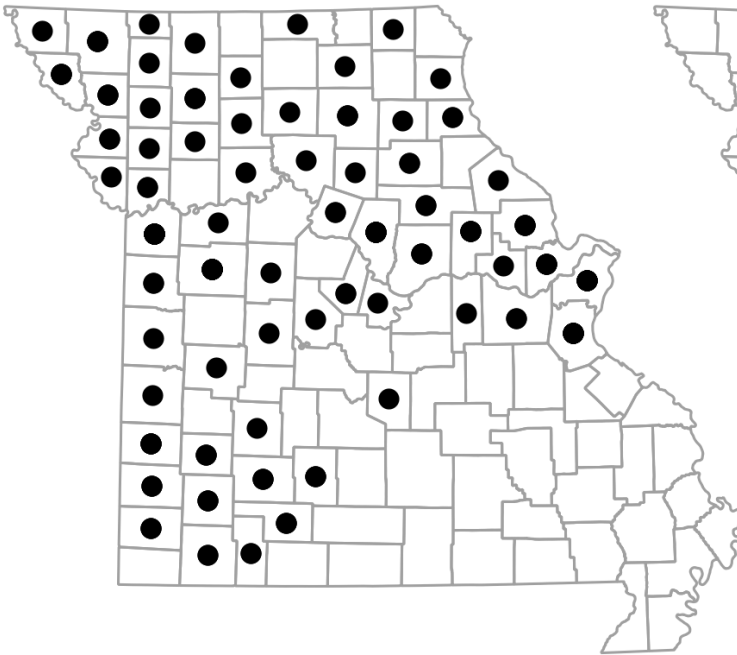
*Pseudacris feriarum*  
Upland Chorus Frog



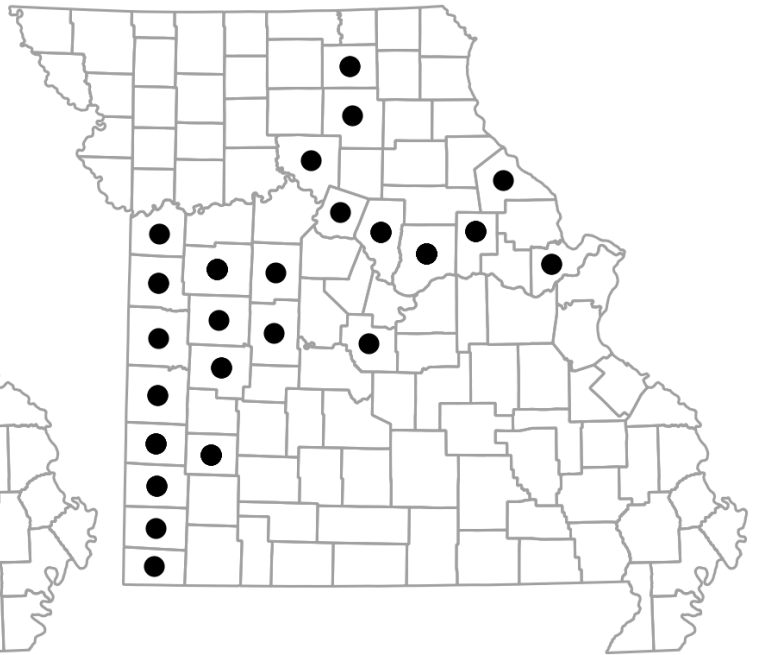
*Pseudacris fouquettei*  
Cajun Chorus Frog



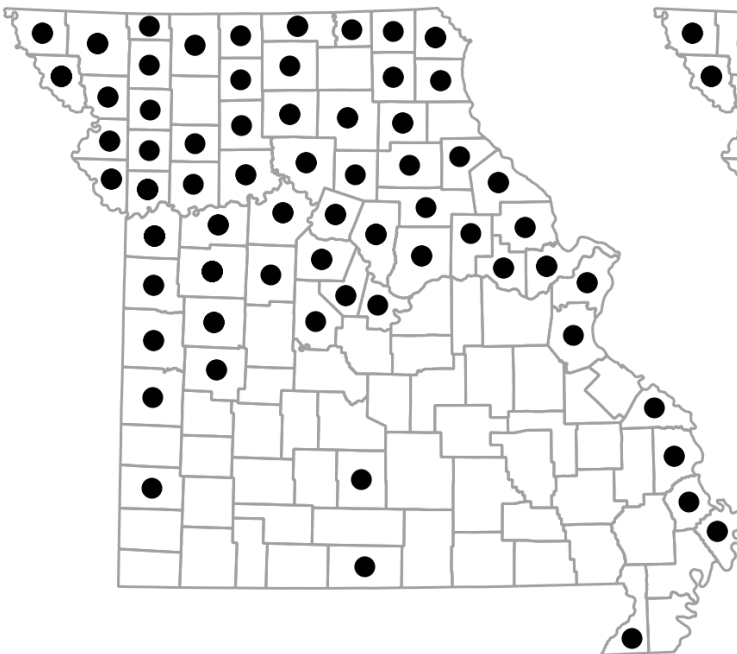
*Pseudacris illinoensis*  
Illinois Chorus Frog



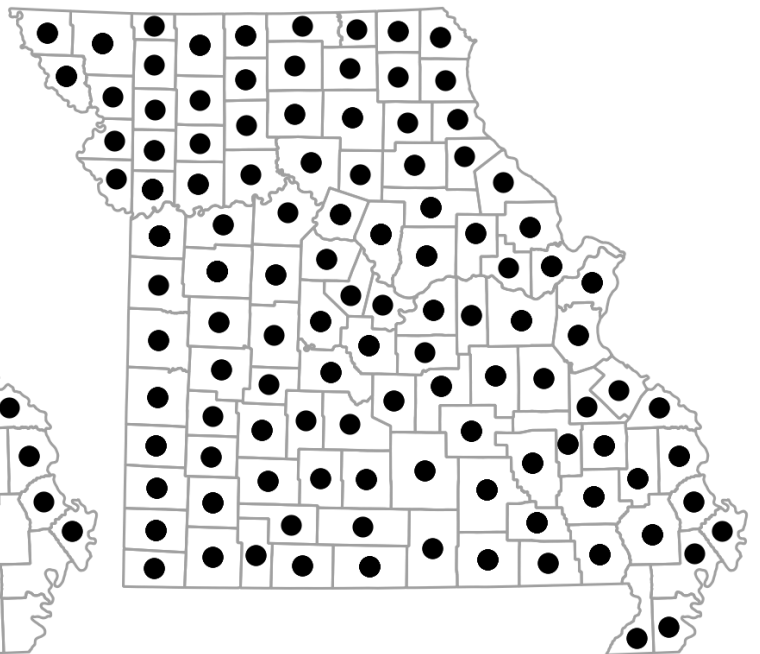
*Pseudacris maculata*  
Boreal Chorus Frog



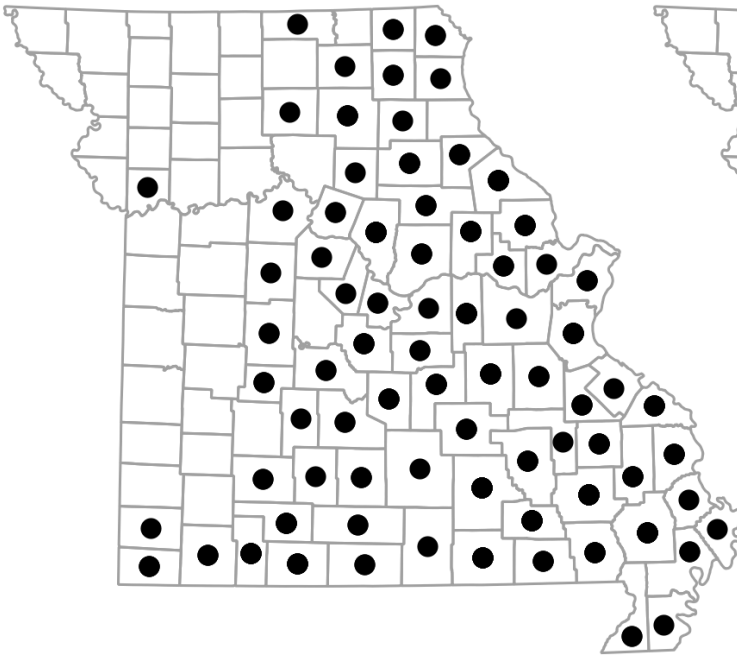
*Lithobates areolatus*  
Northern Crawfish Frog



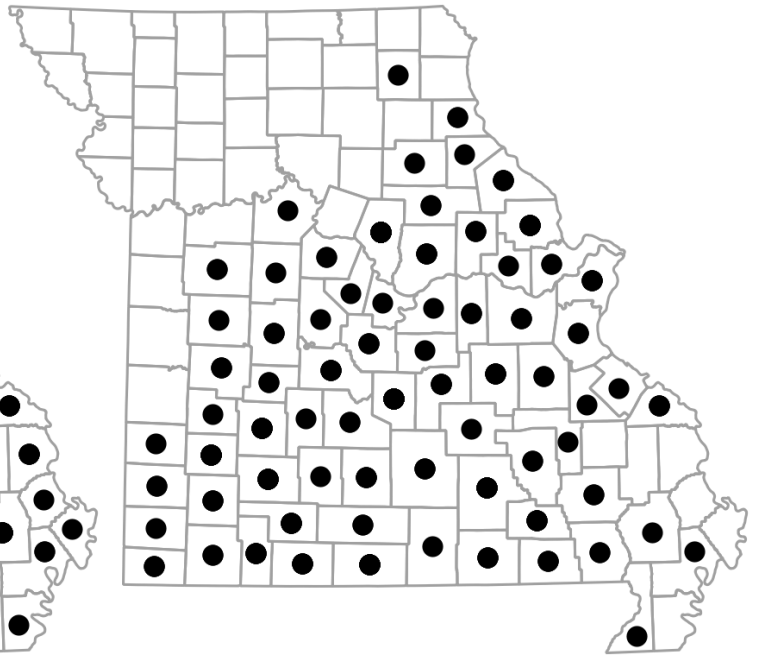
*Lithobates blairi*  
Plains Leopard Frog



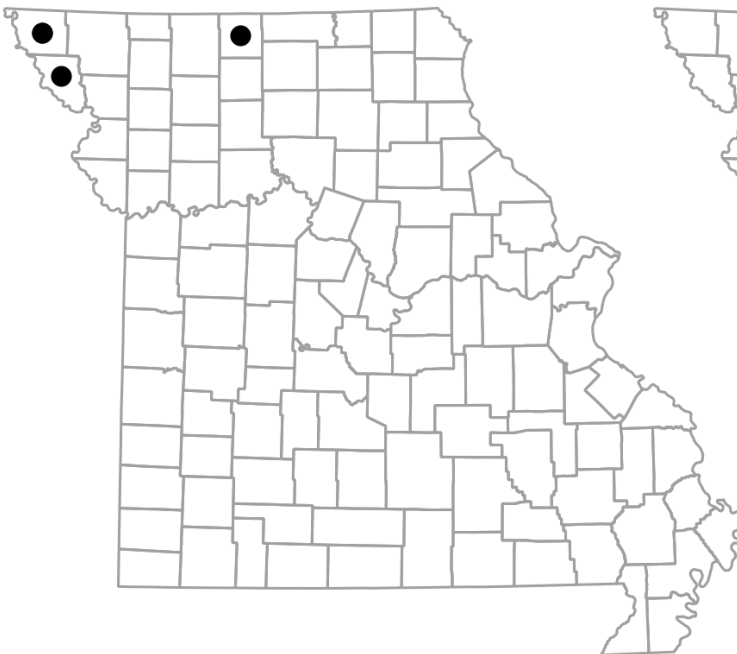
*Lithobates catesbeianus*  
North American Bullfrog



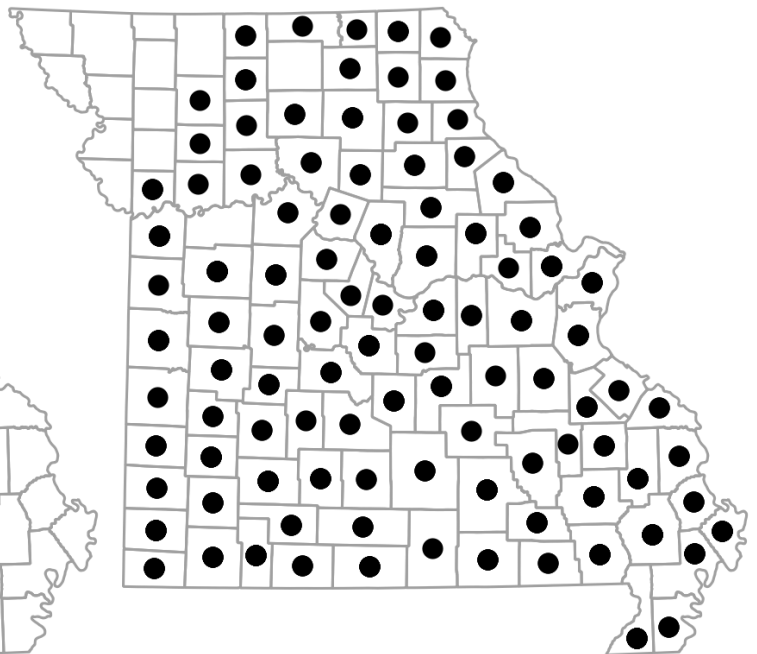
*Lithobates clamitans*  
North American Green Frog



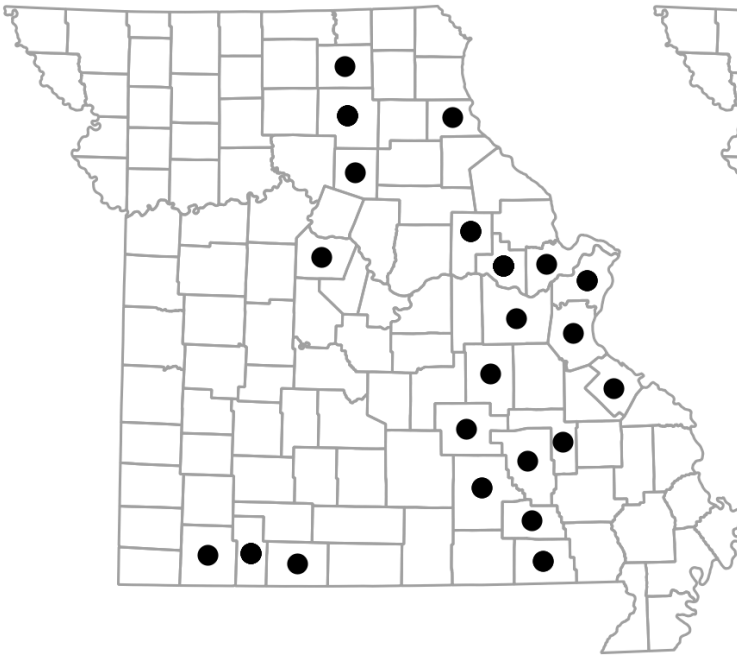
*Lithobates palustris*  
Pickerel Frog



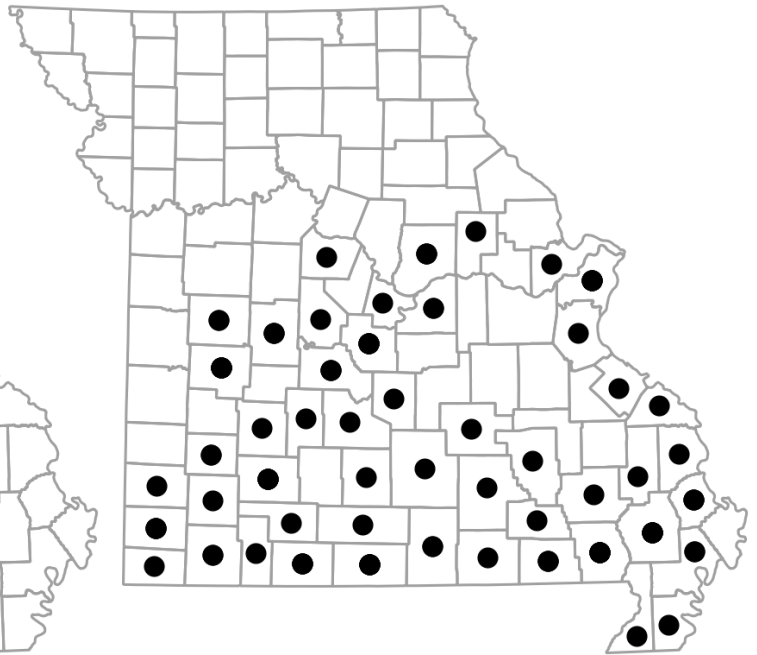
*Lithobates pipiens*  
Northern Leopard Frog



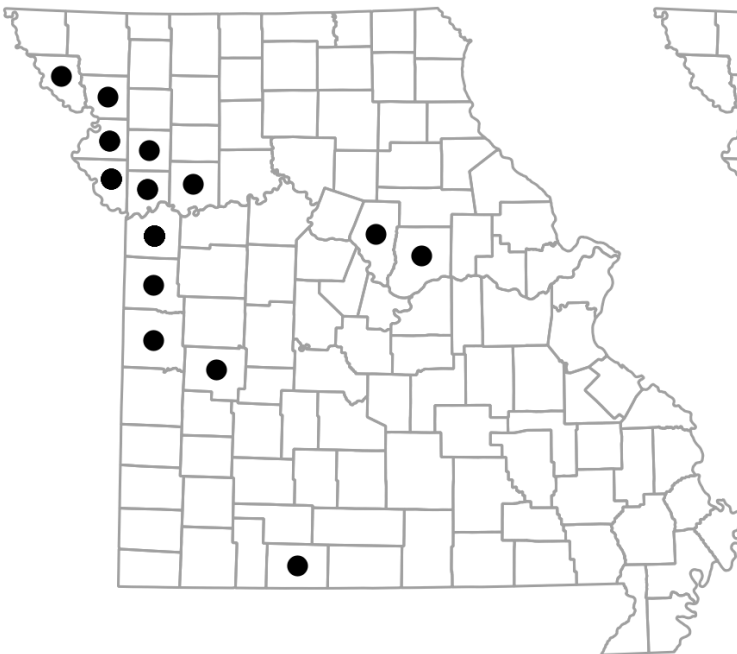
*Lithobates sphenoccephalus*  
Coastal Plains Leopard Frog



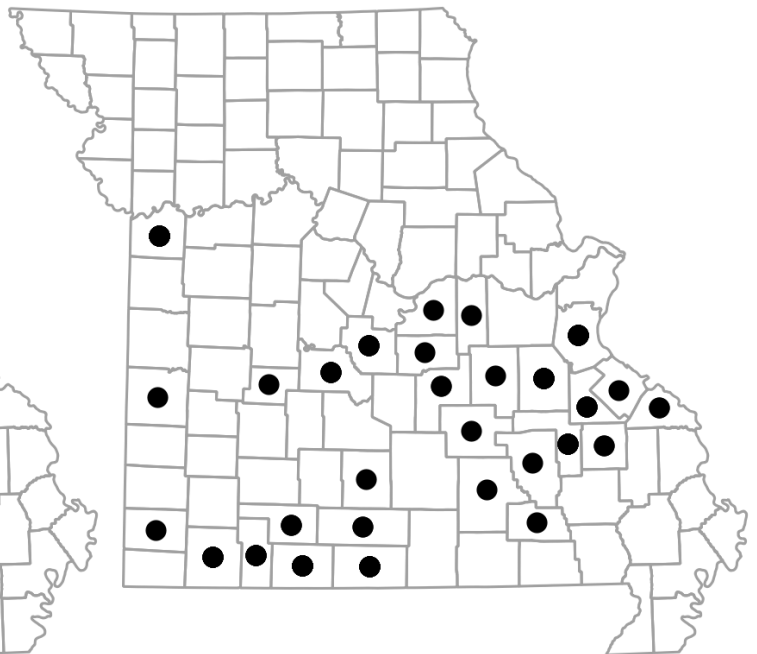
*Lithobates sylvaticus*  
Wood Frog



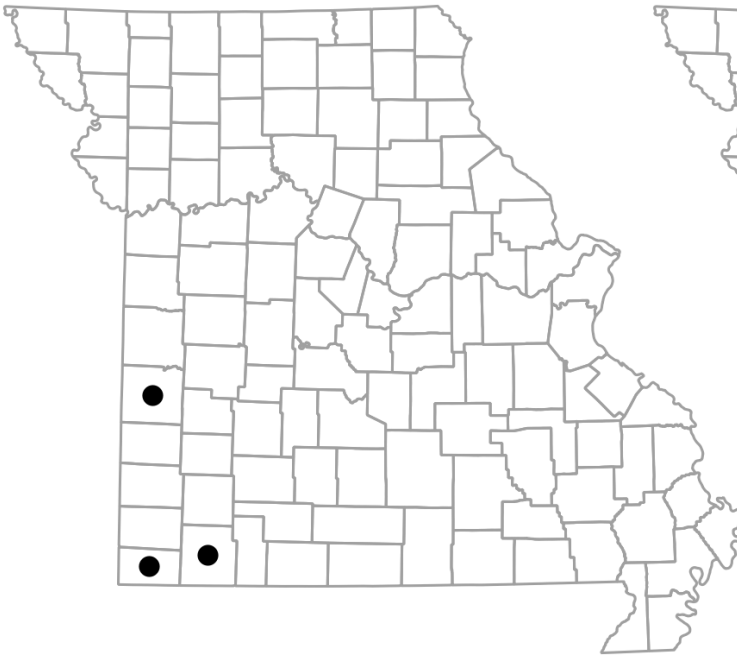
*Gastrophryne carolinensis*  
Eastern Narrow-mouthed Toad



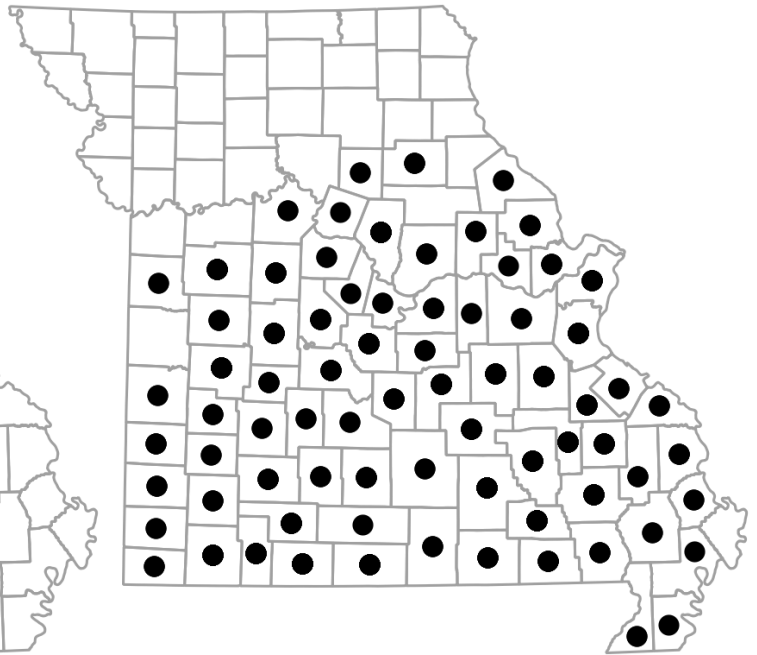
*Gastrophryne olivacea*  
Western Narrow-mouthed Toad



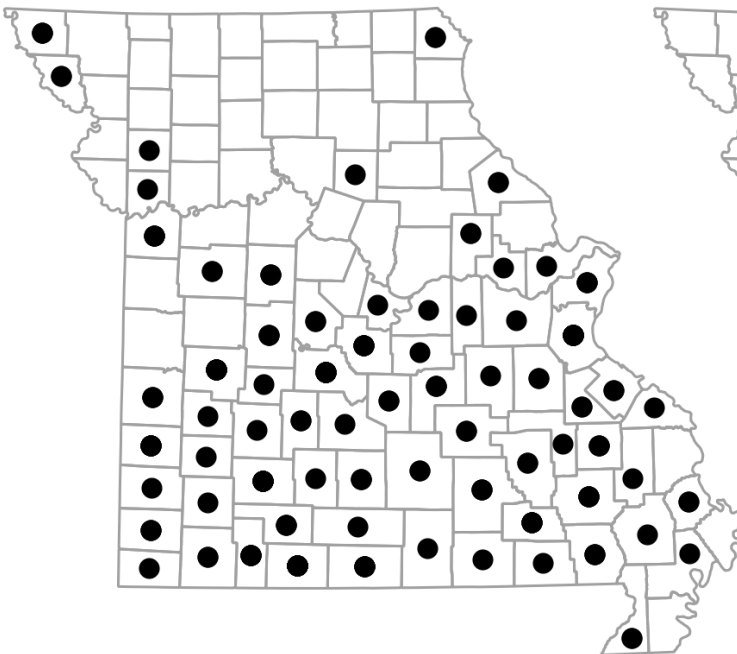
*Crotaphytus collaris*  
Eastern Collared Lizard



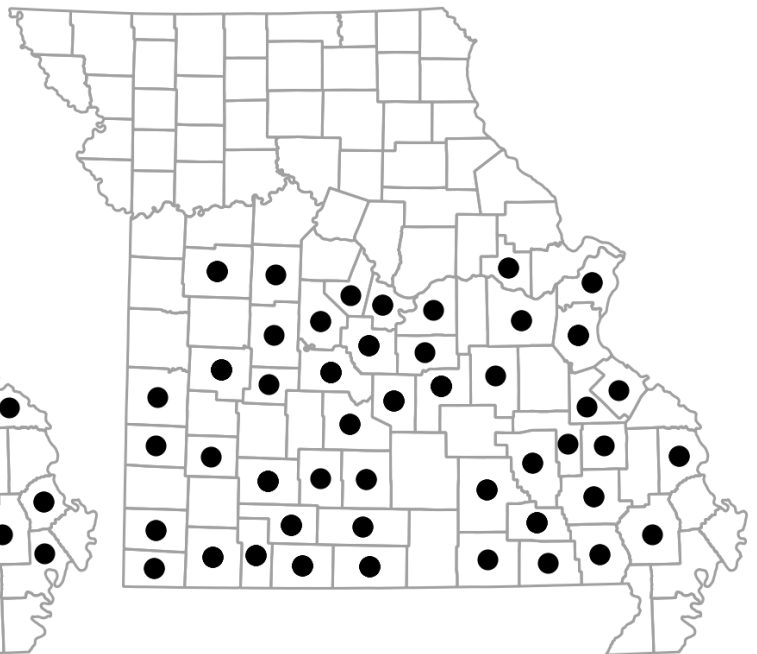
*Phrynosoma cornutum*  
Texas Horned Lizard



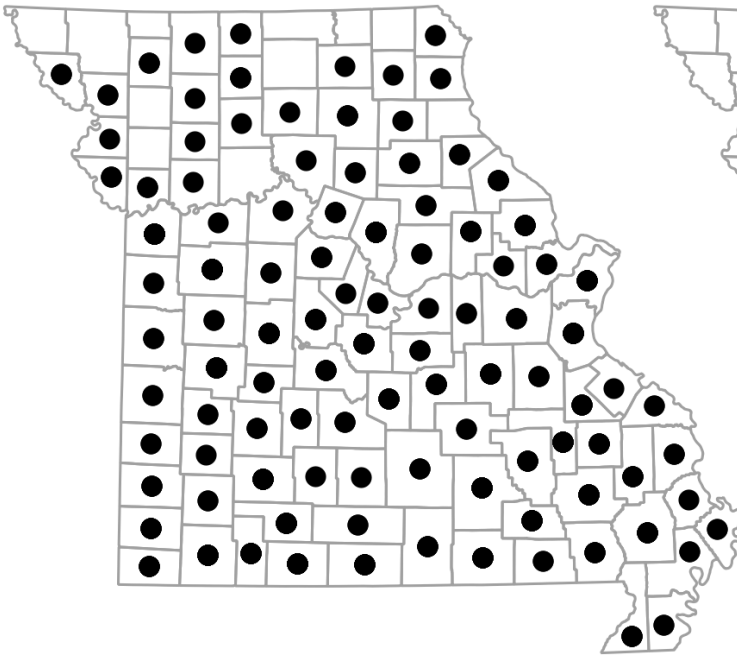
*Sceloporus consobrinus*  
Prairie Lizard



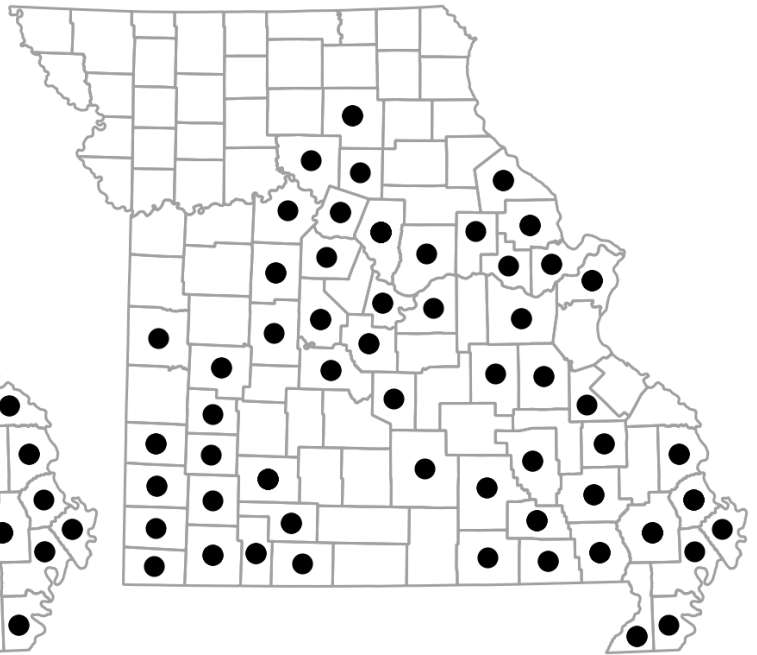
*Aspidoscelis sexlineatus*  
Prairie Racerunner



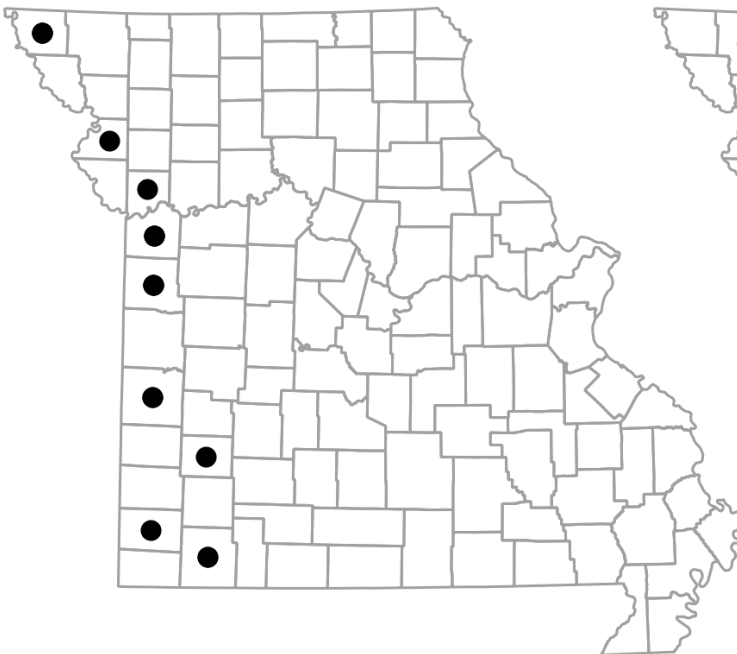
*Plestiodon anthracinus*  
Southern Coal Skink



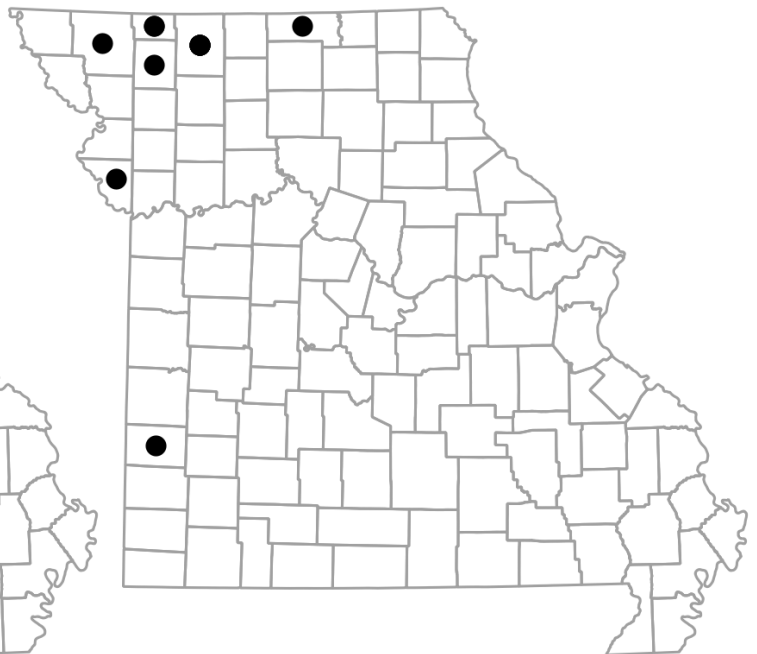
*Plestiodon fasciatus*  
Common Five-lined Skink



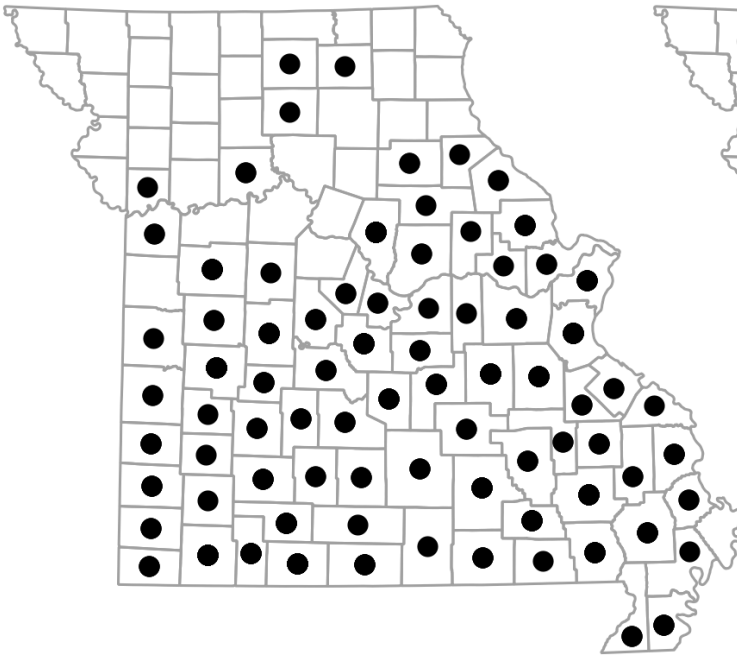
*Plestiodon laticeps*  
Broad-headed Skink



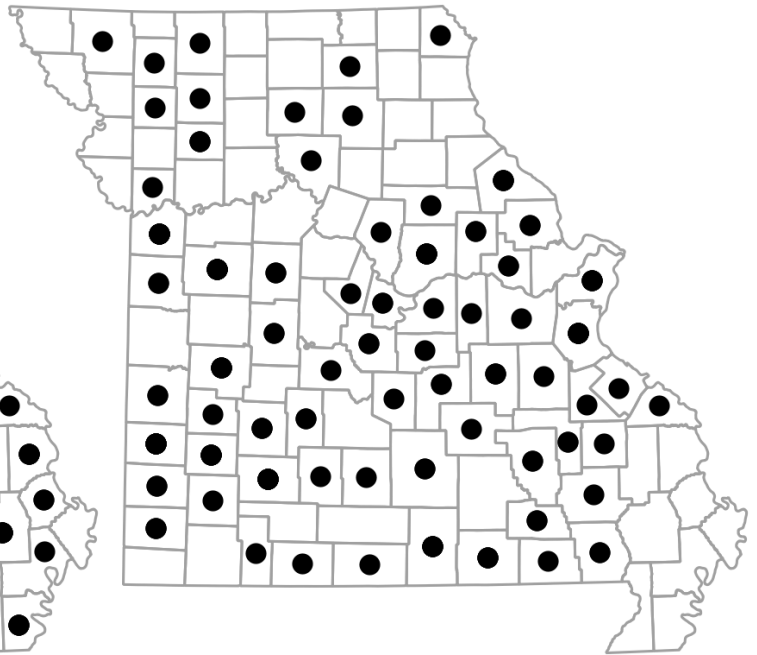
*Plestiodon obsoletus*  
Great Plains Skink



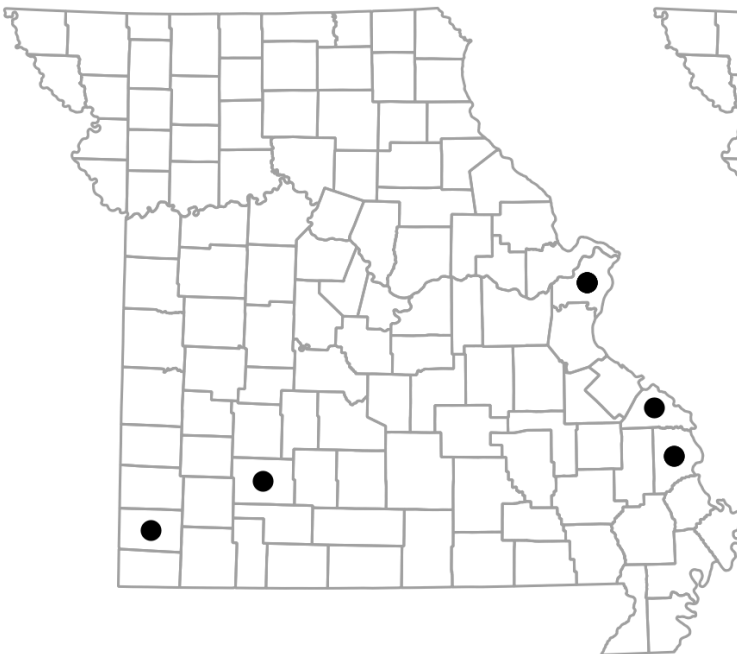
*Plestiodon septentrionalis*  
Prairie Skink



*Scincella lateralis*  
Little Brown Skink



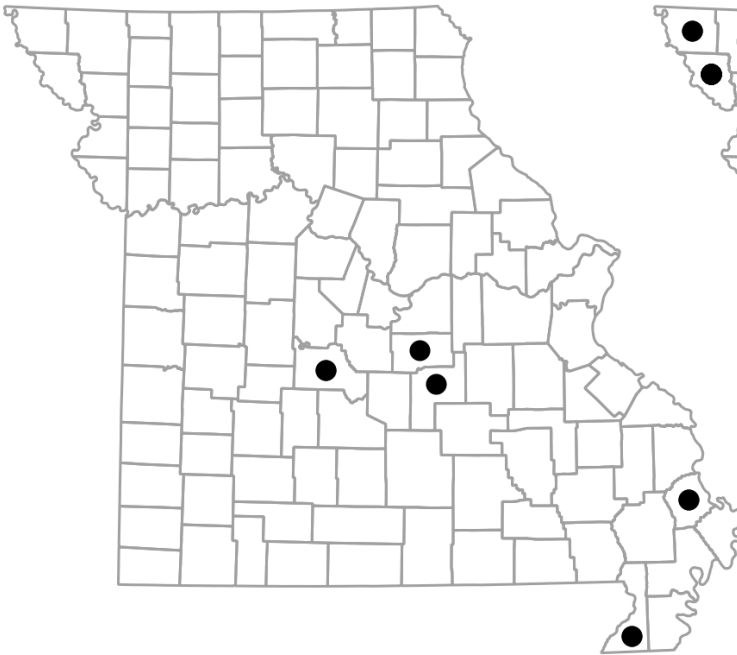
*Ophisaurus attenuatus*  
Western Slender Glass Lizard



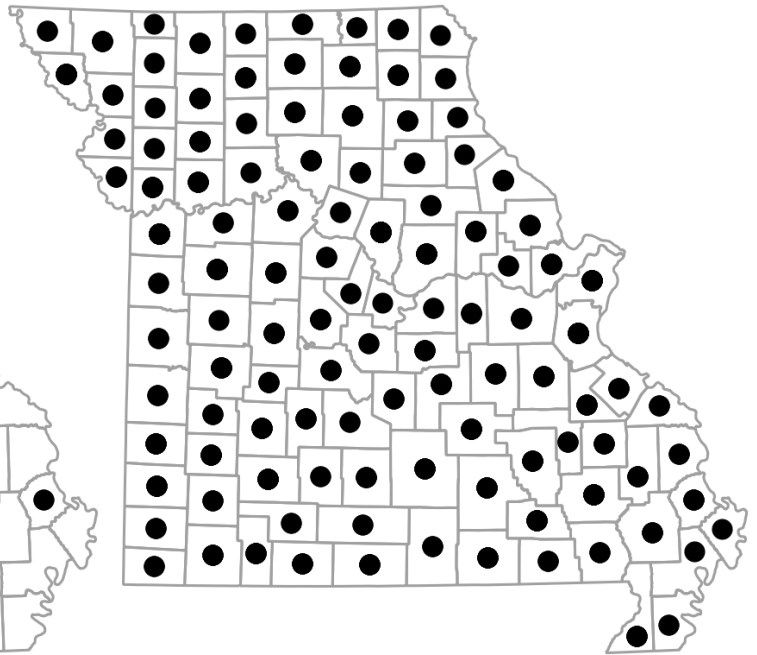
*Hemidactylus turcicus*  
Mediterranean Gecko



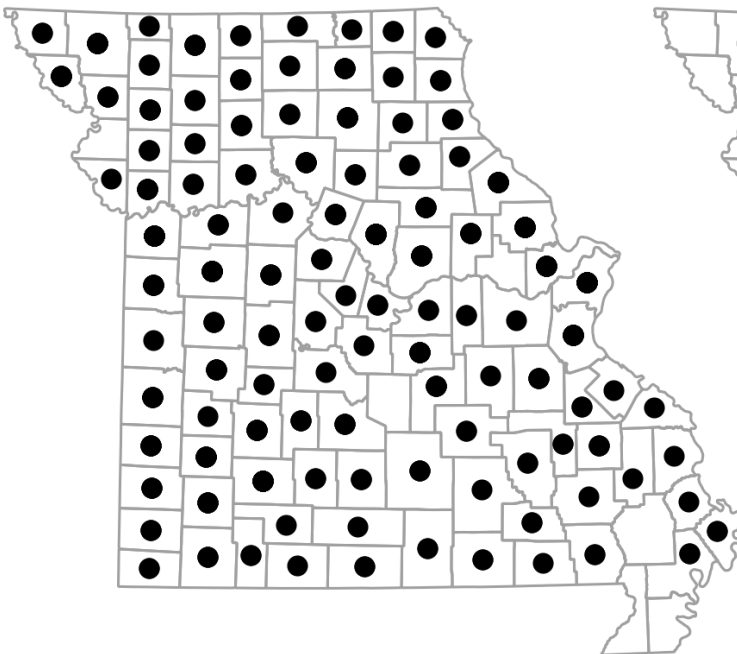
*Podarcis siculus*  
Italian Wall Lizard



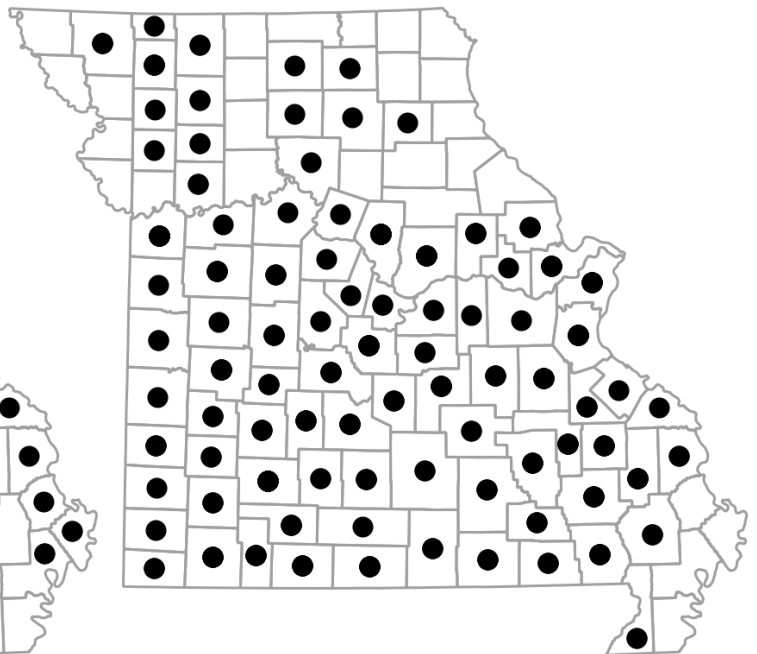
*Cemophora coccinea*  
Northern Scarletsnake



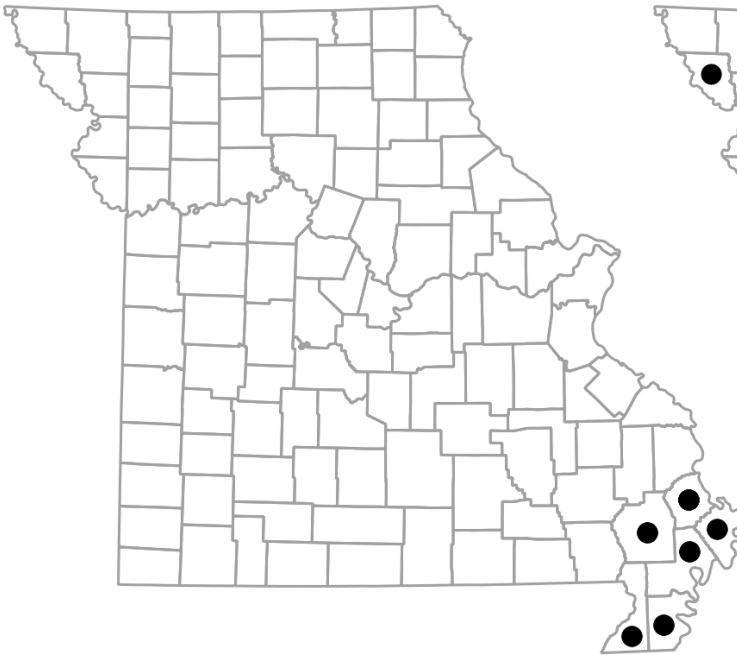
*Coluber constrictor*  
North American Racer



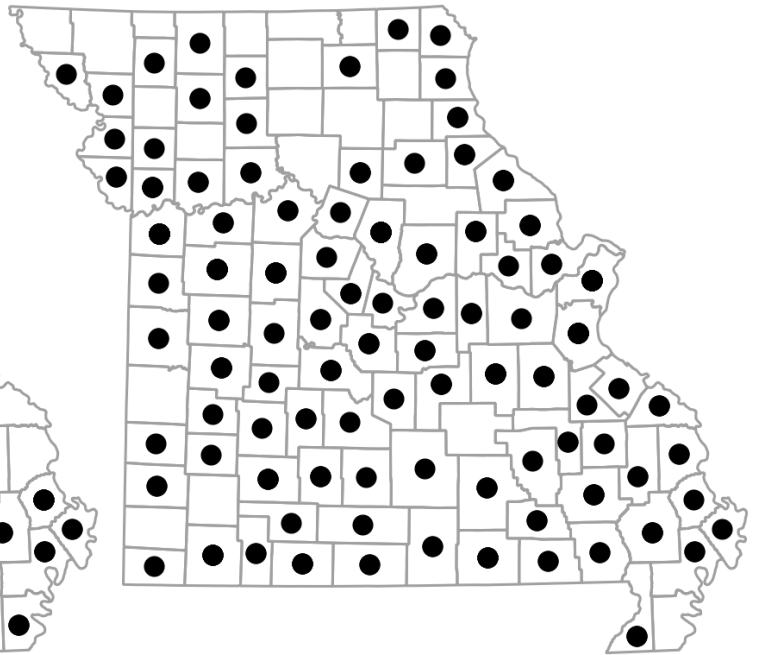
*Lampropeltis calligaster*  
Prairie Kingsnake



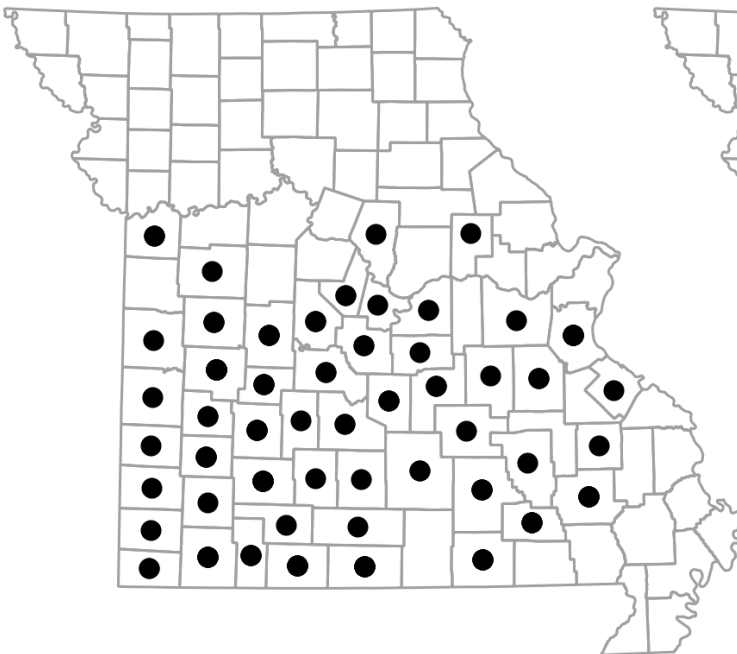
*Lampropeltis holbrooki*  
Speckled Kingsnake



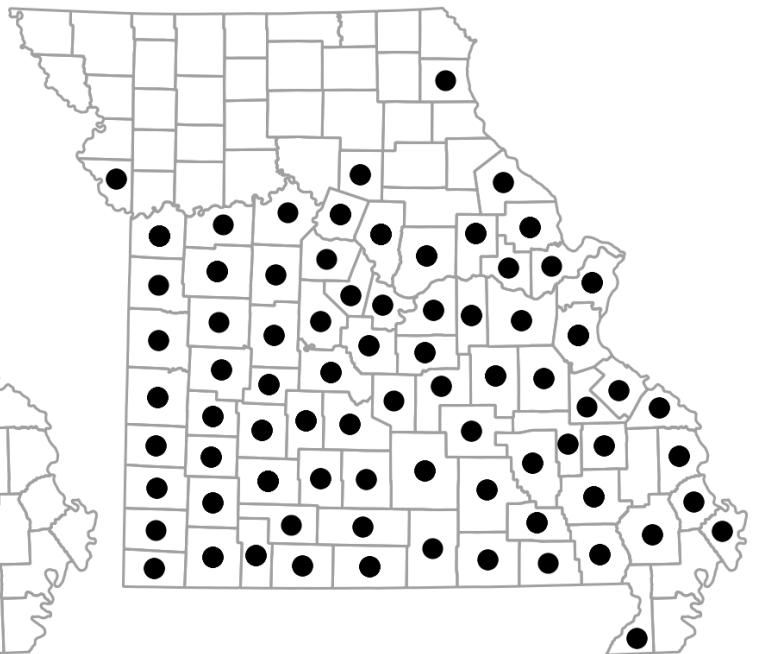
*Lampropeltis nigra*  
Eastern Black Kingsnake



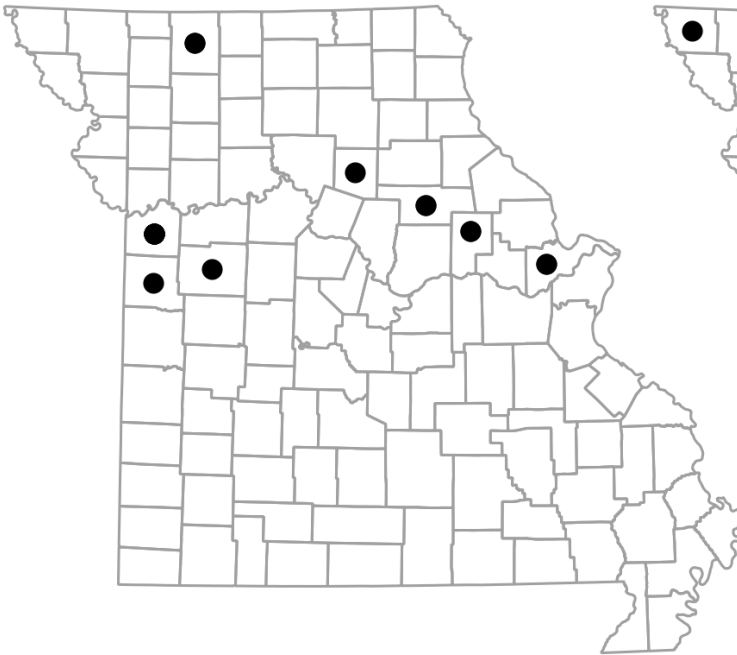
*Lampropeltis triangulum*  
Eastern Milksnake



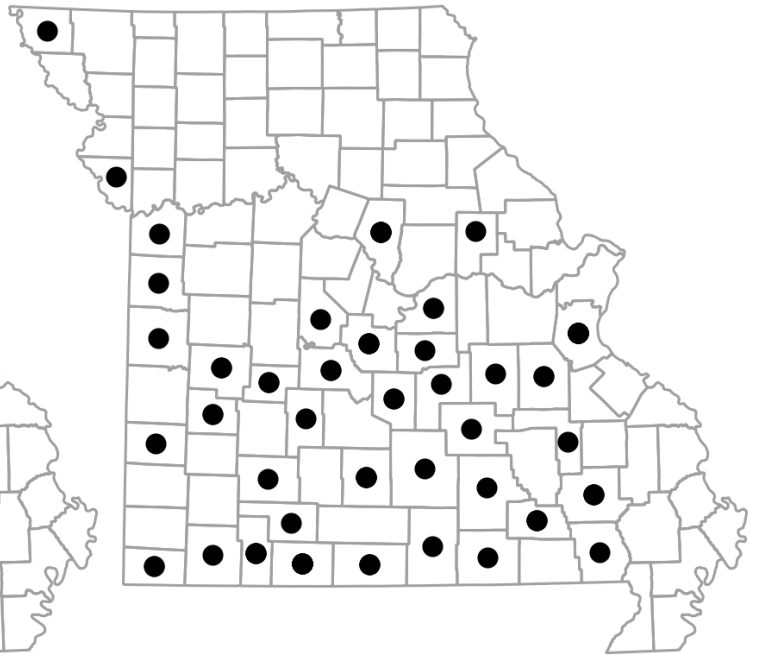
*Masticophis flagellum*  
Eastern Coachwhip



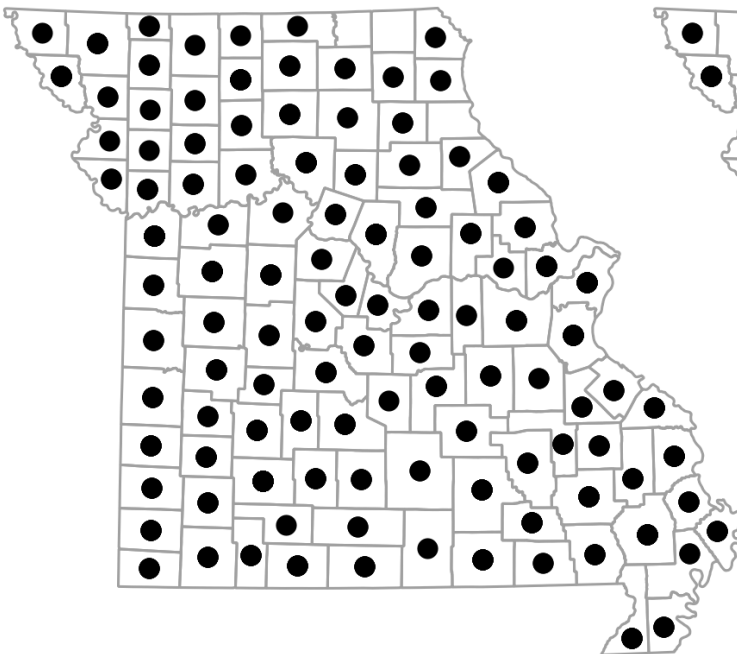
*Ophedrys aestivus*  
Northern Rough Greensnake



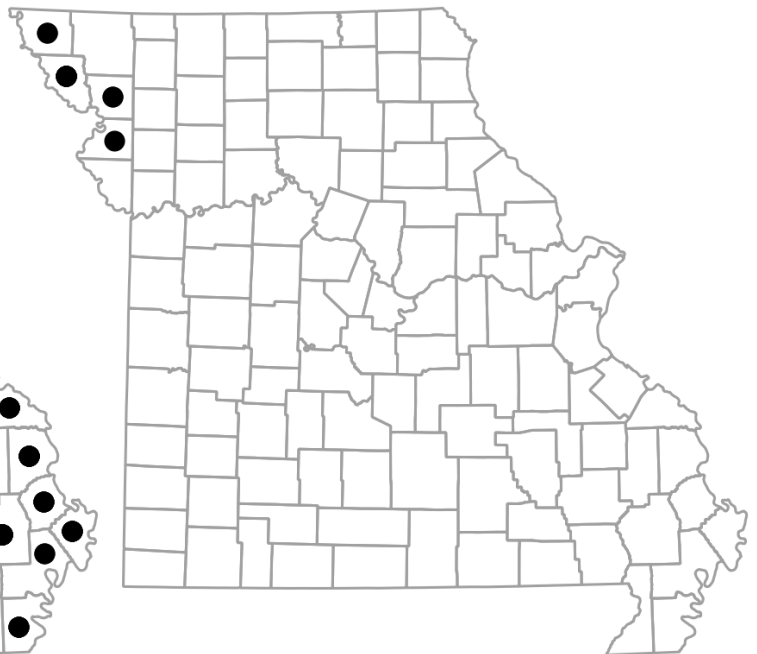
*Opheodrys vernalis*  
Smooth Greensnake



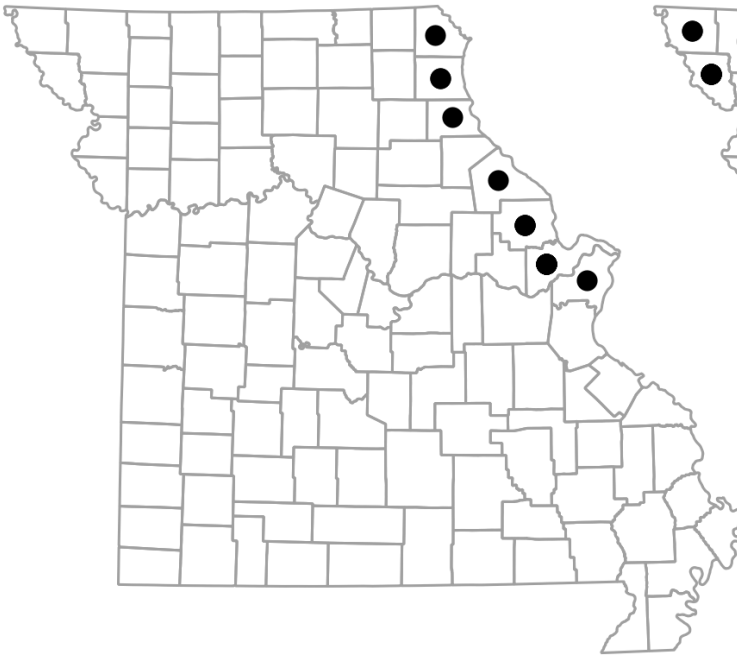
*Pantherophis emoryi*  
Great Plains Ratsnake



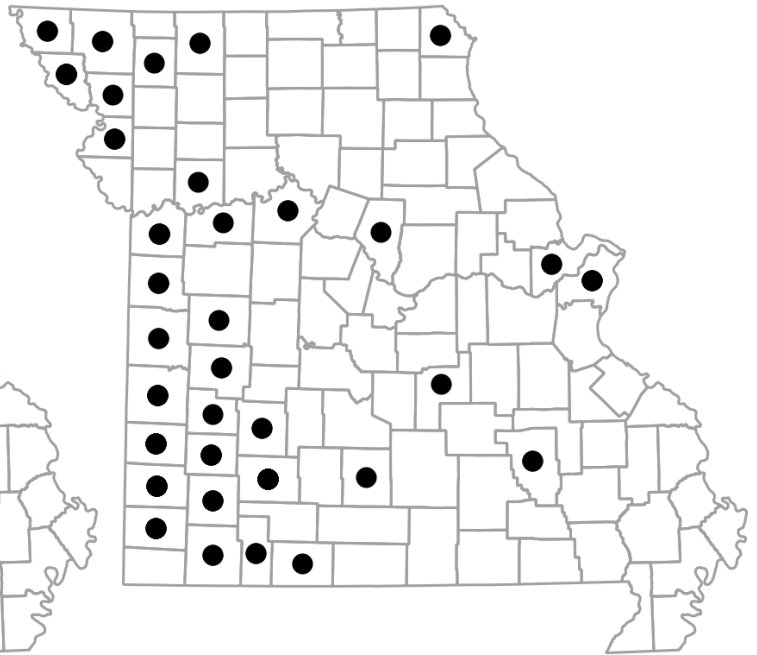
*Pantherophis obsoletus*  
Western Ratsnake



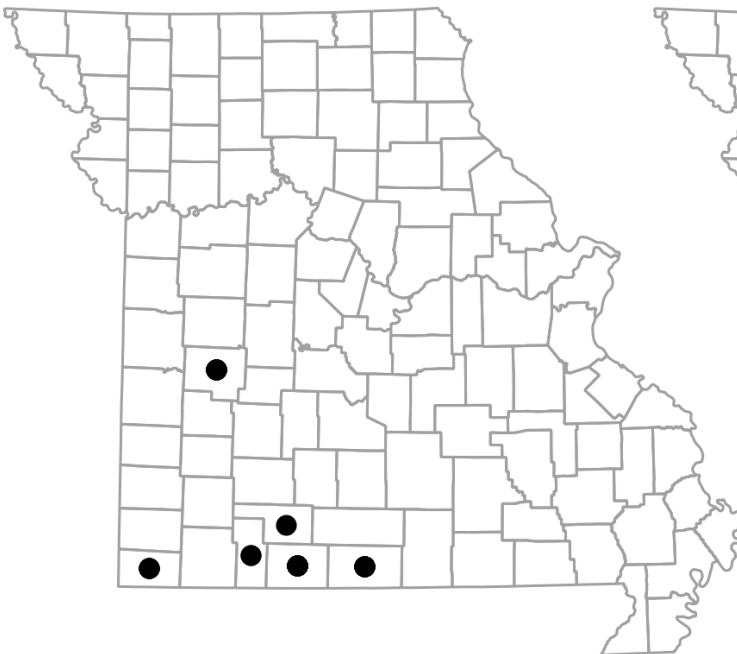
*Pantherophis ramspotti*  
Western Foxsnake



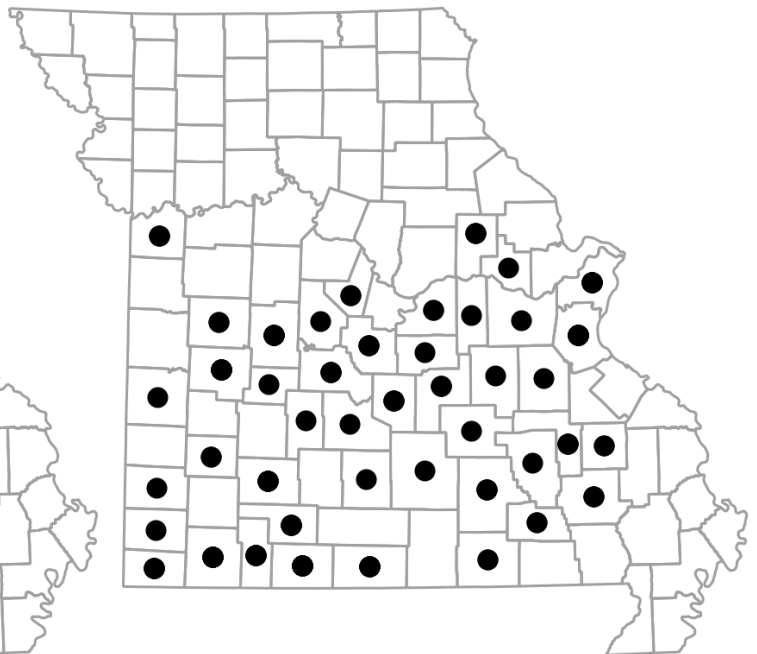
*Pantherophis vulpinus*  
Eastern Foxsnake



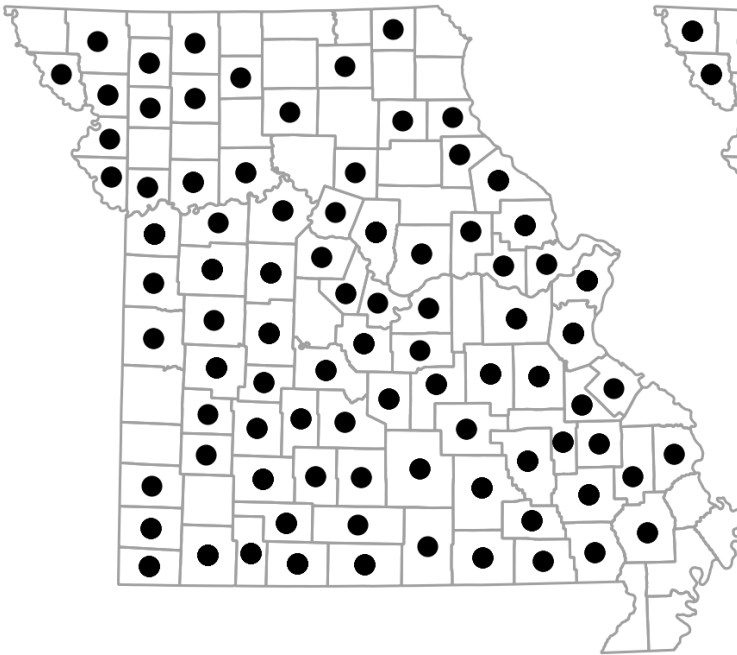
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Bullsnake



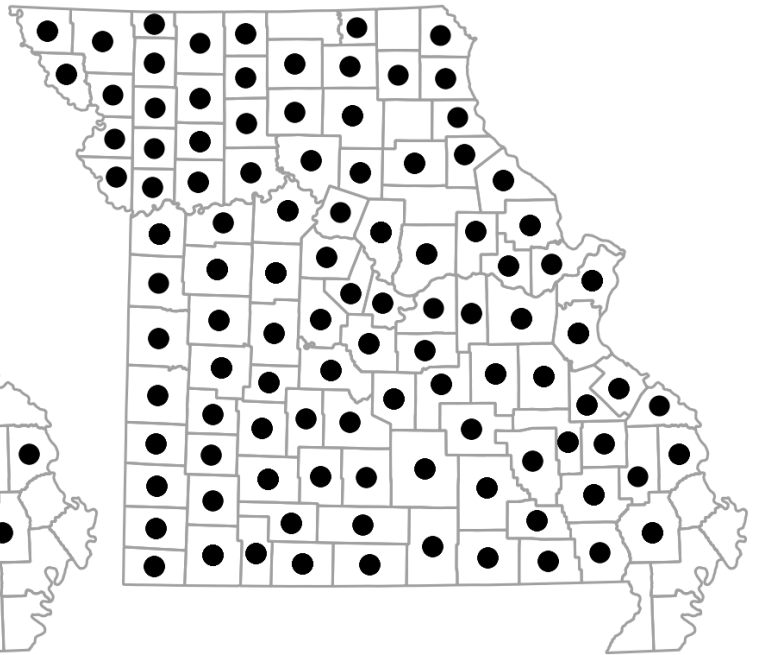
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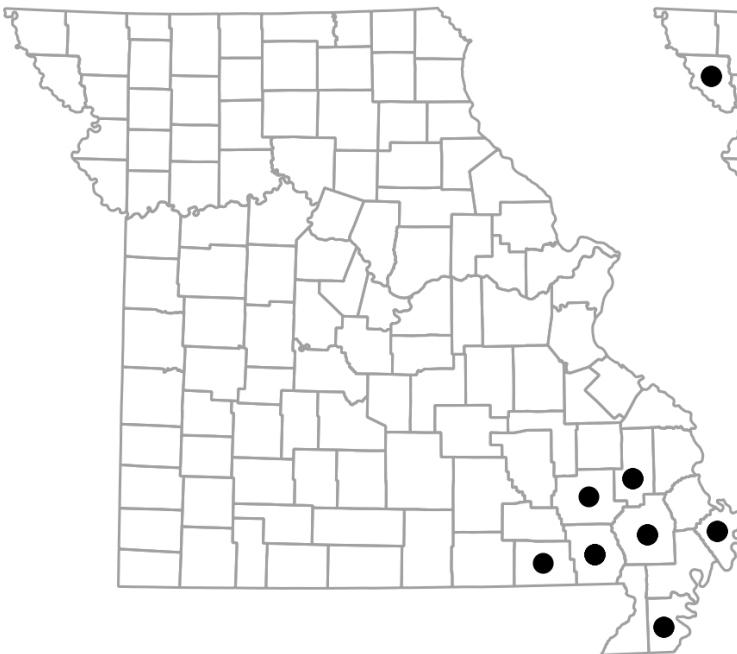
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Flat-headed Snake



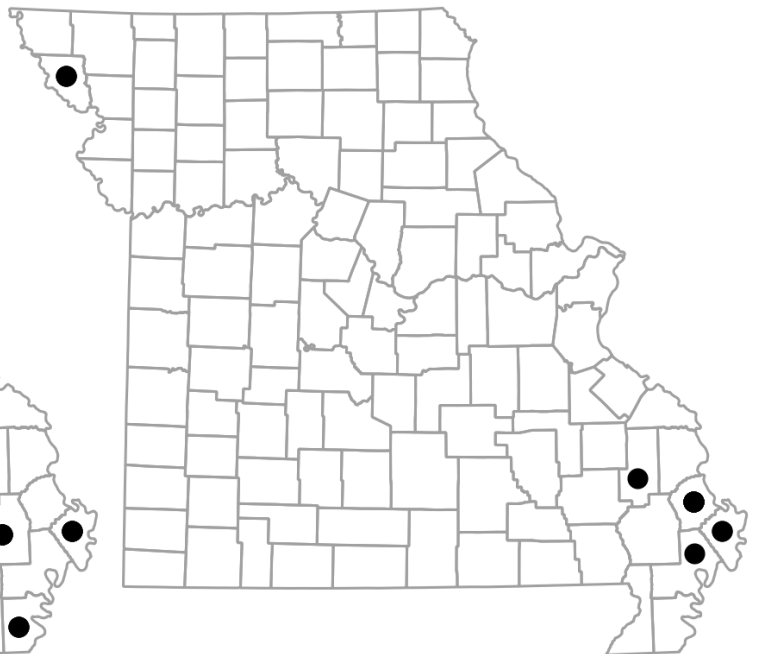
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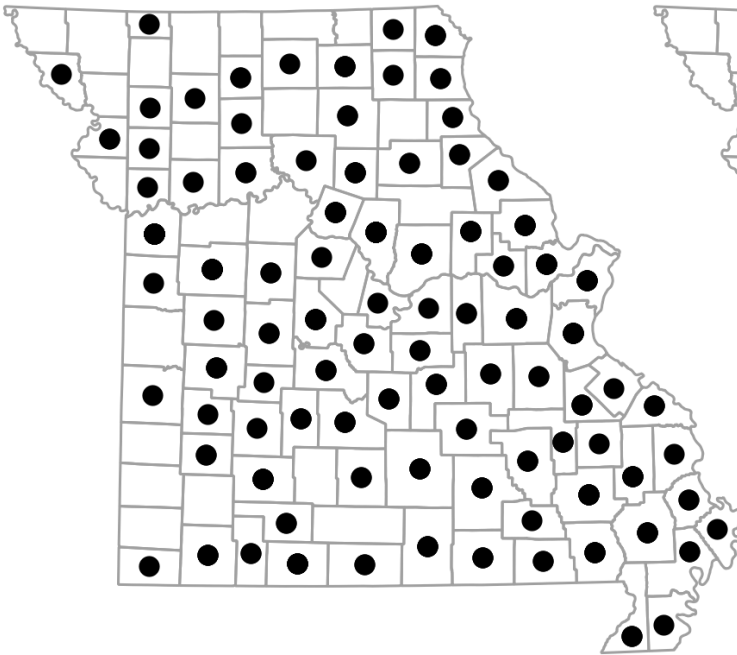
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Ring-necked Snake



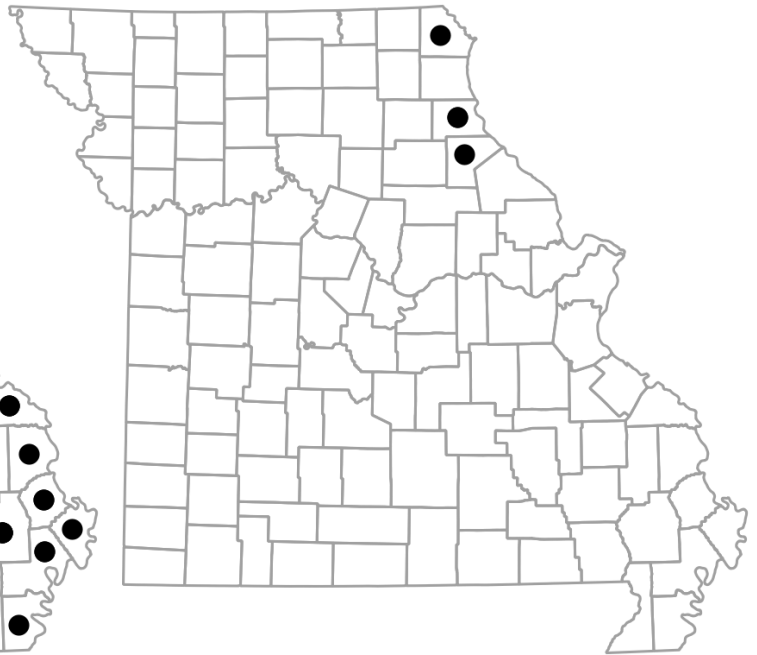
*Farancia abacura*  
Western Mudsnake



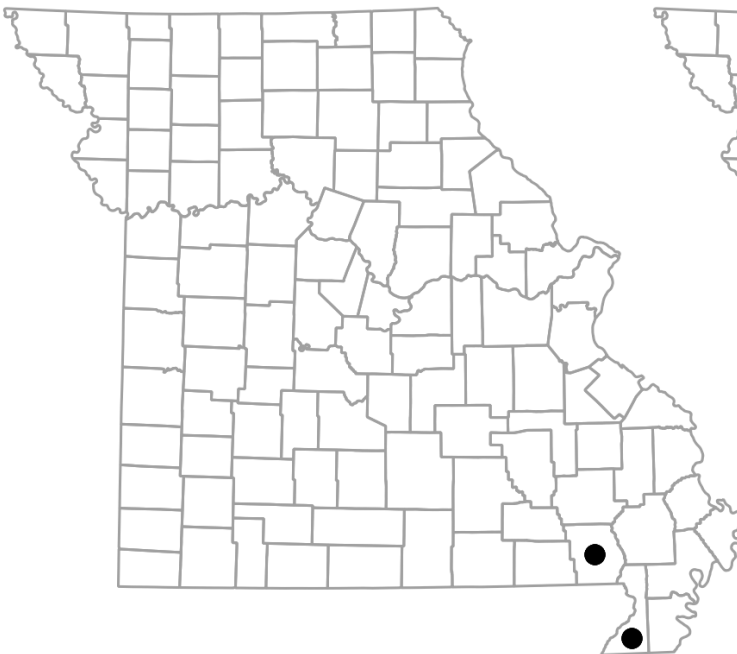
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Western Hog-nosed Snake



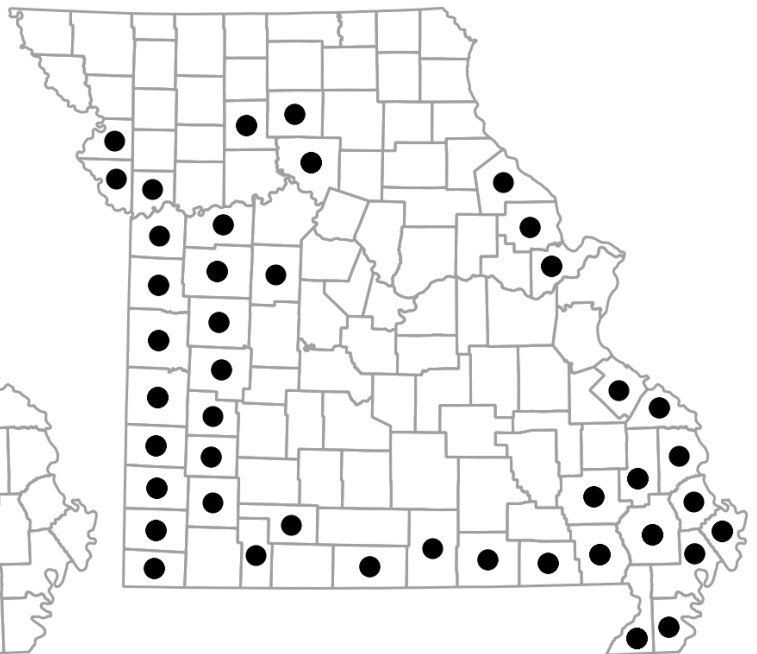
*Heterodon platirhinos*  
Eastern Hog-nosed Snake



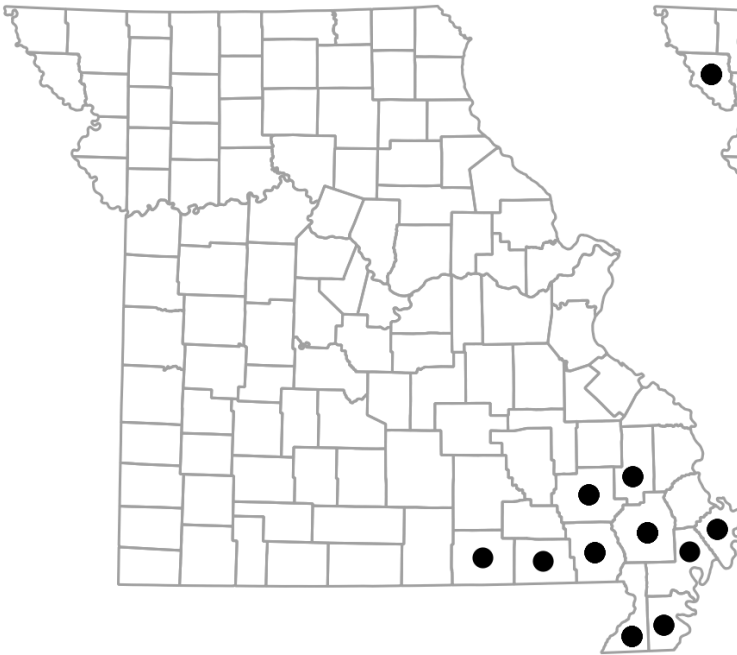
*Clonophis kirtlandii*  
Kirtland's Snake



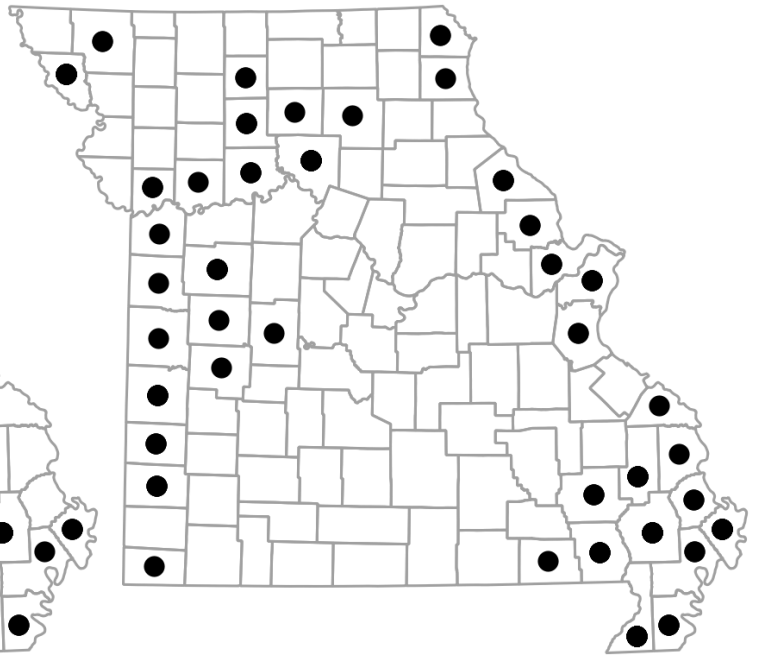
*Nerodia cyclopion*  
Mississippi Green Watersnake



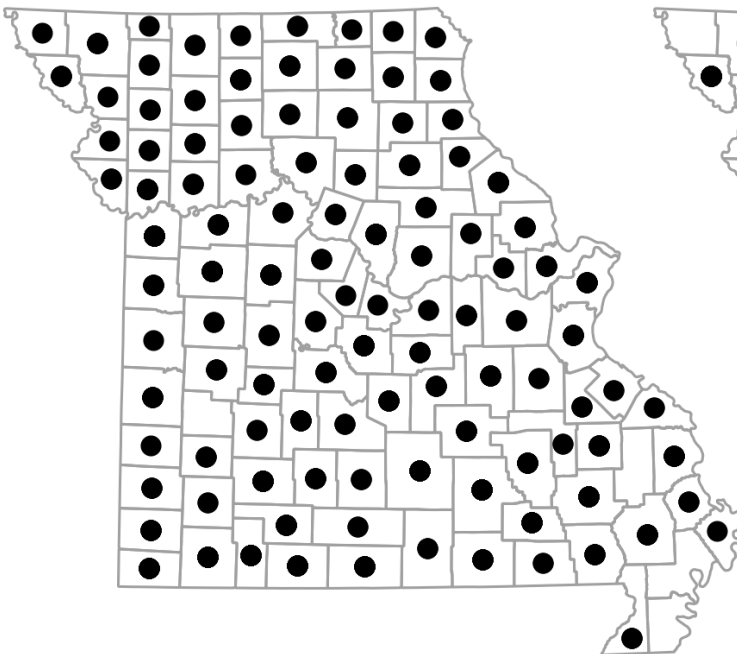
*Nerodia erythrogaster*  
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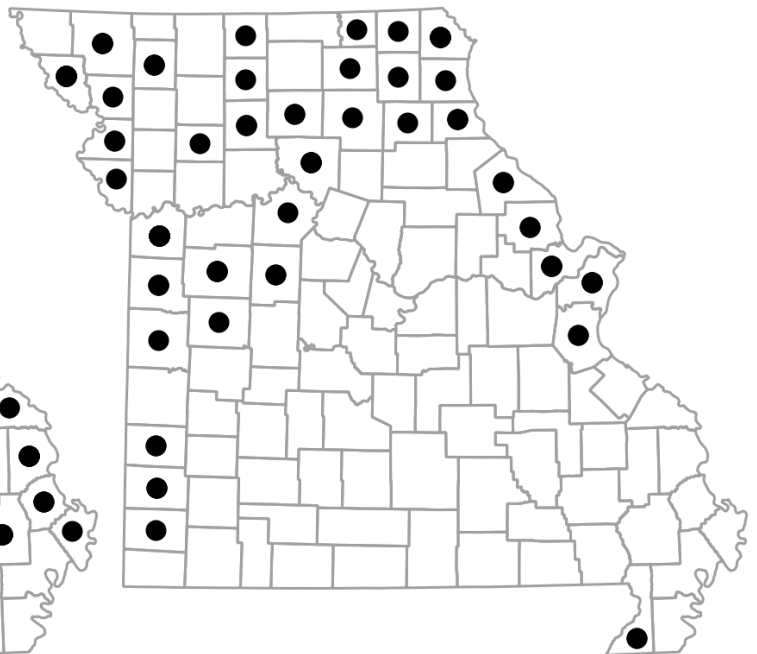
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Broad-banded Watersnake



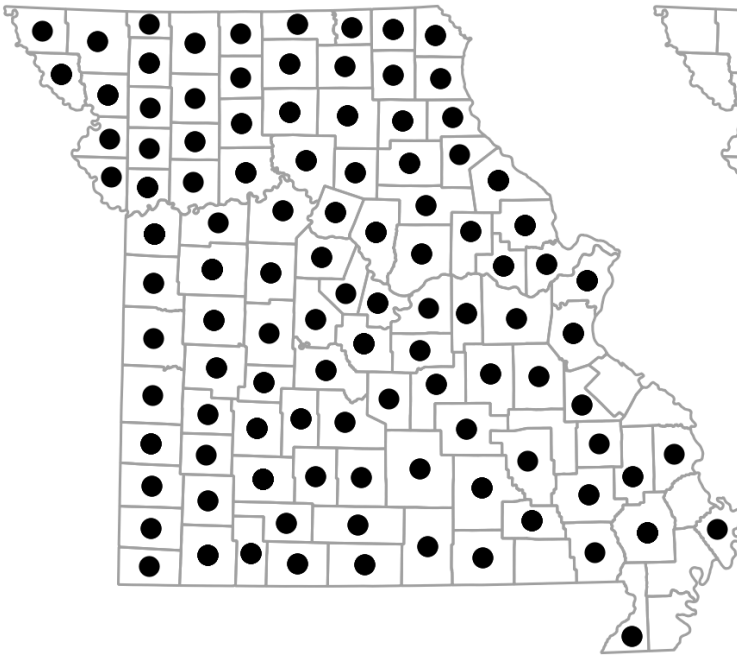
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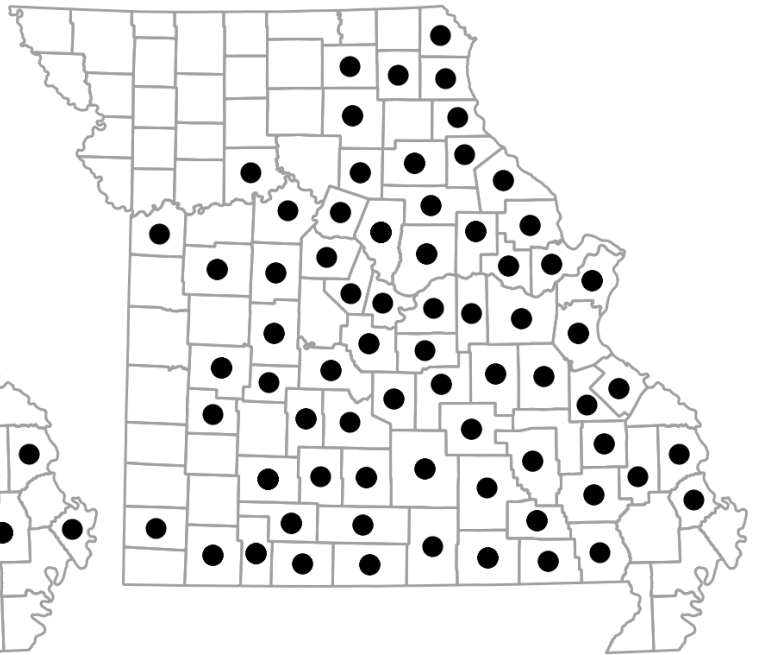
*Nerodia sipedon*  
Common Watersnake



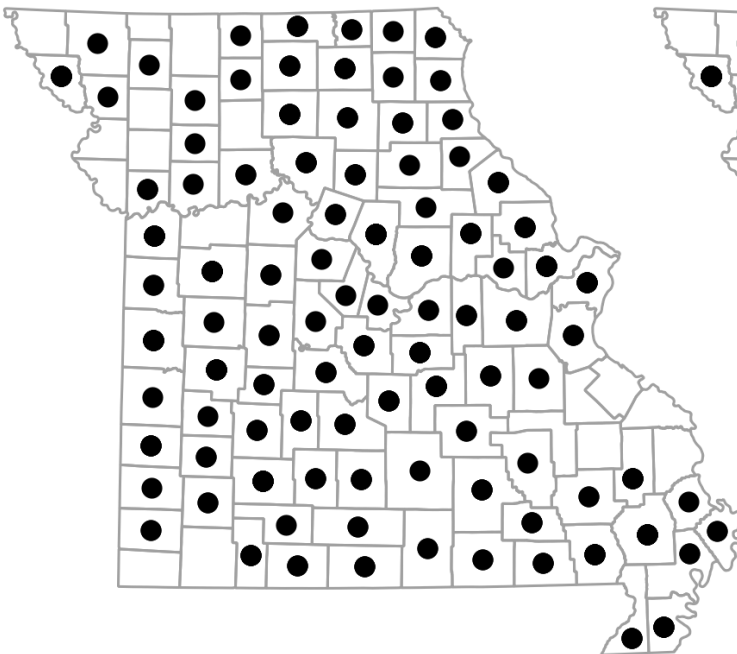
*Regina grahamii*  
Graham's Crawfish Snake



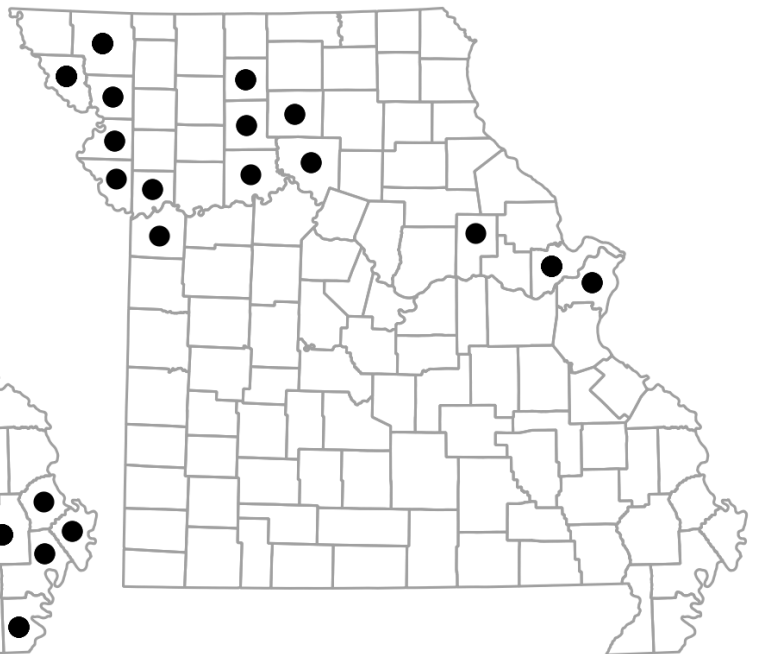
*Storeria dekayi*  
DeKay's Brownsnake



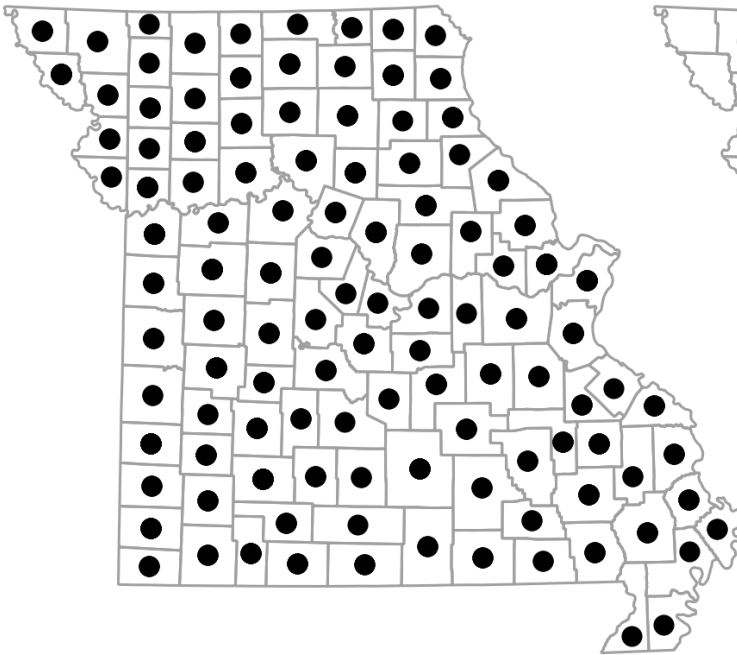
*Storeria occipitomaculata*  
Red-bellied Snake



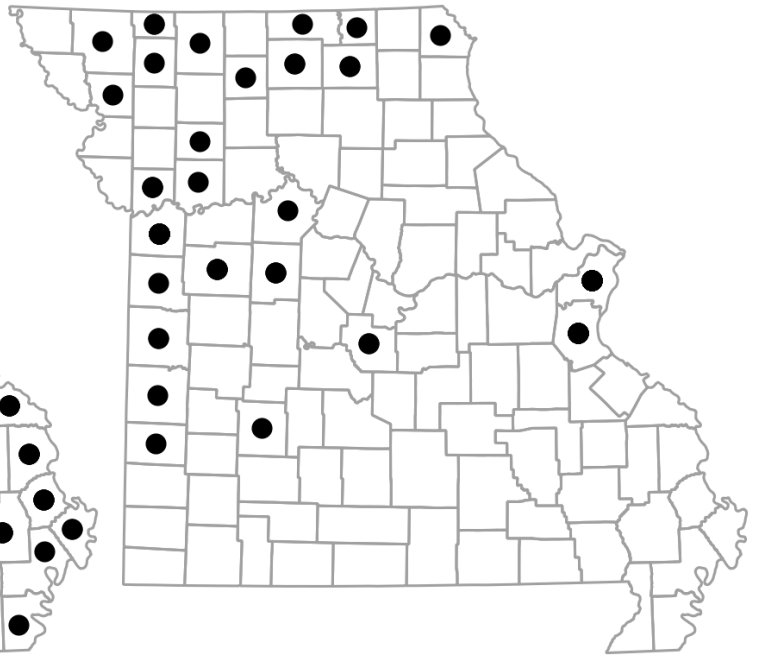
*Thamnophis proximus*  
Orange-striped Ribbonsnake



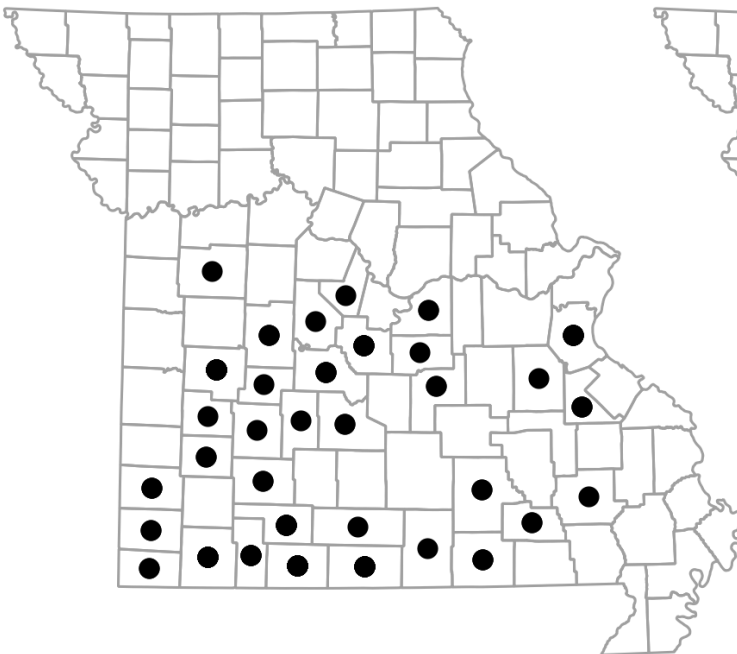
*Thamnophis radix*  
Plains Gartersnake



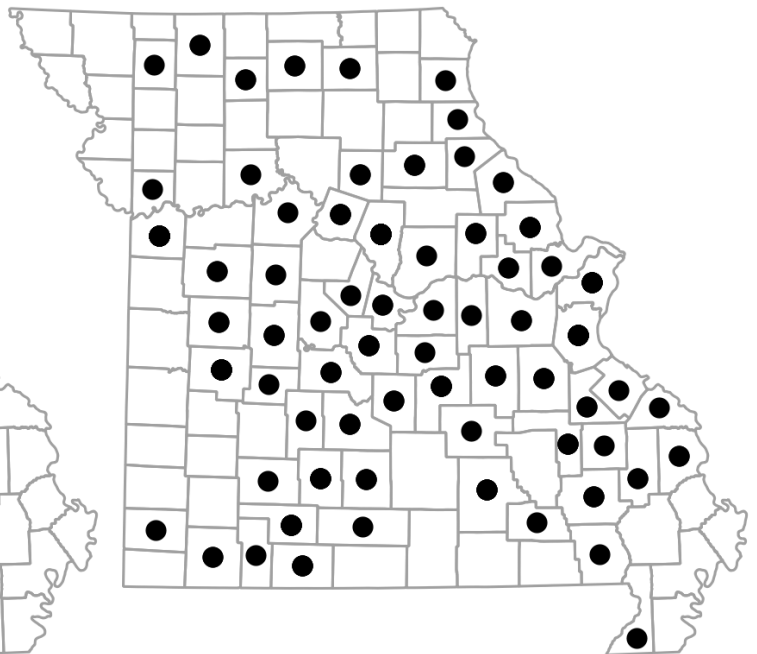
*Thamnophis sirtalis*  
Common Gartersnake



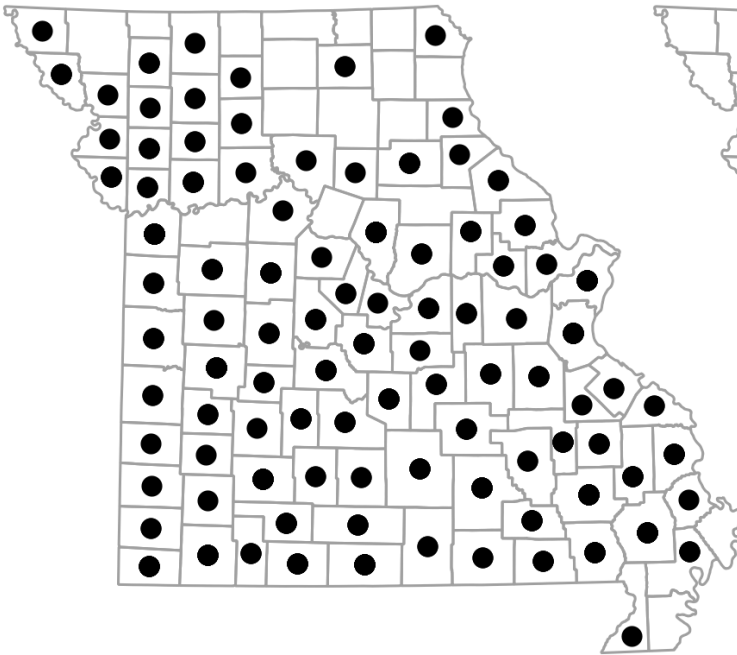
*Tropidoclonion lineatum*  
Lined Snake



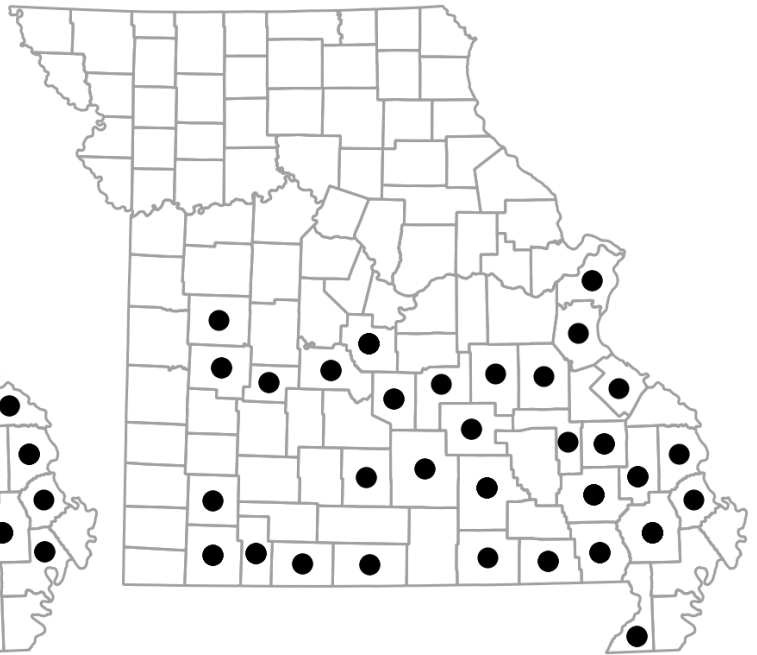
*Virginia striatula*  
Rough Earthsnake



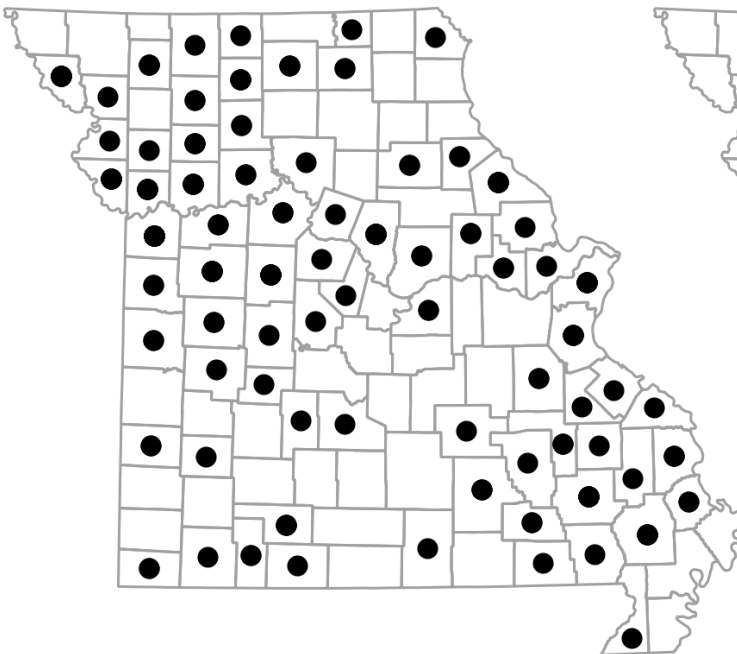
*Virginia valeriae*  
Western Smooth Earthsnake



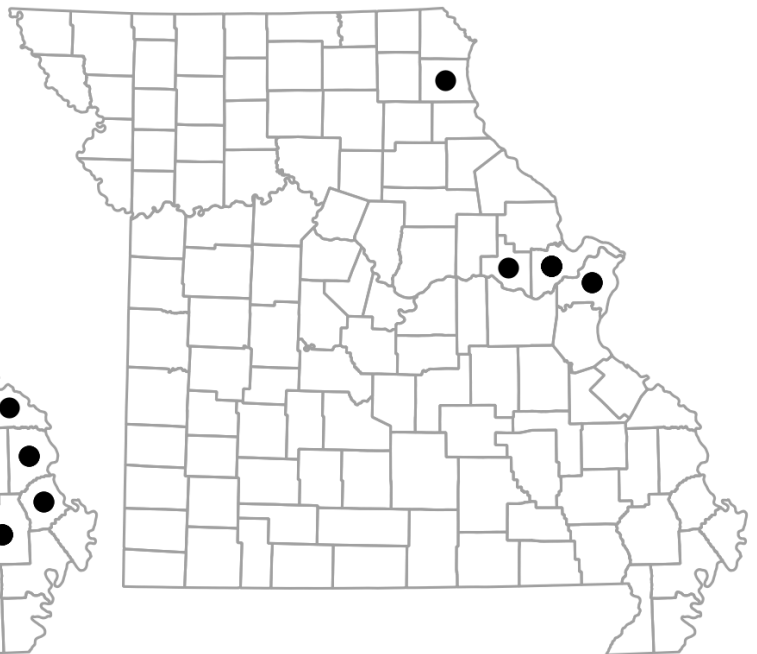
*Agkistrodon contortrix*  
Eastern Copperhead



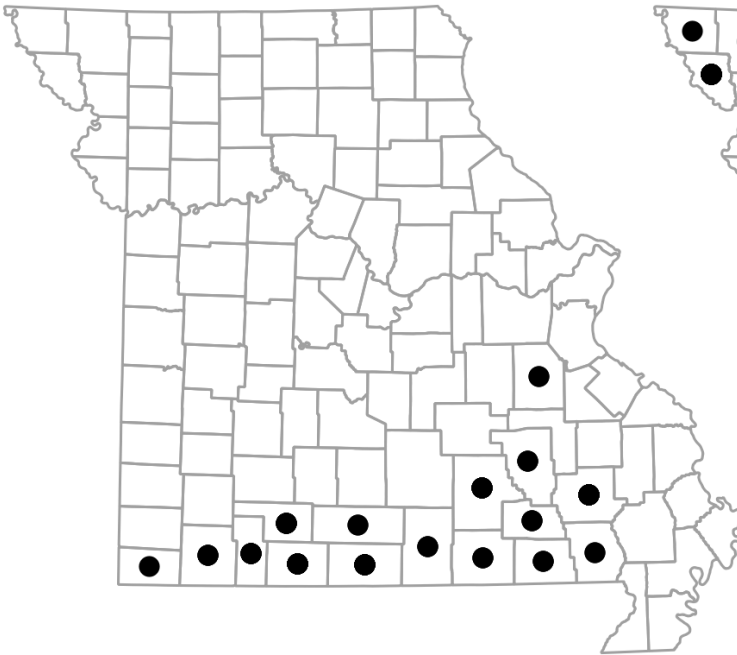
*Agkistrodon piscivorus*  
Northern Cottonmouth



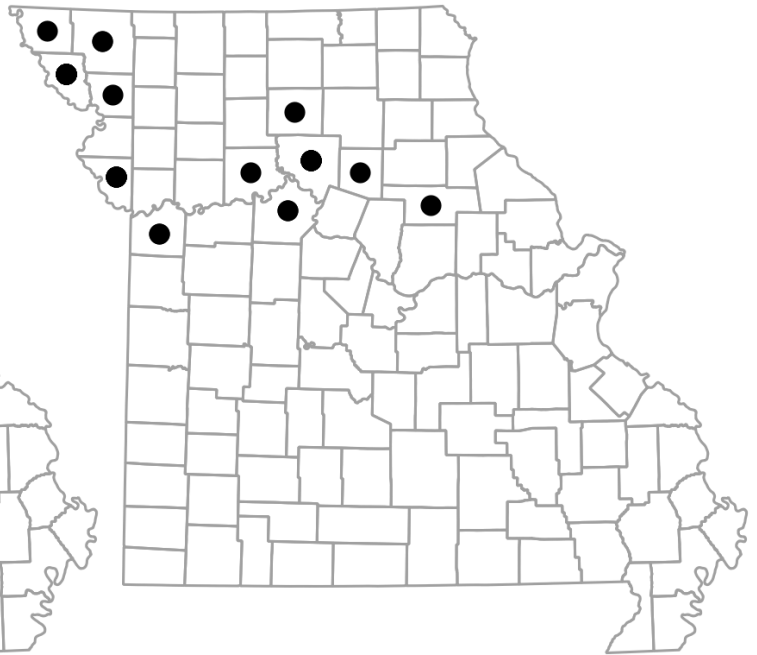
*Crotalus horridus*  
Timber Rattlesnake



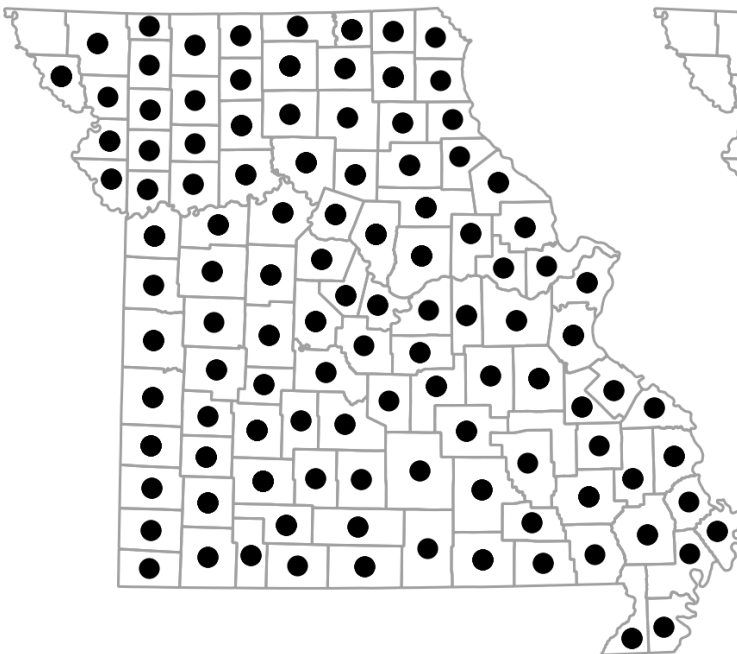
*Sistrurus catenatus*  
Eastern Massasauga



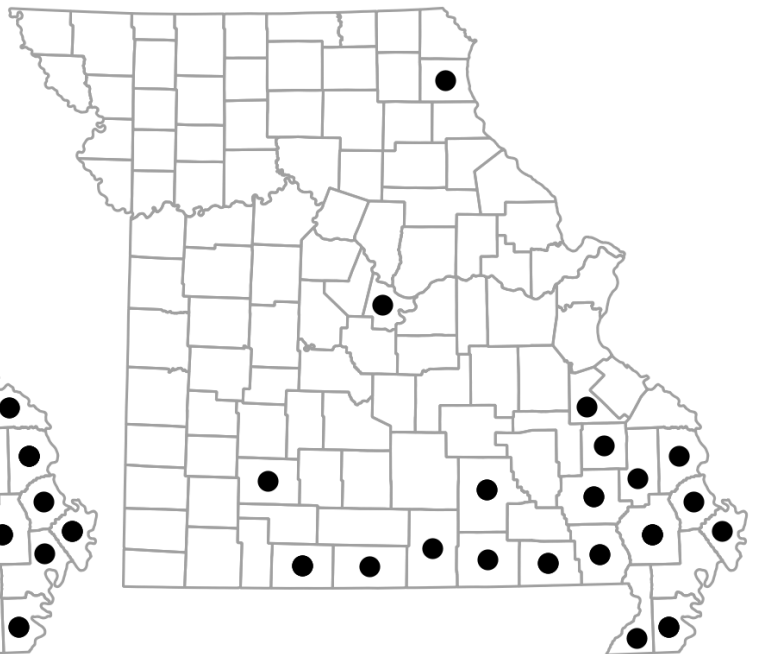
*Sistrurus miliarius*  
Western Pygmy Rattlesnake



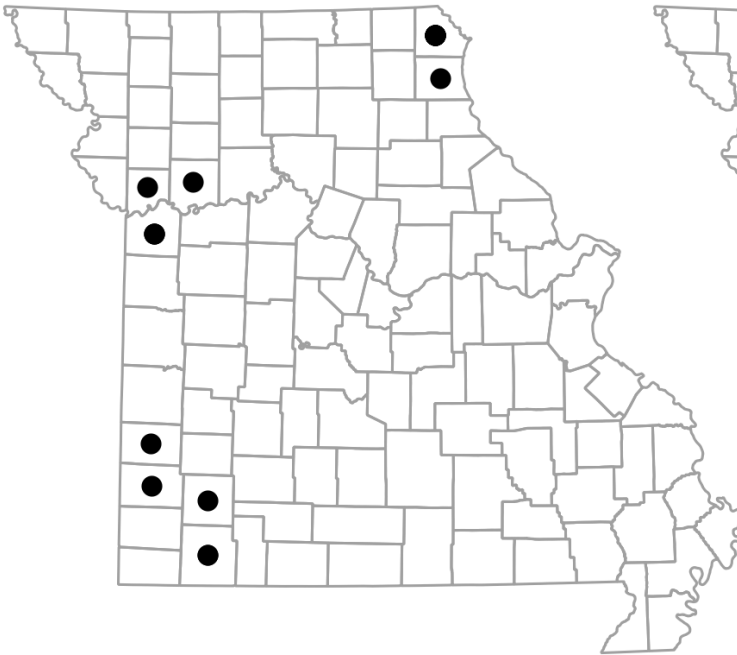
*Sistrurus tergeminus*  
Prairie Massasauga



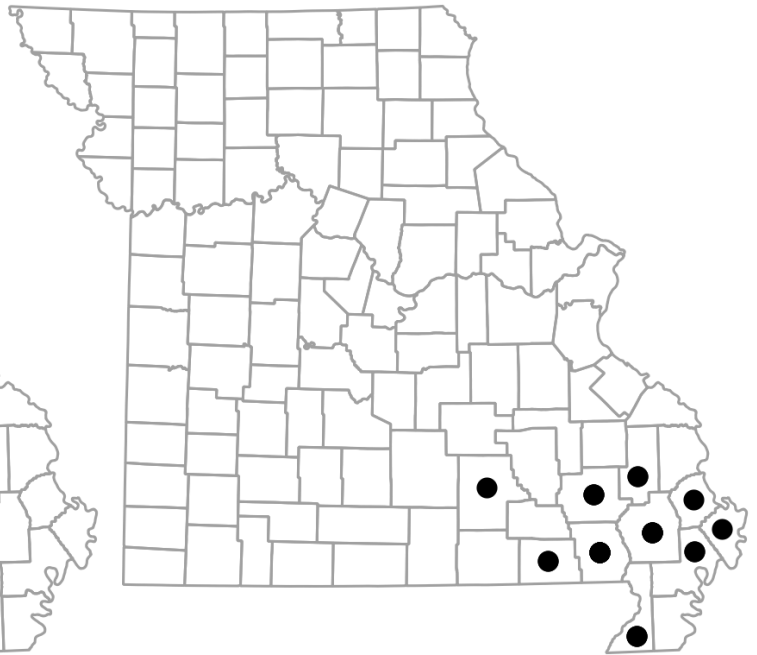
*Chelydra serpentina*  
North American Snapping Turtle



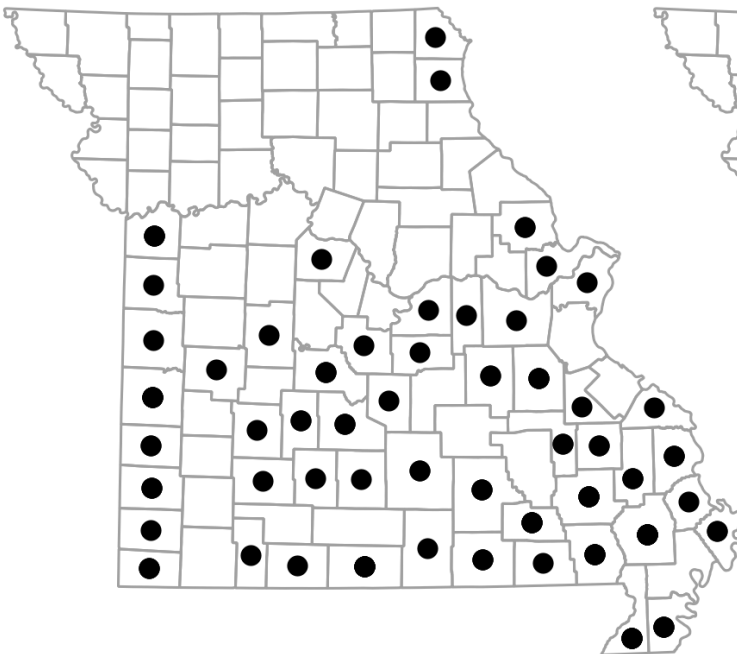
*Macrochelys temminckii*  
Western Alligator Snapping Turtle



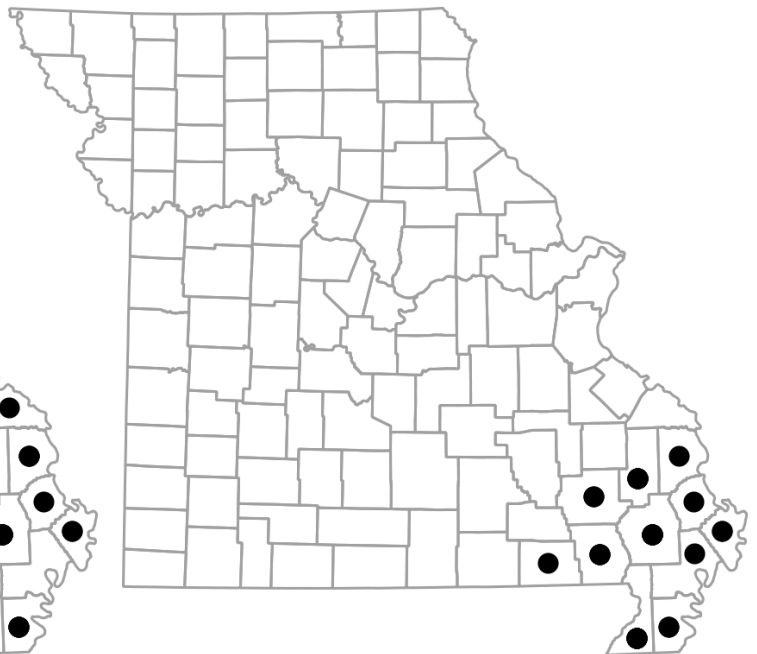
*Kinosternon flavescens*  
Yellow Mud Turtle



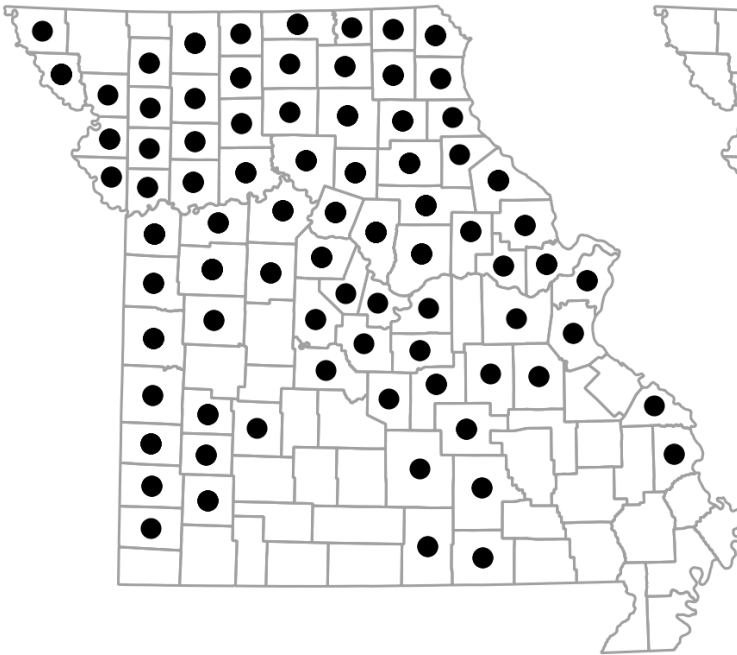
*Kinosternon subrubrum*  
Mississippi Mud Turtle



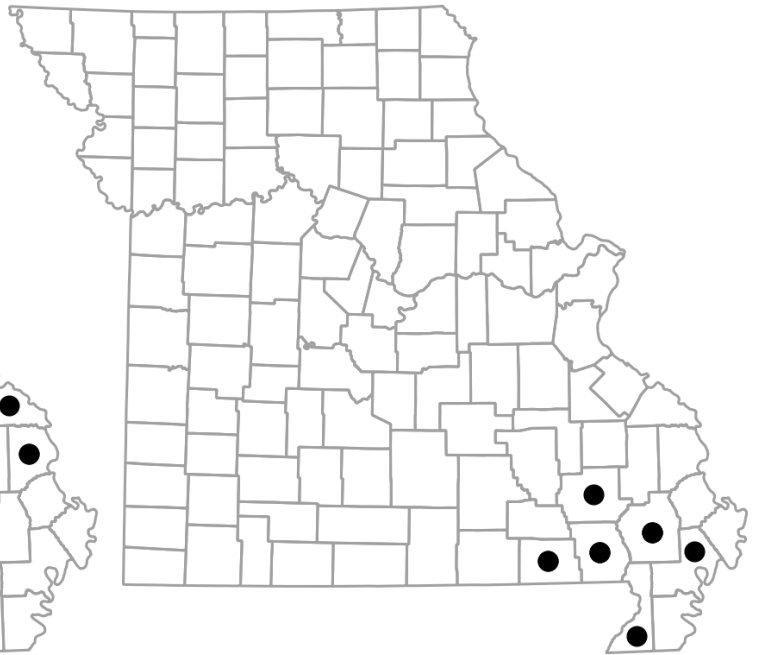
*Sternotherus odoratus*  
Eastern Musk Turtle



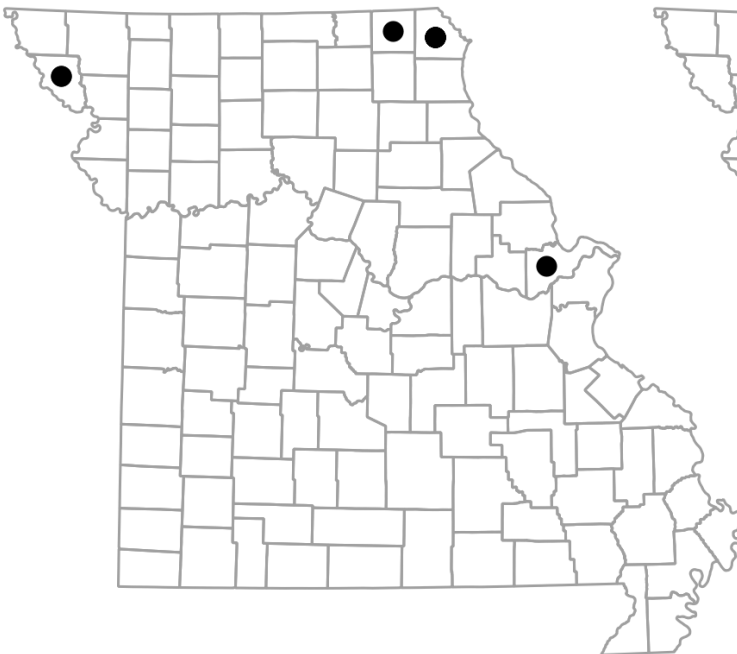
*Chrysemys dorsalis*  
Southern Painted Turtle



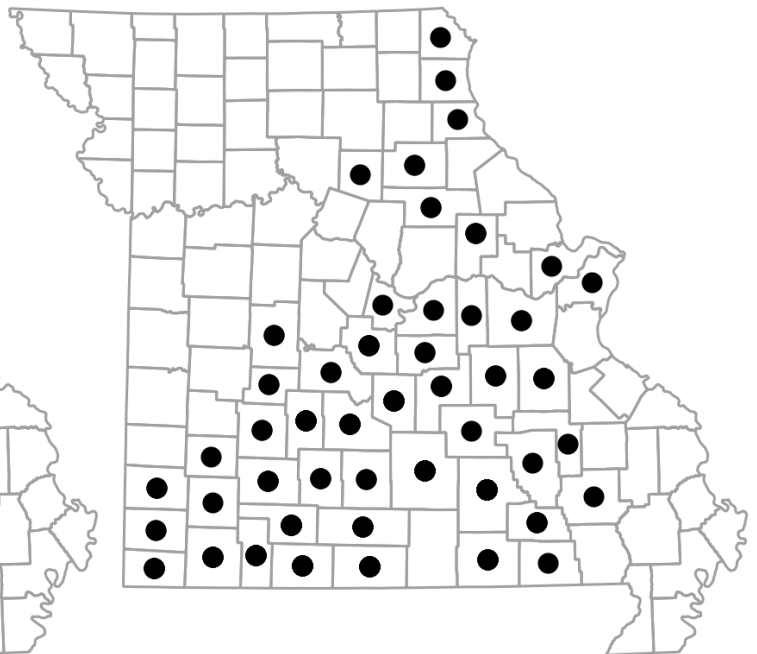
*Chrysemys picta*  
Western Painted Turtle



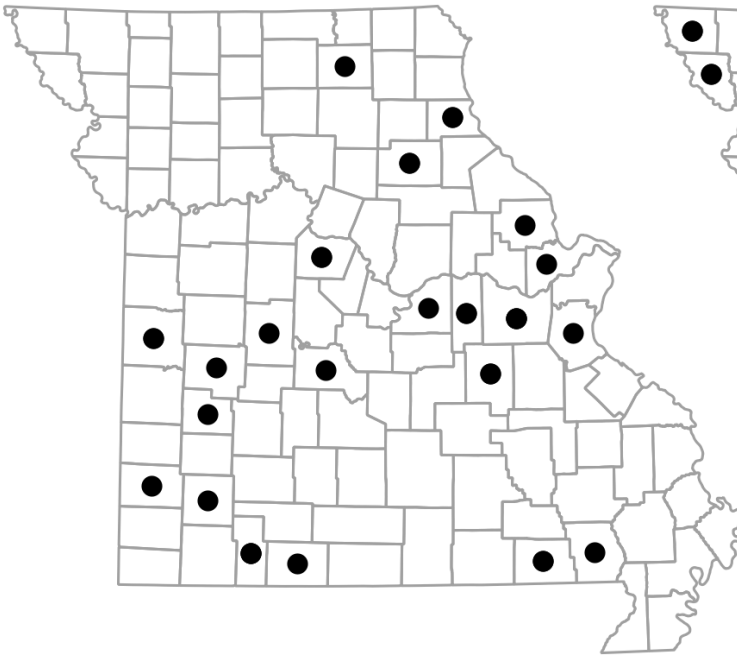
*Deirochelys reticularia*  
Western Chicken Turtle



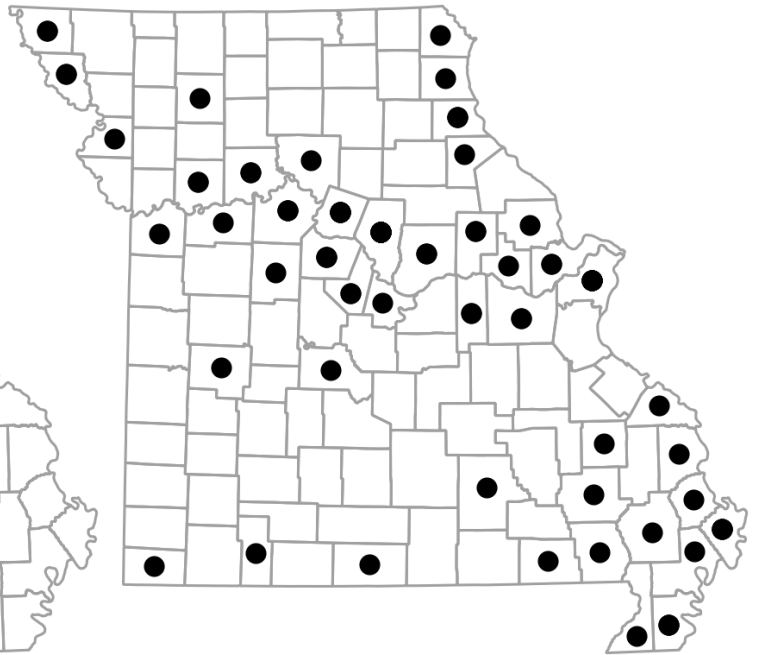
*Emydoidea blandingii*  
Blanding's Turtle



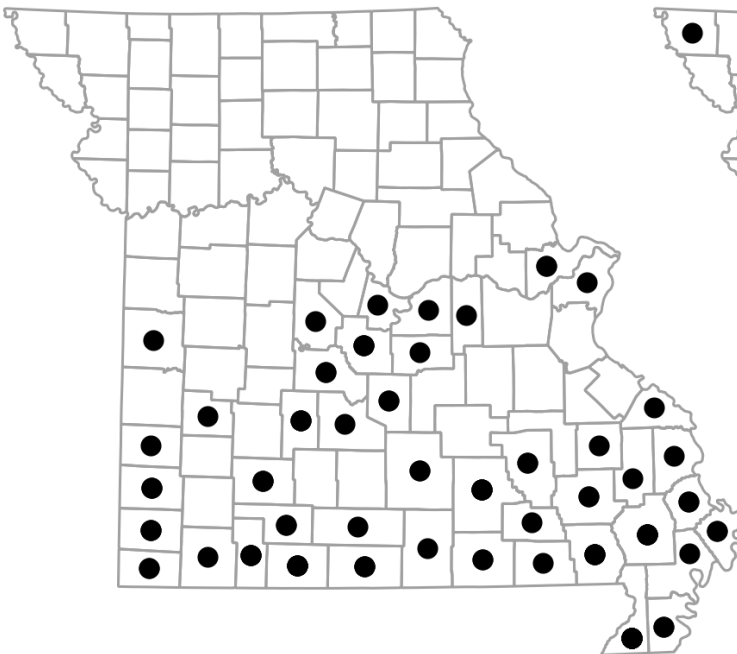
*Graptemys geographica*  
Northern Map Turtle



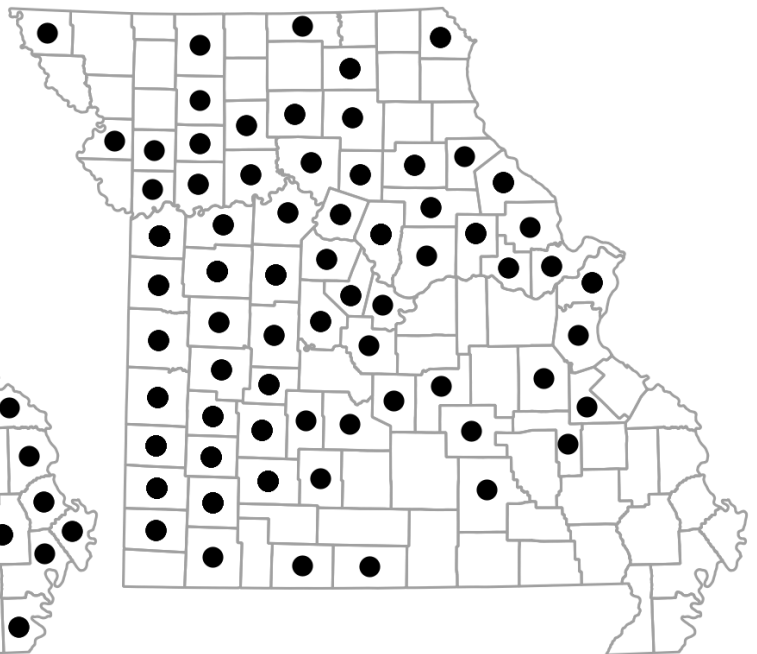
*Graptemys ouachitensis*  
Ouachita Map Turtle



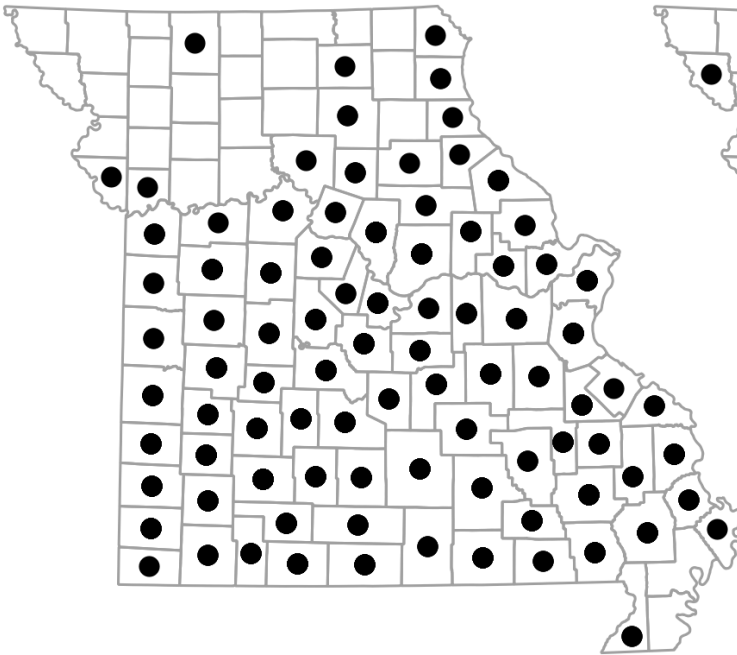
*Graptemys pseudogeographica*  
False Map Turtle



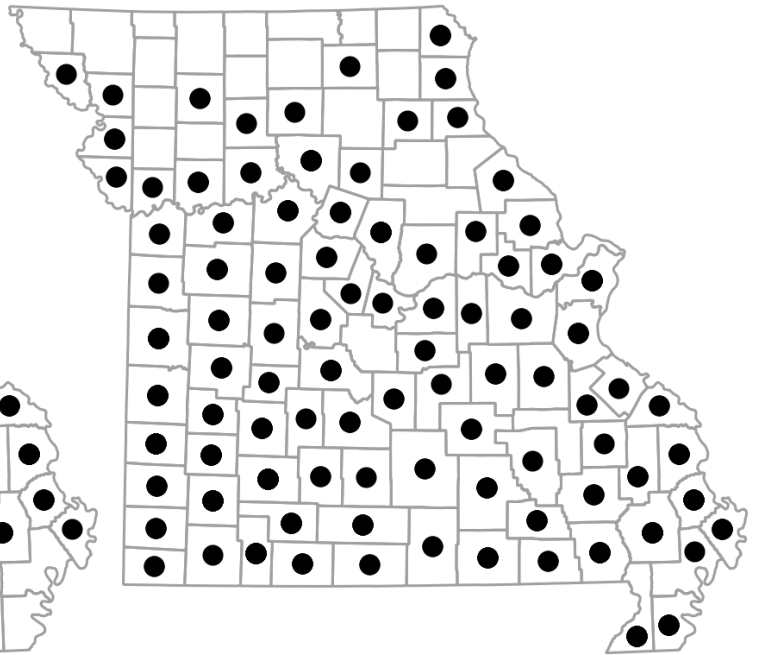
*Pseudemys concinna*  
Eastern River Cooter



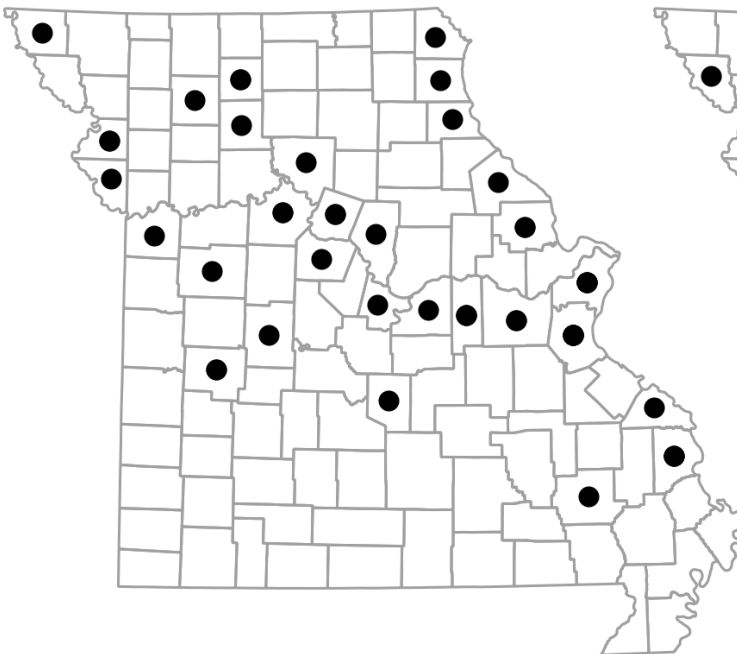
*Terrapene ornata*  
Ornate Box Turtle



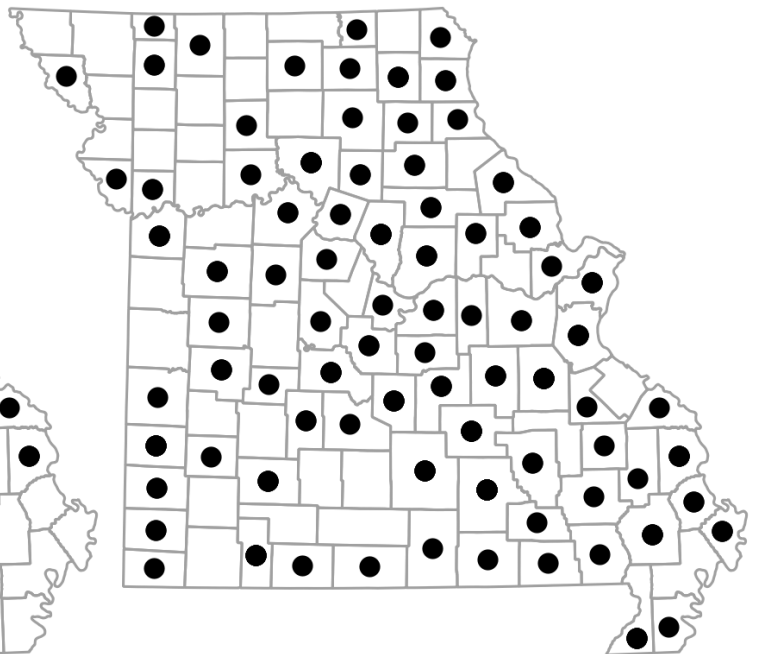
*Terrapene triunguis*  
Three-toed Box Turtle



*Trachemys scripta*  
Red-eared Slider



*Apalone mutica*  
Midland Smooth Softshell



*Apalone spinifera*  
Northern Spiny Softshell

## Acknowledgements

Data for the base county maps for the locality and county distributions, the labeled county map, and the ecological drainage units and aquatic subregions were generously provided by the Missouri Spatial Data Information Service (MSDIS 2009a, 2009b, 2009c). Data for the major rivers were provided by the United States Geological Survey (USGS 1994) and supplemented with data from the Missouri Department of Conservation (MDC 2007). Data for Missouri natural divisions and sections (based on Thom and Wilson (1980)) were generously provided by the Missouri Department of Conservation (MDC 2007). Data for watershed boundaries were provided by the Natural Resources Conservation Service (NRCS 2002). Data for ecoregions were provided by the US Environmental Protection Agency (EPA 2003). Base map data for surrounding states were provided by the National Atlas of the United States (National Atlas 2001).

All technology-related aspects of the Missouri Herpetological Atlas Project are supported by a suite of open source software that is both *gratis* (free as in beer) and *libre* (free as in speech). Kubuntu Linux is used as the operating system to host and execute all processes related to the project. Atlas, checklist, and GIS data are stored in a PostgreSQL database, which has been spatially enabled using PostGIS. Project documentation and database scripts are written with PHP and displayed using an Apache web server. QGIS is used to produce all base maps, distribution, county records, and other maps. The programming language Python is used to create GIS plug-ins for map exports. The open source Python library, ReportLab, is used to create the final *Atlas* publication in portable document format (PDF), an ISO standard.

Most importantly, a project of this magnitude cannot be accomplished without the contributions of many individuals. We would like to thank the following for specimen information, feedback, and technical assistance on the project:

Nathan Aaron, Jamie Alford, Scott Altnether, Tom Anderson, Richard Andrews, Jonathan Ashley, Ralph Axtell, D. Baker, Jason Baker, Stephanie Bartlett, Ben Barton, Neil Bass, Derek Bateman, Tom Beauvais, Bill Becker, Don Becker, Melissa Bedford, Ruth Ann Berry, Adam Beston, Beth Blaisdell, Tyler Blake, Josiah Boothe, Aaron Bossert, Michelle Bowe, Mark Bower, Jeff Bowman, Andrew Braun, Jeff Briggler, Chris Brooks, Christina Brown, Danny Brown, Sara Bruce, Josh Bruegge, Kevin Brunke, Carol Bryant, Steve Buback, Jenny Bunch, Frank Burbrink, Nick Burrell, John Cadle, Eldon Cain, T. Carpenter, Gary Casper, Robert Caviness, Ellen Censky, Candy Chambers, Doug Clark, Clint Coffey, Shayla Coffey, Skyler Collins, Matt Coombs, Wayne Corse, Danny Counts, Christopher Crabtree, Mike Cravens, Joe Criddlebaugh, Wyatt Criddlebaugh, Mary Crowell, R. Dames, Charles Dardin, Jeffrey Dawson, B. Day, Bob Dealey, Brandon DeCavele, Jacob Decker, C. Decoske, Michael Dickey, Angel DiMercurio, Drew Dittmer, Brandon Dix, Evan Dixon, Scott Doherty, Ryan Douglas, Joseph Douglass, D. Drake, Frank Drummond, Joe Duenwald,

Spencer Duffendack, Frank Durbian, Eric East, David Easterla, Amber Edwards, T. Enright, Rick Essner, Pete Eyheralde, Susan Farrington, E. Field, Amanda Fisher, Stephanie Foley, Z. Fratto, G. Frazier, Mark Frazier, Dillon Freiburger, Paul Frese, Darrell Frost, Bonnie Gardner, C. Gemming, Carl Gerhardt, Matt Gifford, Mark Gihring, Brian Gilbert, Bob Gillespie, T. Girard, Brad Glorioso, Steve Gotte, Millie Graham, Brian Greene, Greg Gremaud, Adam Guerich, Brad Hadley, Adam Hamlin, Al Harash Hassan, Tamera Harris, D. Harrison, Kevin Hedgpeth, AJ Hendershott, Robert Henderson, Mary Hennen, John Hess, Jerry Heuer, Joshua Hill, Dan Hocking, Colby Hodges, Dana Hoisington, Ethan Hollender, Terry Holtsclaw, E. Hooper, Emily Horner, Ann Horsman, Brian Hubbs, Jamie Hubert, James Hunt, Seth Ince, Adam Ivey, Thomas Jay, Matt Jeppson, Linda Jepson, Tom Jessen, Tom Johnson, Andrea Johnston, Joe Jones, Mike Jones, Kayl Kapral, John Karel, Tim Kavan, Kate Kelly, Steven Kent, Robert Kipfer, William Kirby, Arnold Kluge, Kent Korthas, Robert Krager, Jim Lamer, Alek Lantar, Mike Leahy, Joseph Lemen, Kevin Lewis, Stephanie Liebi, Day Ligon, Elicia Ligon, Hayleigh Locke, Kenton Lohraff, Alexandria London, Peter Lowther, Beth Lynch, Jennifer Maag, Glenn Manning, Nicholas March, Dexter Mardis, Kevin Martie, Gina Martin, Terrell Martin, Frank Martinez, Rebecca Maxfield, Christine Mayer, Amy McClure, Roy McDiarmid, Elizabeth McGhee, B. McKeage, Paul McKenzie, Don McKnight, Arianne Messerman, Dean Metter, C. Meyer, Brian Miller, Danielle Miller, J. Miller, N. Mitchell, Chad Montgomery, Nathan Montgomery, D. Moore, T. Moore, L. Moree, Denise Morgan-Irish, Nathanael Morris, K. Morrow, Sarah Moss, Nathan Muenks, Tom Nagel, Kevin Narum, L. Neuman-Lee, Chris Newbold, Abigail Nicholson, Krista Noel, Laurel Norton, Kerry Novak, Jim Oehmke, Tyler Olcott, Matt Ormsby, Erik Ost, Seth Otto, Cheryl Palmer, Peter Paplanus, John Par, Ben Parnell, Caleb Pemberton, Bill Peterman, M. Peterson, Katie Petrie, Tim Pettinelli, Chris Phillips, Nick Pieroni, Gregory Pinson, G. Pitchford, P. Pitts, Jon Pollock, Crystal Poole, Robert Powell, Tracey Prenger, Yarrow Price, B. Probst, Keith Pulles, Holly Quinn, Hugh Quinn, Corey Raimond, Alan Resetar, Joe Ridings, Daren Riedle, Rhonda Rimer, Tony Robyn, Bernard Ross, Douglas Rossman, Allen Rost, David Rostollan, Chad Runco, B. Russell, Lisa San Diego, Greg Schneider, Tim Schoppenhorst, E. Schott, Bruce Schuette, Jeremy Schumacher, C. Scott, K. Scott, John Severson, Alex Sharp, Chris Shelton, Chris Shulse, Dustin Siegel, Carri Silman, John Simmons, Rachel Simmons, Carl Smith, Geoff Smith, Isaac Smith, Madeline Smith, S. Smith, Steven Snow, Leon Spring, Marianne Stanley, Clarissa Starbuck, Andy Starostka, Shane Staten, Brandon Stehl, Jeff Stewart, Greg Stoner, James Studdard, Kelly Sulkowski, Mercedes Summers, Becky Swearingen, Travis Taggart, Aaron Taylor, Jeremiah Terrell, Wendell Tharp, Ryan Thies, M. Thompson, A. Thorn, Bart Tibbs, Mark Tovar, Sean Tracy, Stan Trauth, Angelina Trombley, T. Trombone, Linda Trueb, Joe Twardowski, Chad Wallis, Sammy Wentz, J. West, Steve Westin, Amber Wiewel, Brian Willey, Bethany Williams, Linda Williams, Myki Williamson, Matt Wishard, Rod Wittenberg, Nathan Woodland, Nathan

Woolery, Reese Worthington, Patricia Yates, Nico Yoch, Elizabeth Yohe

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## Appendix A: Collection Sources

American Museum of Natural History  
Anderson, P. 1965. *The Reptiles of Missouri*. University of Missouri Press, Columbia, Missouri. xxiii + 330p.  
Arkansas State University  
Austin Peay State University \*  
Bobby Witcher Memorial Collection, Avila College (KU)  
Carnegie Museum of Natural History  
Chicago Academy of Sciences  
Cornell University Museum of Vertebrates  
Culver-Stockton College  
Dallas Museum of Natural History \*  
Field Museum of Natural History  
H. Carl Gerhardt Audio Recording Collection (Cornell)  
Hurter, J. 1911. Herpetology of Missouri. *Transactions of the Saint Louis Academy of Science* 20(5): 59-274.  
Illinois Natural History Survey  
Milwaukee Public Museum  
Missouri Department of Conservation \*  
Missouri State University  
Museum of Comparative Zoology, Harvard University  
Museum of Natural Science, Louisiana State University  
Museum of Southwest Biology (New Mexico) \*  
National Museum of Natural History  
Natural History Museum of Los Angeles County \*  
Pittsburg State University  
Saint Louis Academy of Sciences  
Southeast Missouri State University  
Southern Illinois University--Carbondale  
Southern Illinois University--Edwardsville  
Sternberg Museum of Natural History, Fort Hays State University  
Texas Natural History Collection \*  
University of Arkansas--Fayetteville  
University of California--Berkeley Museum of Vertebrate Zoology  
University of Central Missouri  
University of Florida at Gainesville \*  
University of Georgia, Museum of Natural History  
University of Illinois Natural History Museum  
University of Kansas, Museum of Natural History  
University of Michigan, Museum of Zoology  
University of Missouri--Columbia Dean E. Metter Memorial Herpetology Collection  
William Jewell College

\* Collection sources marked with an asterisk (\*) are included from published accounts only and are presumed to represent only a portion of that collection's Missouri material.

## Appendix B: Literature Sources

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