



Herpetofauna Communities on Mined Lands in Southeast Kansas

Emma M. Buckardt, Christine C. Rega-Brodsky, & Andrew D. George
Department of Biology, Pittsburg State University, Pittsburg, KS 66762



Introduction

Due to destruction and degradation of habitat, amphibian and reptile populations have undergone global declines. Herpetofauna span both terrestrial and aquatic ecosystems, making them a model organism to understand human-altered landscapes, including those with a history of surface mining. Coal mining industries can drastically alter the landscape, and the protection and restoration of these mined lands can help to conserve their biota. Surveying the herpetofauna communities and their associated habitat on mined lands can help inform future habitat management to support and conserve herpetofauna in human-altered ecosystems.

Objectives:

- Implement upland habitat surveys and monitoring. Generate spatial habitat models for herpetofauna target species, incorporating species' presence, vegetation composition, and structure;
- Strip-pit wetland surveys and monitoring. Determine habitat associations of target species within mined land aquatic habitats, specifically anurans, and central newts;
- Provide recommendations for habitat improvements in mined land habitat.

Methods

Upland Monitoring

Drift fence arrays were created and run at each of the 6 site during 2018-2020. One site (MLWA 4) was only surveyed during 2018 due to flooding during other years. The sites were selected based on habitat and mining history on the land. Each array consisted of four pitfall traps and 3 double sided funnel traps along slit fencing (Fig 1). Traps were checked daily from May-August, with some years starting earlier in the spring or extending later into the fall.

At each site, five 1.2m x .9m coverboards were placed randomly along the habitat edges near the drift fence arrays. They were checked no more than twice a week to reduce disturbance.

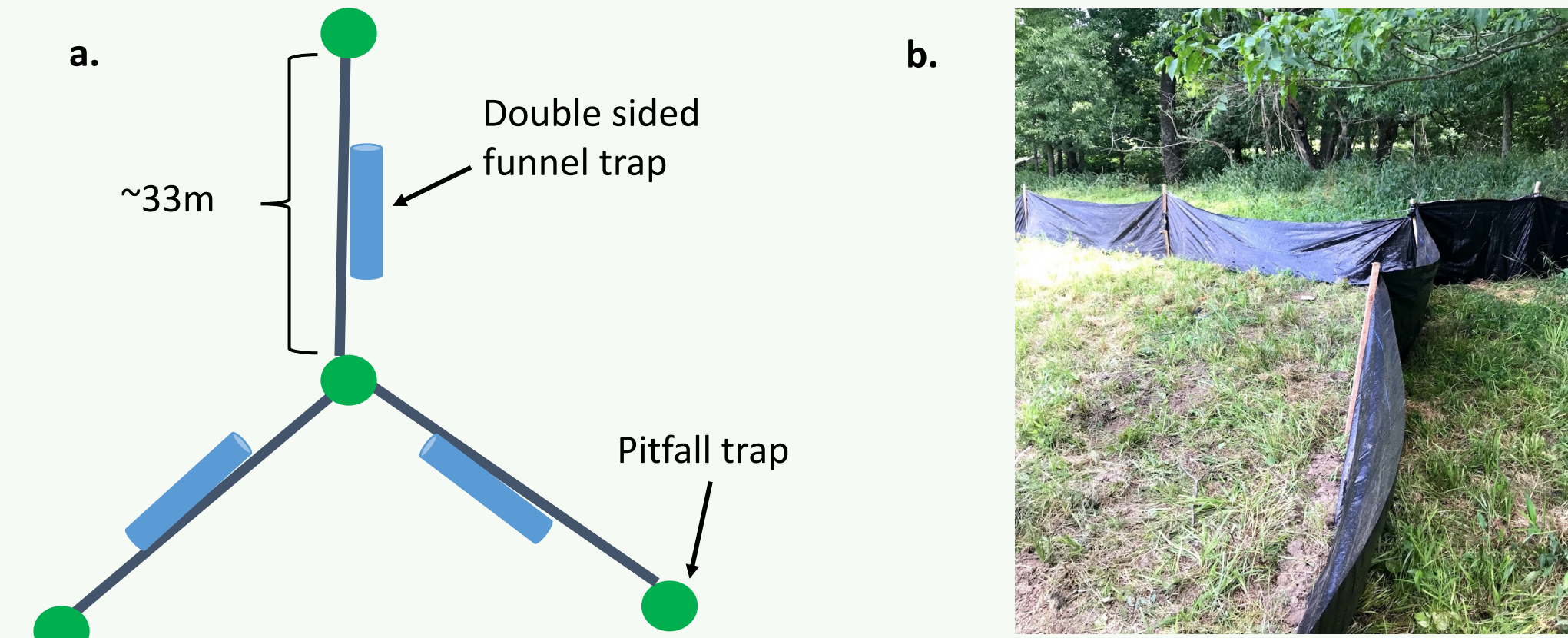


Figure 1. a) Drift fence array schematic and b) image of set up drift fence.

Anuran Call Surveys

Five-minute auditory call surveys were conducted throughout the region at 23 different wetlands between June 1 and June 6, 2020 (Fig. 2). After a 1-minute acclimation period, the surveyor listened for anuran calls coming from a specific wetland and recorded the strength of the chorus (Crouch and Paton, 2002).

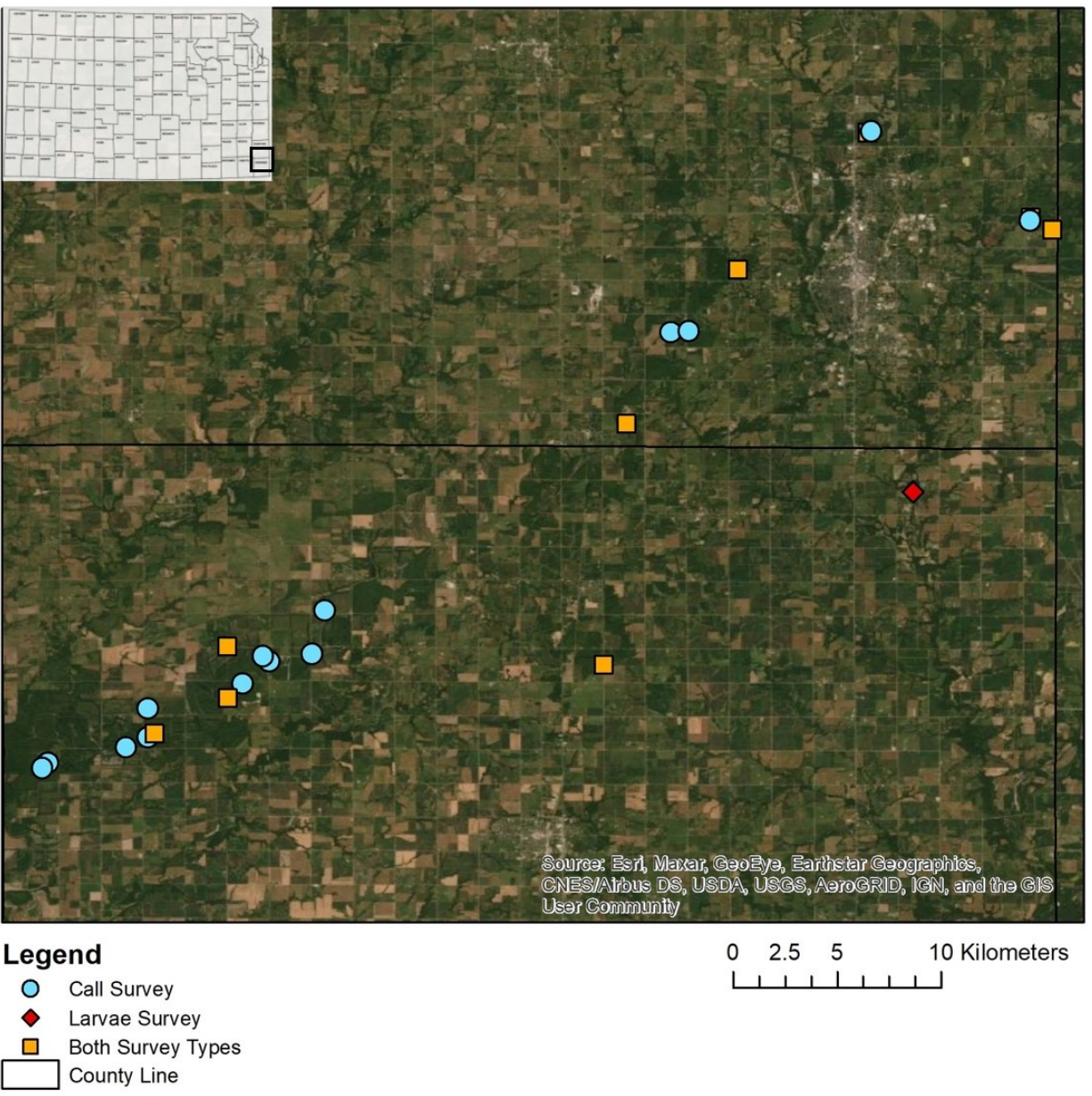


Figure 2. Regional map of herpetofauna sampling locations in southeast Kansas. Sites are indicated by their surveys conducted on site.

Wetland Communities

We conducted larvae surveys at 10 wetlands (Fig 2). Each site was surveyed two consecutive days using 4 dipnets locations and 4 minnow traps around the perimeter of each wetland. All species were identified and counted and then returned to the wetland. Standard habitat measurements were collected including basic water quality and wetland plant composition.

Results

- The most abundant species captured in the arrays from 2018-2020 were anurans (Fig. 3)
- MLWA 14 had the highest diversity and had the greatest number of turtle species found (Fig. 3)
- Broadhead Skink (*Plestiodon laticeps*) was the only species in need of conservation (SINC) captured in 2020 (Table 1)
- Ten herpetofauna species were found during the wetland surveys (Table 1)
- Blanchard's Cricket Frog (*Acris blanchardi*) was found at the greatest number of wetland sites (92%; Table 1)

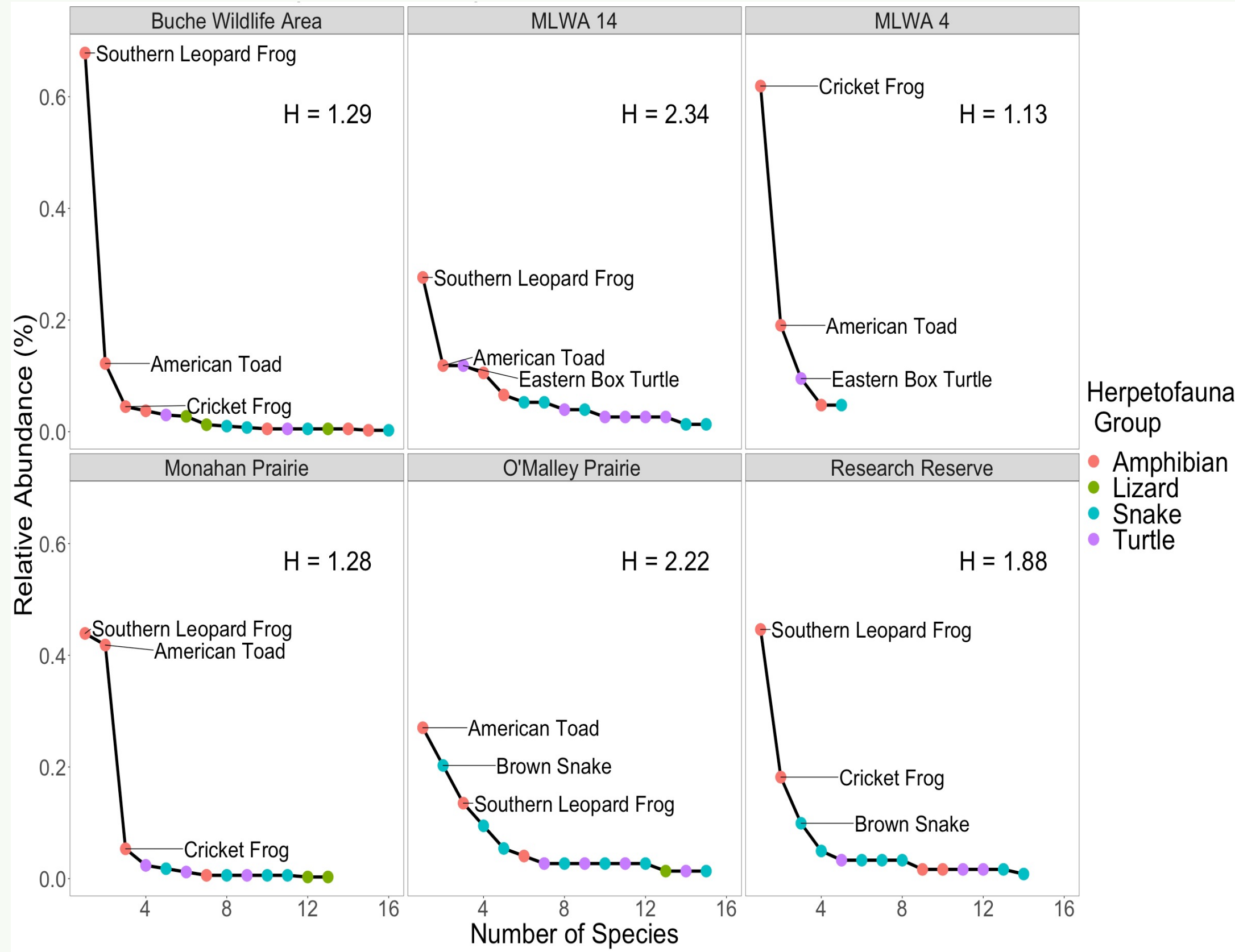


Figure 3. Rank-abundance curve and Shannon-Wiener Diversity Index (H) of the herpetofauna observed at each study site from 2018-2020.

Table 1. Percent of sites with herpetofauna species captured at wetland surveys and drift fence arrays in 2020. Species in need of conservation are bolded.

Common name	Latin name	% Wetland sites (n=24)	% Drift Fence sites (n=5)
American Toad	<i>Anaxyrus americanus</i>	4	60
Blanchard's Cricket Frog	<i>Acris blanchardi</i>	92	40
Treefrog Complex	<i>Hyla chrysoscelis/versicolor</i>	54	20
Boreal Chorus Frog	<i>Pseudacris maculata</i>	0	40
American Bullfrog	<i>Lithobates catesbeianus</i>	67	40
Southern Leopard Frog	<i>Lithobates sphenoccephalus</i>	67	100
Common Five-lined Skink	<i>Plestiodon fasciatus</i>	0	20
Broad-headed Skink	<i>Plestiodon laticeps</i>	0	20
North American Racer	<i>Coluber constrictor</i>	0	20
Prairie Kingsnake	<i>Lampropeltis calligaster</i>	0	20
Great Plains Ratsnake	<i>Pantherophis emoryi</i>	0	20
Western Ratsnake	<i>Pantherophis obsoletus</i>	0	40
Plain-bellied Watersnake	<i>Nerodia erthrogaster</i>	29	20
Diamond-backed Watersnake	<i>Nerodia rhombifer</i>	12	0
Dekay's Brownsnake	<i>Storeria dekayi</i>	0	20
Western Ribbonsnake	<i>Thamnophis proximus</i>	0	20
Common Gartersnake	<i>Thamnophis sirtalis</i>	0	40
Eastern Box Turtle	<i>Terrapene carolina</i>	12	20
Ornate Box Turtle	<i>Terrapene ornate</i>	0	20
Pond Slider	<i>Trachemys scripta</i>	16	0
Eastern Musk Turtle	<i>Sternotherus odoratus</i>	4	0

Conclusions

- Habitat characteristics like vegetation composition or landscape composition may influence differences in species composition among wetland and upland habitats on mined lands.
- To further investigate habitat associations these methods will be used in the upcoming seasons
 - Anuran call surveys will be expanded to 65 sites that will be surveyed during 3 different survey windows.
 - Wetland community surveys will be expanded to 30 sites.

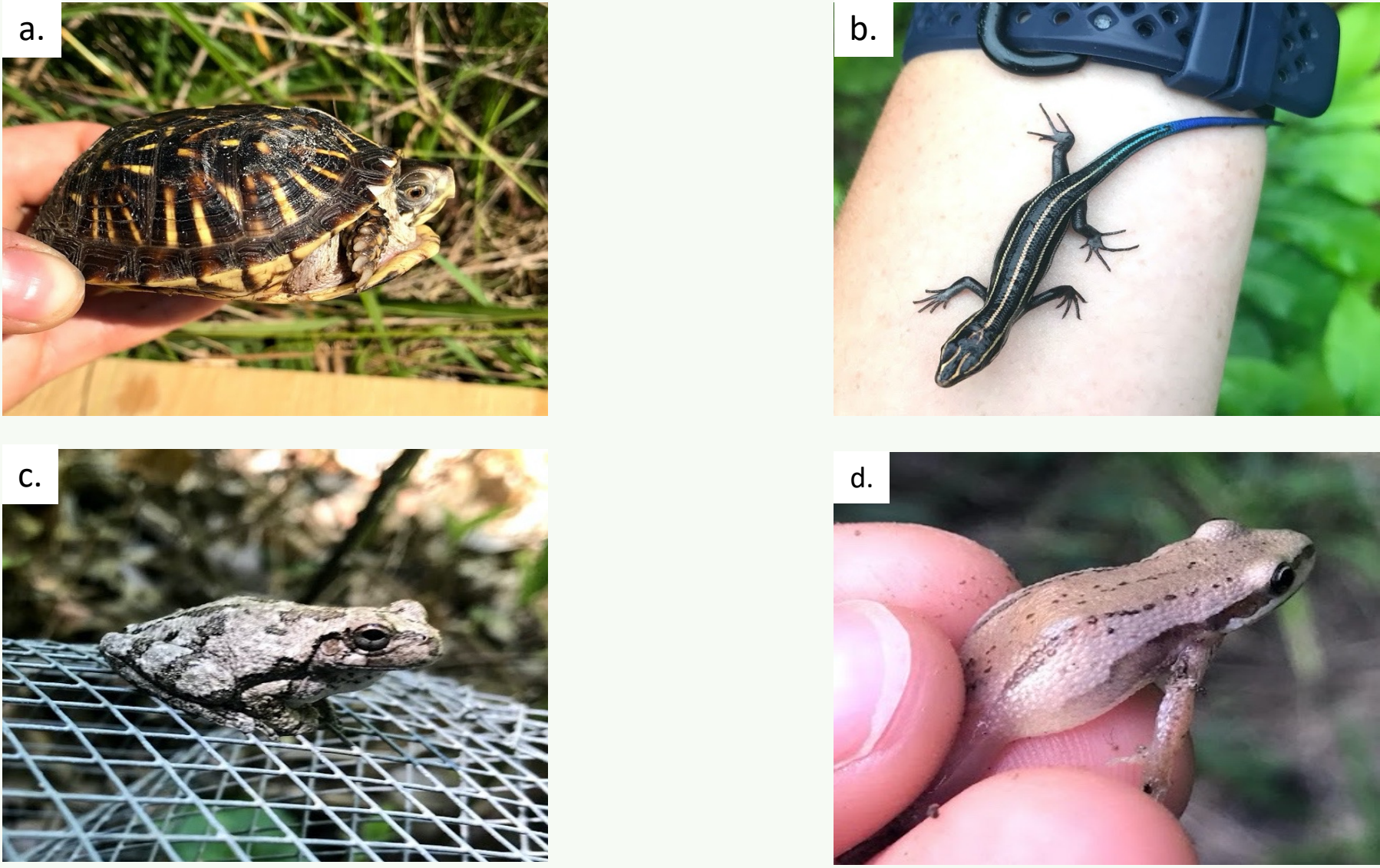


Figure 4. Some of the species found in the drift fence array a) Ornate Box Turtle, b) Broadhead Skink juvenile, c) Gray Treefrog Complex, and d) Boreal Chorus Frog.

Acknowledgements & References

Thank you to the KDWPT, State Wildlife Grants Program, and the Chickadee Checkoff Program for providing funding for this research. Also, thank you to Luke Headings, Ashlyn Henderson, Ryan McGinty, Kyle Findley, Rachel Styers, and Jake Wright who helped collect data during the last 3 years.

Crouch, W. B., & Paton, P. W. C. (2002). Assessing the Use of Call Surveys to Monitor Breeding Anurans in Rhode Island. *Journal of Herpetology*, 36(2), 185–192.
Kansas Department of Wildlife, Parks, and Tourism. (2018). *Mined Land Wildlife Area* [Brochure].

