Rich lizards: How affluence and land cover explain the diversity and abundance of desert reptiles persisting in an urban landscape.

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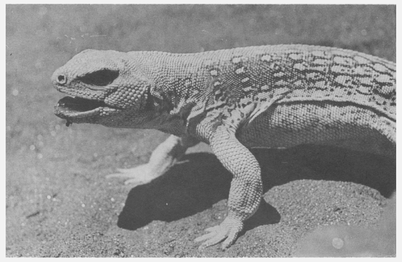
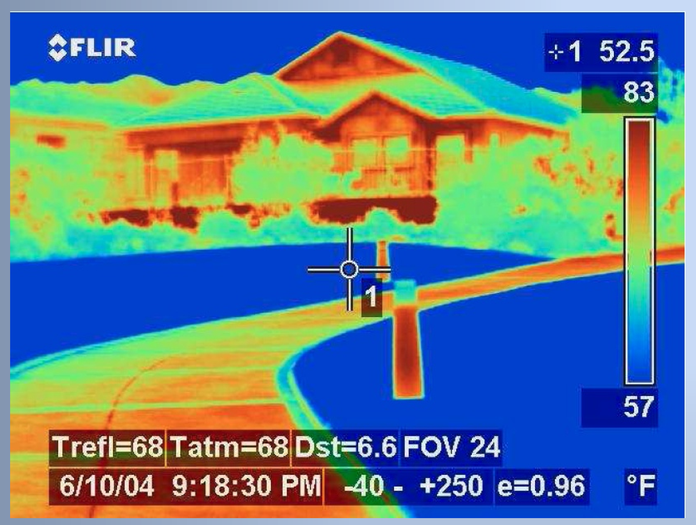


A Desert Iguana showing signs of extreme heat stress.
Thermoregulatory behaviors include open mouth panting and elevating the abdomen. Image: Cowles and Bogert 1944[2]

A cold stressed Horned Lizard is unable to move off the authors finger.
Anthropogenic heat can benefit ectotherms in some circumstances. Image: Author



Urbanization in Phoenix has increased average temperatures (red areas in top figure) and temperature variability (bottom). While these are the primary factors influencing summer lizard behavior in Phoenix[3], thermal variables were not significant factors in this study, and do not yet seem to have a year-round impact on diversity and abundance..
Figures: CAP LTER

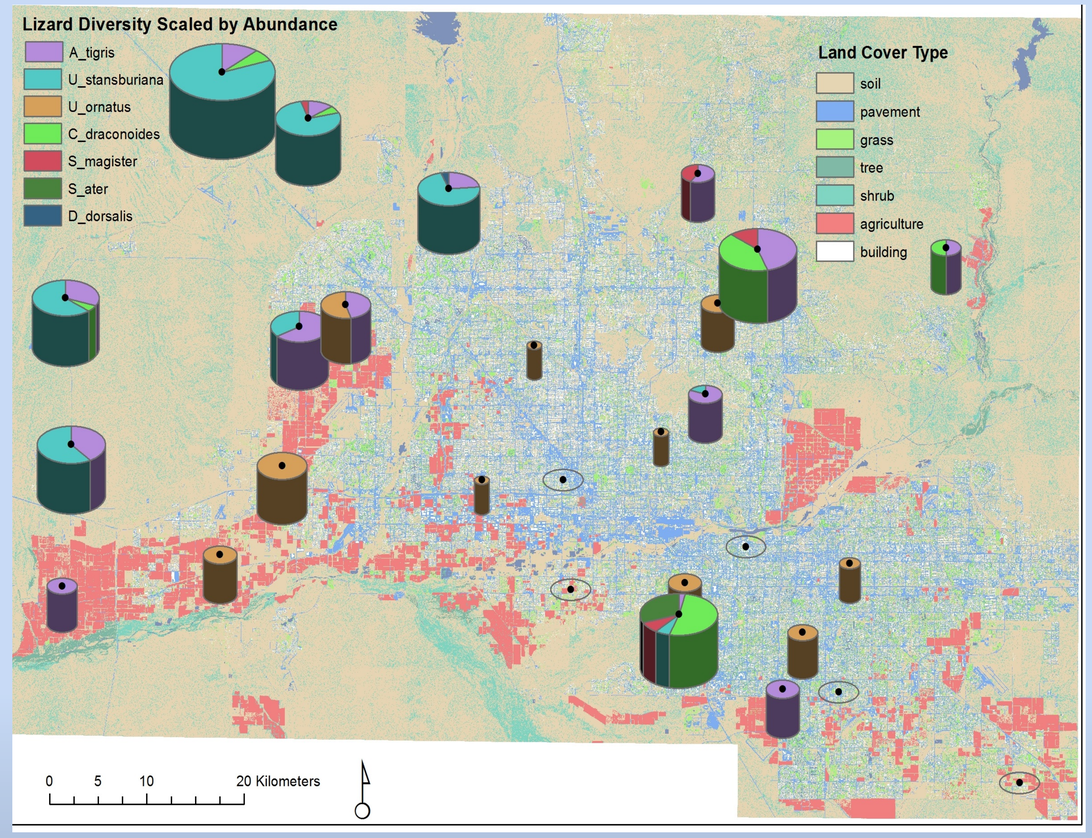
Global warming of +2 °C is predicted to drive almost 40% of lizard populations extinct by 2080[1]*. In Phoenix, AZ, an urban heat island (UHI) of +3 °C already exists, and native lizard abundance is drastically lower in the urban core.*

Research goals:

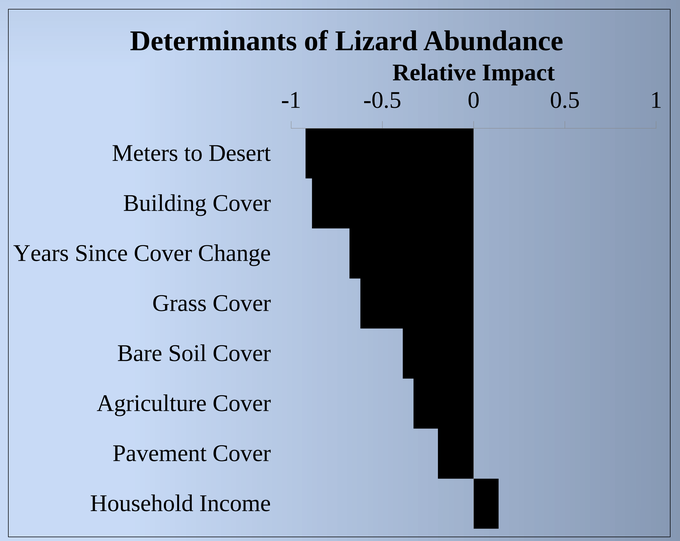
- *Determine if the UHI correlates with lizard diversity and abundance.*
- *Identify potential landscape-scale mitigation strategies.*

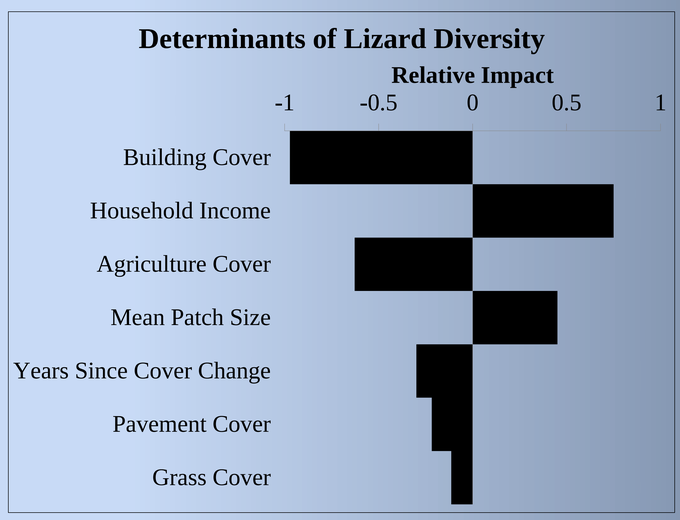
Methods

During fall 2012 and spring 2013, lizard diversity (number of species per site) and relative abundance (lizards per site) were estimated at 28 random locations stratified along a land use gradient of increasing urbanization. We constructed a 95% confidence set of the most likely Generalized Linear Models using a variety of explanatory historical, thermal, socioeconomic, and landscape variables.



Lizard abundance is lowest in Phoenix's urban core. Sites near the urban fringe and in mostly natural urban parks had similar abundances to desert sites, though a different set of species was present in natural and developed areas. The most diverse site (bottom center, N=5) had the highest median household income (>200,000 $US per year).





What are the most important landscape characteristics for mitigation strategies?

Lizard diversity and abundance were best explained by different factors. No included thermal variables were significant, possibly because our surveys were not conducted during summer. Affluent Phoenix residents prefer more xeric, less urban, and more biologically diverse areas , which could be driving the "luxury effect" with household income[4,5] (relative impact is cumulative weight of the variable in the 95% confidence set of models).

Literature cited

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