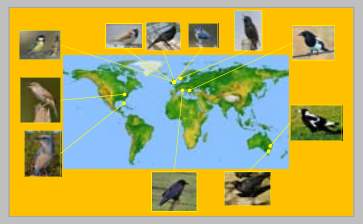
Does urbanization influence the timing of seasonal reproduction and the effect of stress on the reproductive physiology of a Sonoran Desert songbird?

Scott Davies & Pierre Deviche
School of Life Sciences, Arizona State University

Introduction

- Animals, such as birds, time their seasonal reproductive activity to coincide with conditions that maximize fitness.
- Consequently, the timing of reproduction is considered one of the major life history traits reflecting the adaptation of birds to local environmental characteristics.
- To correctly time reproduction, birds track environmental cues that can predict future conditions conducive to reproduction.
- A review by Chamberlain *et al.* (2009, *Ibis*) found that over ¾ of species advance breeding in urban areas, compared to outlying wildlands (see map below).
- Stress, both acute and chronic, suppresses the activity of the reproductive system, so for breeding to continue uninterrupted it is crucial that birds resist its effects.



Objectives

- **Compare the timing of reproduction of birds inhabiting urban and outlying desert habitats.**
- **Compare the resilience of the reproductive system to acute and chronic stress.**

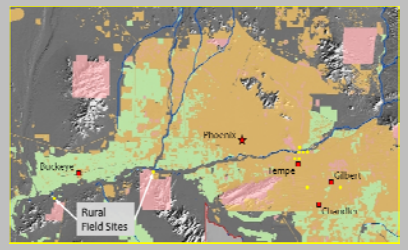
Methods

Species: male Abert's Towhee, *Melozone aberti*.

Time: June 2009, the end of the Abert's Towhee breeding season.

Capture: Conspecific song playback and mistnet.

- In the field, a blood sample was taken immediately after capture ('baseline') and again after 60 min of acute stress ('stressed').
- In captivity, half of each urban and rural birds were chronically treated with corticosterone to raise their stress hormone concentrations, mimicking chronic stress. A blood sample was taken weekly. The width of the cloacal protuberance, the avian intromittent organ, was also measured weekly.

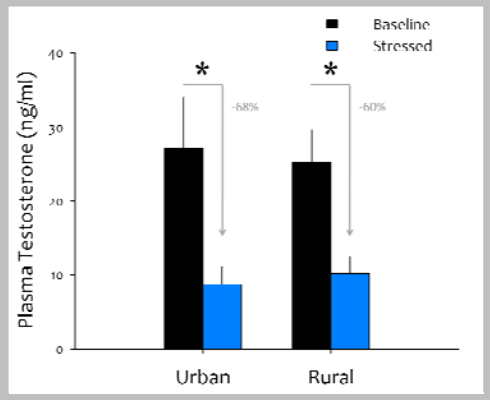


Map of study area: Sampling sites indicated by yellow circles.

Results

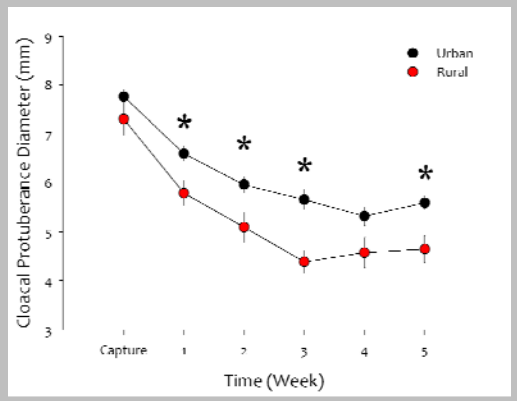
Acute Stress

Acute stress significantly decreased plasma testosterone, but there were no differences between urban and rural birds.



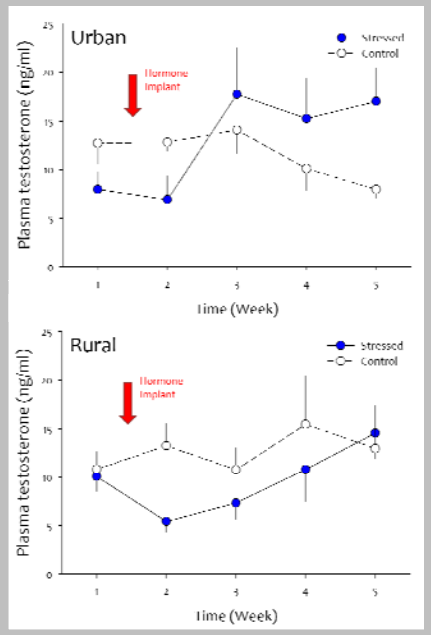
Reproductive Morphology

The decrease in cloacal protuberance width associated with the end of breeding occurred earlier in rural birds compared to urban birds.



Chronic Stress

Chronic stress initially significantly decreased plasma testosterone in birds from both habitats. Between-subject comparisons showed that there were no significant differences between urban and rural birds. However, within-subject comparisons revealed a significant interaction between treatment and habitat.



Conclusion

- Urban Abert's Towhees appear to end seasonal breeding later than rural conspecifics, possibly extending their breeding season.
- Abert's Towhees inhabiting urban and rural habitats do not appear to differ in their response to acute or chronic stress, as measured by reproductive physiology and morphology, suggesting that stress may not be the factor causing the disparity in breeding cessation seen in this study.

Future Directions

- Future studies aim to compare the onset of breeding in Abert's Towhees and to elucidate the mechanism by which urbanization influences the timing of reproduction.
- In particular, test the hypothesis that food availability is the cue advancing reproduction in urban birds.