

Adapting to City Life: Physiology and Behavior of Urban and Desert House Finch (*Haemorrhous mexicanus*)

Sarah Polekoff, Kylie Maxwell, Ray Pressman, and Pierre Deviche
School of Life Sciences, Arizona State University, Tempe, AZ 85287



Background

House Finches are native to the southwest and occur in both natural desert and urbanized habitats. Urban and desert habitats differ in several stressors which might impact behavior or oxidative status including human disturbance, noise pollution, food availability, and water availability. Oxidative stress can lead to cell death and illness [1]. Exploratory behavior represents how a bird would explore a novel area and has been connected to exploratory movements in the field [2, 3].



Natural Sonoran desert
(McDowell Mountain)



Urbanized habitat
(ASU Tempe Campus)



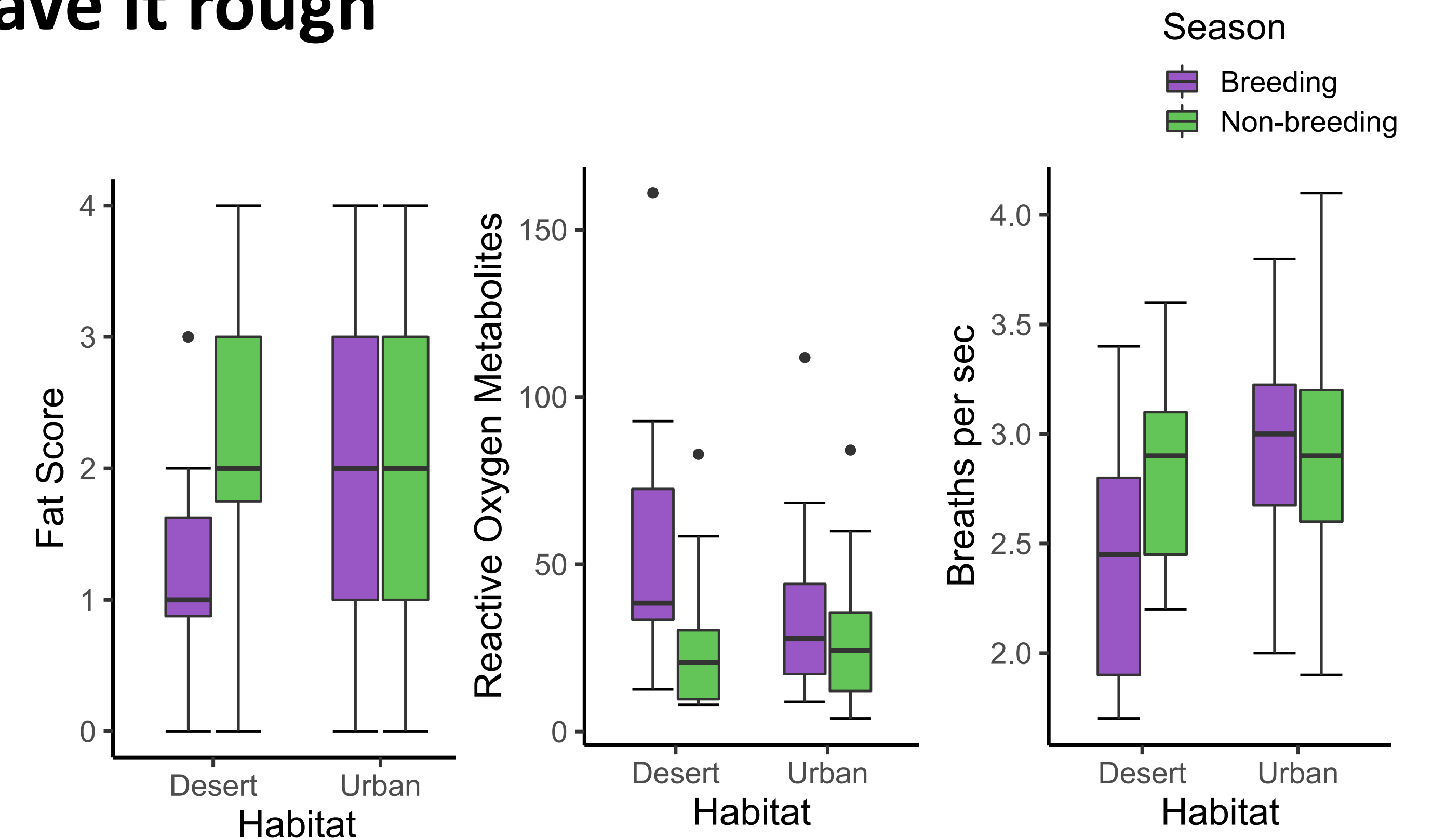
Field sites around Phoenix
(urban and desert)

Desert-breeding finches have it rough

Multiple factors displayed a habitat by season interaction effect, where desert finches in the breeding season stood out:

- Less body fat
- Higher pro-oxidants in plasma
- Lower breath rate in hand

No difference in antioxidant measures (antioxidant capacity of plasma, uric acid) across sites or seasons.



Field and Lab Methods

- Took blood samples and measured behavior in the field.
- Used colorimetric assays to measure plasma antioxidants and pro-oxidants.
- Exploratory behavior: 5 min test using a 1 x 1 x 1.5 m wooden box.
- Scored actions, flight time, number of unique zones and pegs reached, and latency to reach zones.
- Created composite **exploratory score** using Principal Components Analysis. High score = more exploratory.

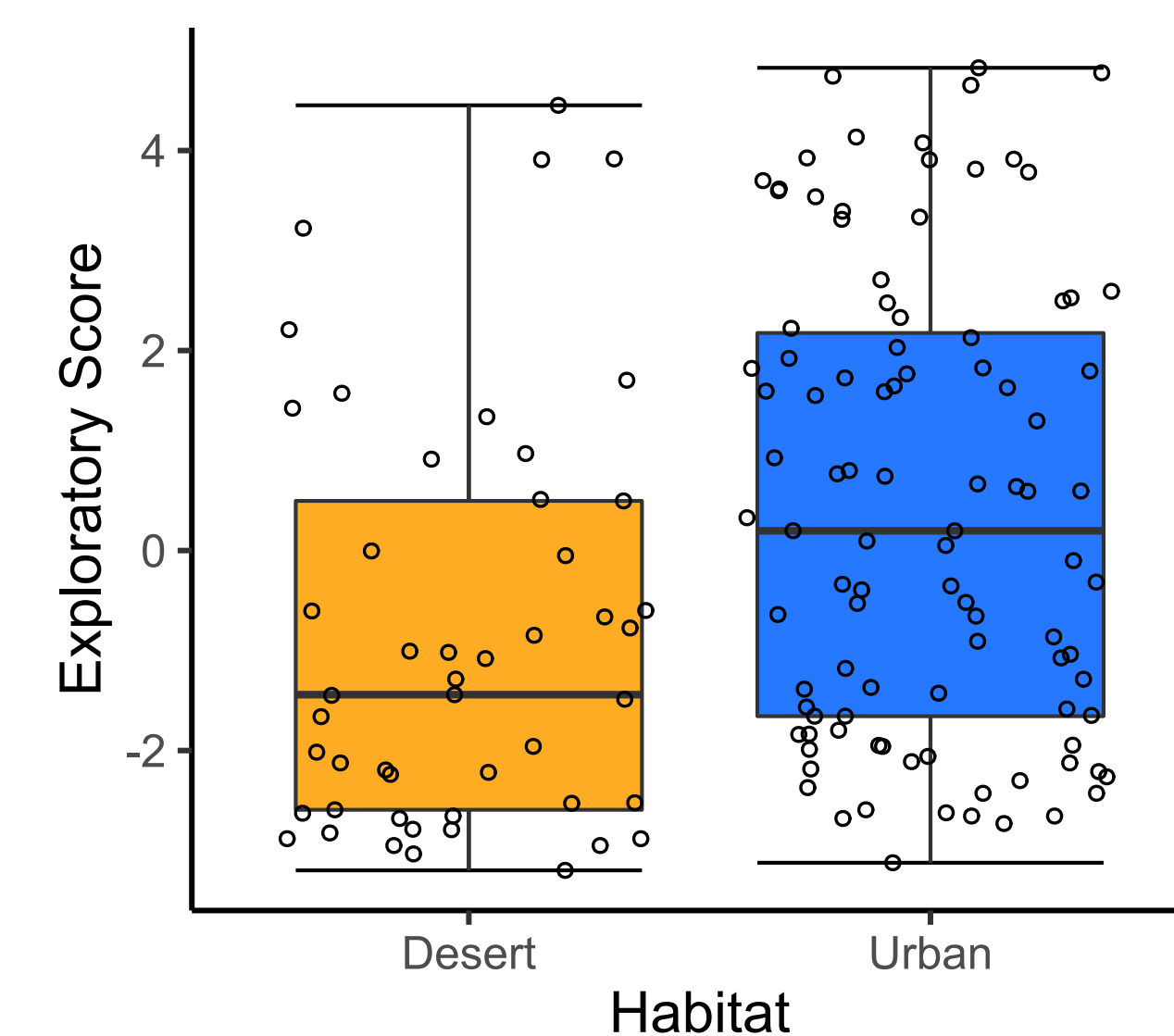


Urban finches more exploratory

More exploratory birds also had:

- Higher breath rate
- Higher box temperature during the test

No correlation with oxidative status



Conclusions

- Urban resources (water, food) may buffer finches from the difficulty of breeding during the dry season in the desert.
- Behavior is not explained by oxidative status.
- Difficult to separate effects of time of day, season, and temperature on behavior.

References

1. Isaksson C. 2015. *Funct. Ecol.* 29(7):913-823.
2. Portugal S.J., *et al.* 2017. *Phil Trans R Soc B.* 372(1727):20160234.
3. Evans J.C., *et al.* 2018. *Behav Ecol.* 29(2):448-458.

Acknowledgments

Central Arizona Project (CAP) LTER, NSF, and Arizona Field Ornithologists (AZFO) funded this research. Thanks to my big team of field and lab assistants: Eunisse Chua, Jasmin Moreno, Kent Ebale, Morgan Vellone, Phelene De Vries Stoutt, Abbilyn Slovak, Tyler Davis, Danya Osman, Emily La Sala, Maitri Patel, Nadia Upah, and Taison Roddy. Thanks to Kevin McGraw and his lab for supplies. House Finch photo by Peter Kaetsner.