

Urbanization and food availability advance the reproductive phenology of a Sonoran Desert songbird

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Introduction

The timing of seasonal reproduction (reproductive phenology) is a major life history trait reflecting the adaptation of birds to local environmental characteristics.

To correctly time reproductive activity, birds track environmental cues that can predict future conditions conducive to reproduction.

The annual change in day length (photoperiod) creates a window of opportunity for vernal reproductive activity.

Other supplementary cues, such as food availability, fine tune reproductive phenology to local environmental conditions.

The most consistent pattern emerging from studies of the effects of urbanization on birds is that urbanization is associated with advancement in breeding phenology.

We hypothesize that a key factor of this difference between urban and non-urban ecosystems is food availability (Chamberlain et al. 2009, Ibis).

General Methods

Species: Abert's Towhee, *Melospiza aberti*.

Capture: Conspecific song playback and mistnet.

Plasma **testosterone (T)** quantified using an enzyme-linked immunoassay (Enzo Life Sciences, PA, USA).

The width of the **cloacal protuberance (CP)**, a secondary sexual characteristic, was measured using digital calipers.

Furcular fat was scored from 0 – 5, following Helms & Drury (1960, *Bird Banding*).

Pectoral muscle was scored from 0 – 3, adapted from Gosler (1991, *Bird Study*).

Body condition was calculated using the regression residuals of body mass vs. tarsus length (Green 2001, *Ecology*).

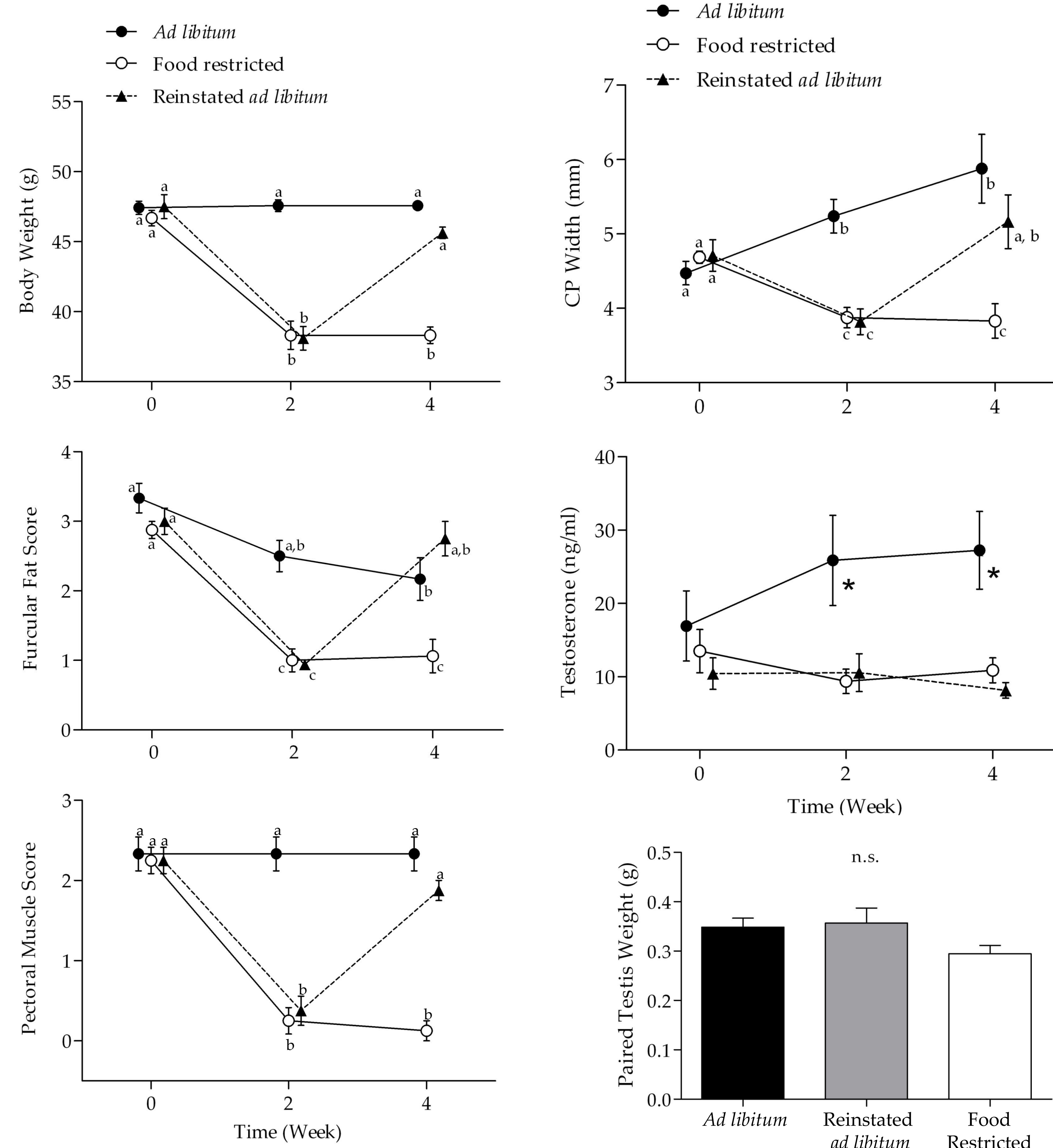
Food Restriction Captive Study

Objective: to investigate the effects of food availability on reproductive physiology and morphology

Approach: Birds randomly assigned to one of three treatment groups:

- 1) *Ad libitum*
- 2) Food Restricted
- 3) Reinstated *ad lib.* (food restriction for 2 weeks followed by *ad lib.* food for two weeks)

Food restricted birds received 70% of average *ad lib.* consumption

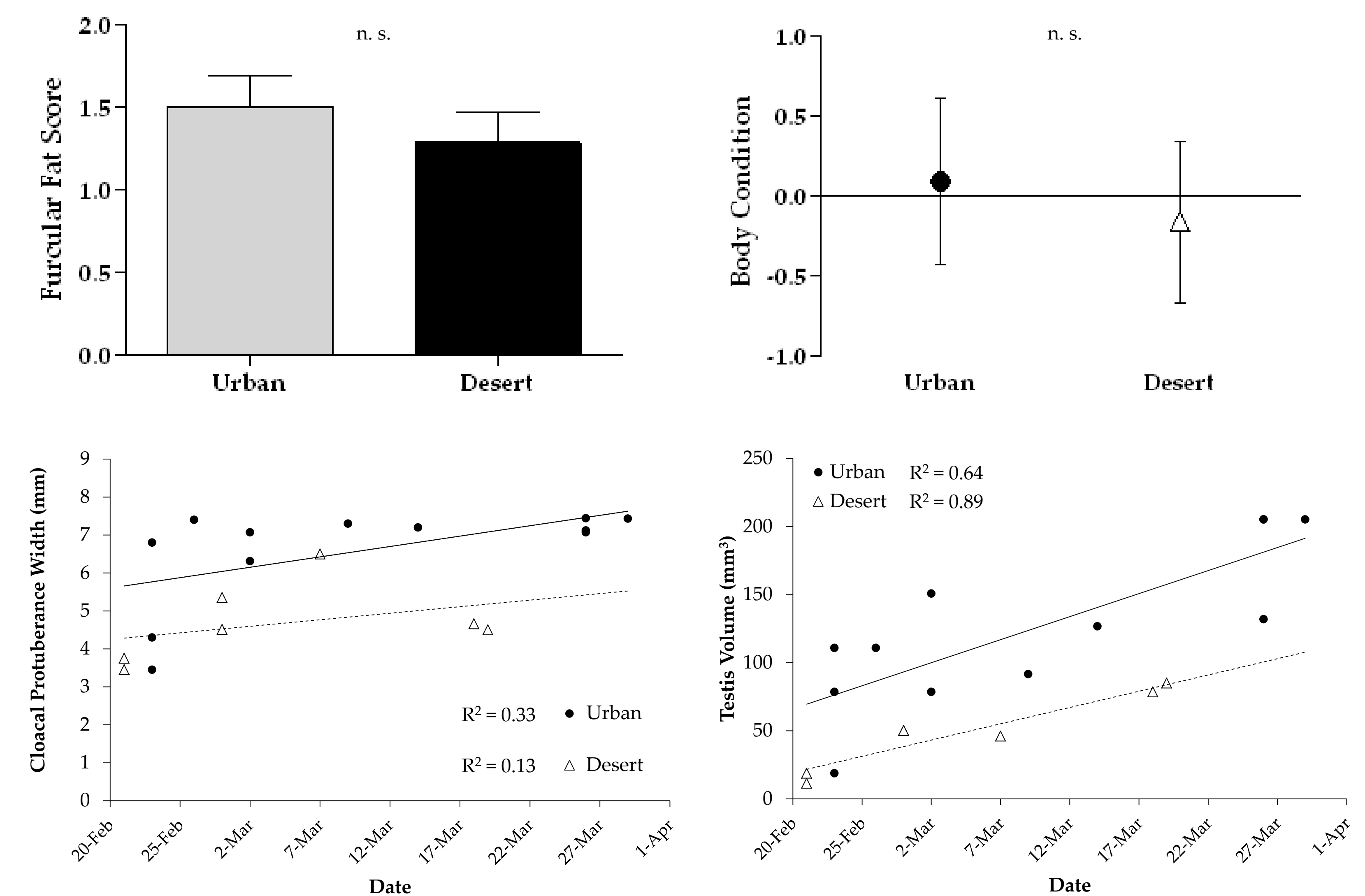


Summary

- Food availability modulates vernal development of the reproductive system in captive Abert's Towhees.
- However, not all aspects of the reproductive system respond similarly to changes in food availability.

Reproductive Phenology Field Study

Objective: to compare the reproductive phenology of urban and desert Abert's Towhees



Summary

- Vernal development of the reproductive system in free-ranging Abert's Towhees appears to be advanced by urbanization of Phoenix, AZ, compared to desert localities.
- There were no differences in body condition or fat stores, suggesting that this disparity is not due to morphological differences between the habitats.

Conclusions & Future Directions

The vernal reproductive development of Abert's Towhees is modulated by food availability, and reproductive phenology differs in towhees from localities that putatively differ in food availability.

Anthropogenic modifications of the timing, quantity or quality of food availability in the wild, such as induced by urbanization and global climate change, may modulate the reproductive phenology of wild birds.

Future studies aim to demonstrate that the difference in reproductive phenology observed in free-ranging Abert's Towhees is indeed caused by greater food availability in urban areas of Phoenix, AZ.

