



# Predator-Prey Dynamics in an Urban Forest: Assessment Using Raptor Predation on Prey Mimics

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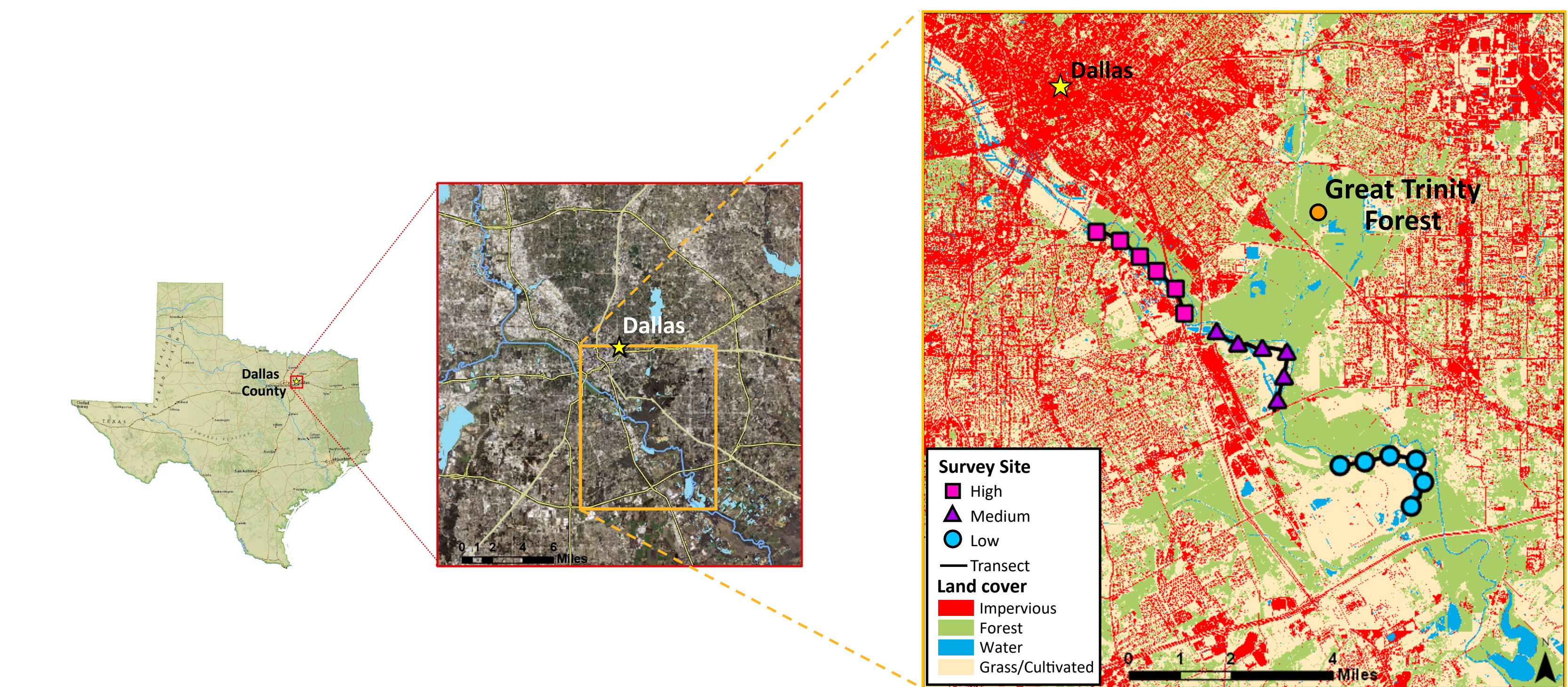
## INTRODUCTION

- Urbanization has resulted in changes in ecological functions and trophic interactions on many biological levels, contributing to losses of biodiversity and altered assemblages of species within communities<sup>1,2,3</sup>.
- Changes in community structure within urban ecosystems often result in the removal or replacement of top predators, modifying top-down control and altering predator-prey interactions<sup>4</sup>.
- Raptors are regularly used as indicators of ecosystem health<sup>5</sup>.
- The Great Trinity Forest is a large urban forest surrounded by the city limits of Dallas, TX (Fig. 1) containing a variety of disturbance factors characteristically associated with a highly urbanized area: poor habitat, invasive species, and increased noise, light and human disturbance.
- Baseline monitoring of raptor activity and community composition, with associated prey relationships along the urban-to-rural gradient in the Great Trinity Forest will assist in determining the current health of this forest ecosystem.

## OBJECTIVE

Quantify predator-prey dynamics in the Great Trinity Forest by assessing raptor predation on prey mimics.

## STUDY AREA



**Figure 1.** Study area within the Great Trinity Forest in Dallas, TX. Three study sites with differing levels of urbanization were assessed for raptor activity/use and rate of predation: high (pink squares), medium (purple triangles) and low (blue circles) urbanization. Individual shapes indicate raptor survey stations along transects. Land cover was assessed using ArcGIS Pro (version 2.2.0).

## METHODS

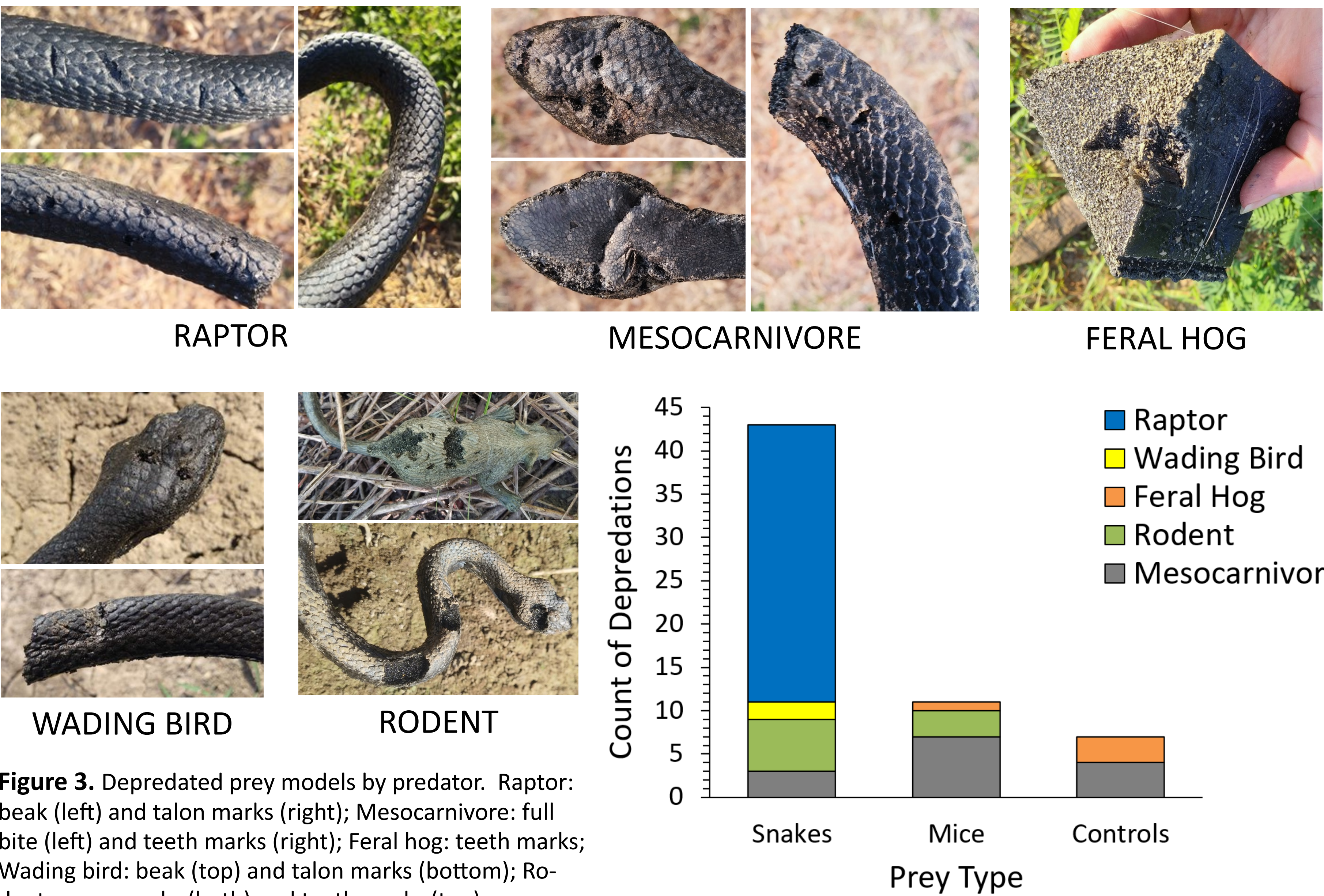
- To quantify urbanization, supervised, object-based landcover classification (ArcGIS Pro, version 2.2.0) was performed on 50-cm pixel resolution, multi-band remote sensing imagery to estimate the percent of impervious surface within the forest. Three main study sites were identified containing high, medium and low percentages of urbanization (Fig. 1).
- May-August 2019: Weekly conspecific broadcast raptor surveys conducted and 732 urethane prey mimics (Fig. 2) deployed at 18 stations along the urban-to-rural gradient.
- Prey mimics were checked once a week for signs of depredation. Predators of depredated mimics were determined by marks left behind on mimics (Fig. 3 and Fig. 4).



**Figure 2.** Urethane foam prey models. a) Large-sized snake mimic (1.5' length x 2" diameter) b) Small-sized snake mimic (8" length x 1" diameter) c) Mouse mimic (3.5" length (not including tail) x 2.5" diameter in the mid-section) d) Triangular control (3" height x 5" base x 4" width).

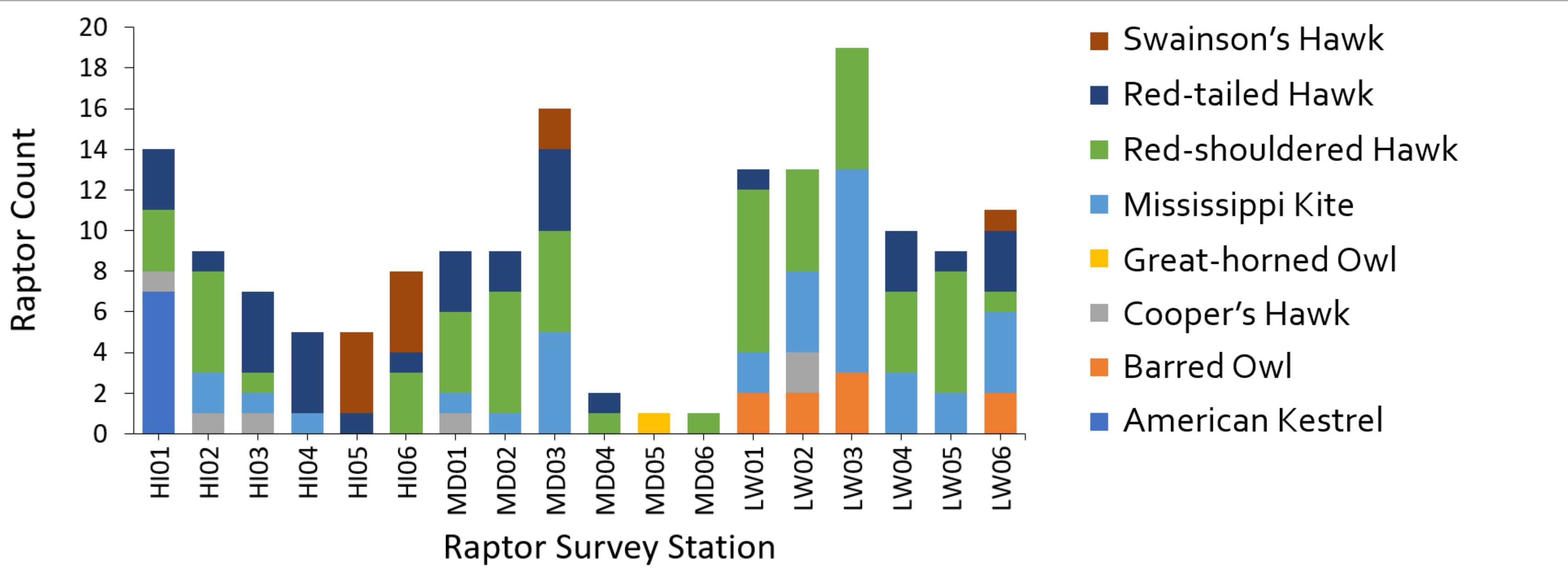
## RESULTS AND DISCUSSION

- Of the 732 prey models deployed, 61 showed signs of being depredated whereas 23 were missing and therefore had an unknown fate (Fig. 4).
- 161 raptors representing 8 species were observed within the study area during the 10-week study period (Fig. 5).
- No relationship between raptor activity, raptor depredations and degree of urbanization (Fig. 6).
- No significant relationship between raptor activity and predation on snake models (Fig. 7).
- Results suggest either increasing levels of urbanization have no effect on raptor-prey dynamics within the Great Trinity Forest or there is low predatory response from raptors in regard to prey mimics.

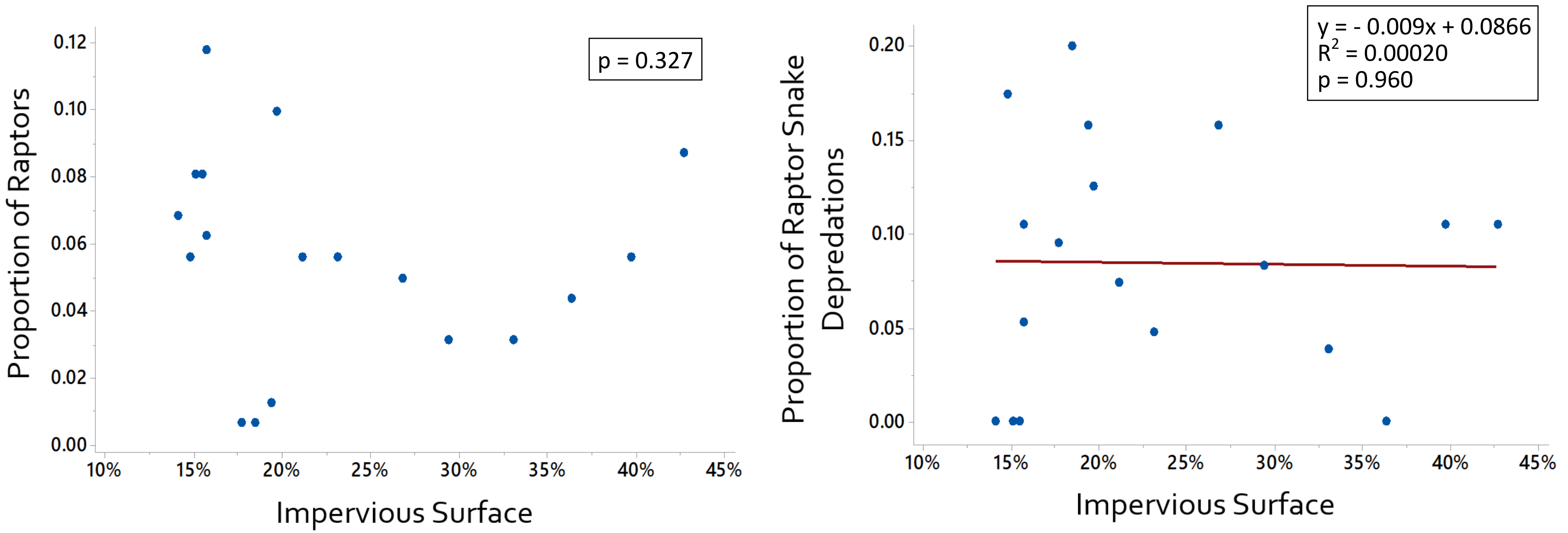


**Figure 3.** Depredated prey models by predator. Raptor: beak (left) and talon marks (right); Mesocarnivore: full bite (left) and teeth marks (right); Feral hog: teeth marks; Wading bird: beak (top) and talon marks (bottom); Rodent: gnaw marks (both) and teeth marks (top).

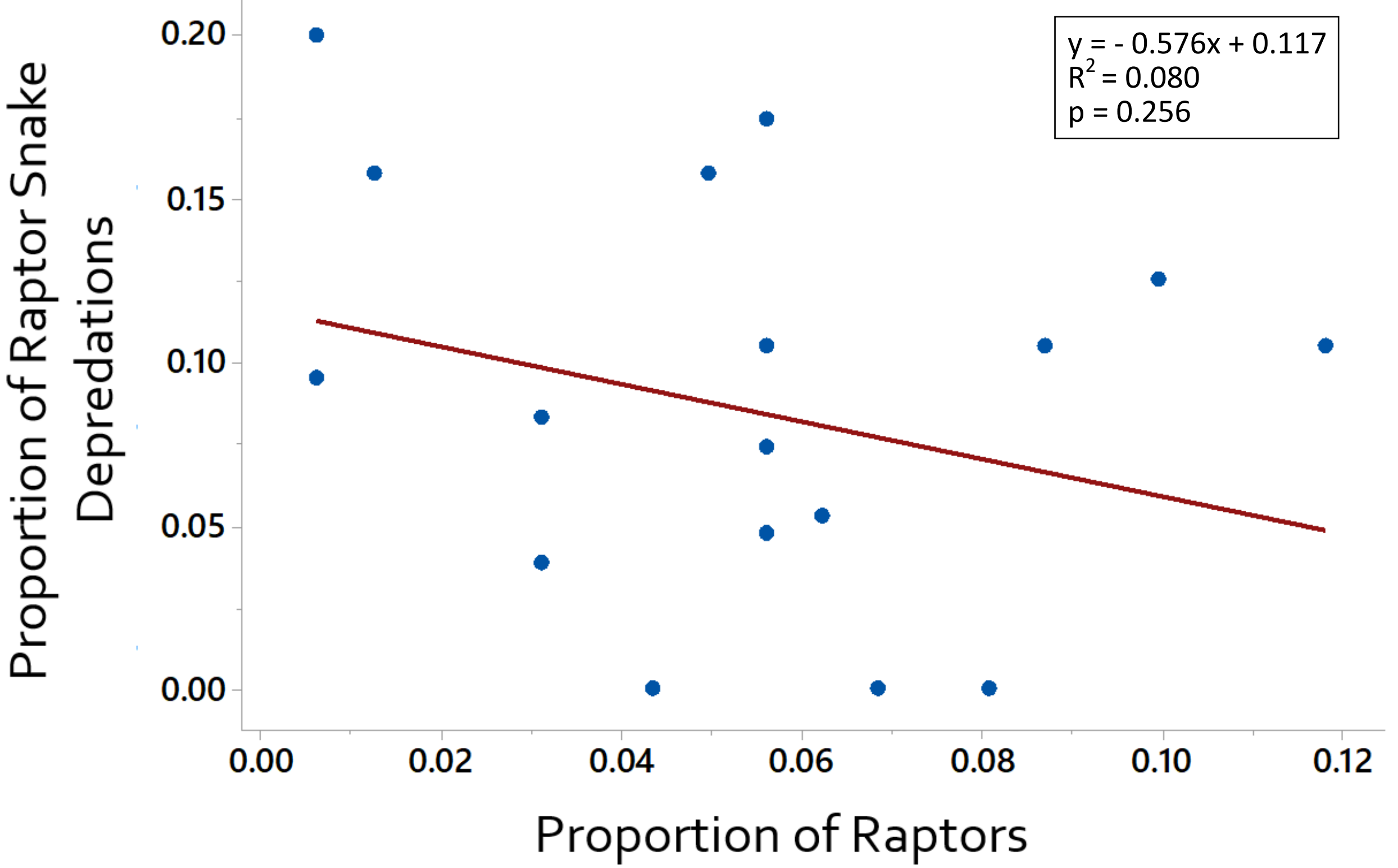
**Figure 4.** Counts of predator type per depredated snake (n = 43 of 398) and mouse (n = 11 of 153) prey mimic, as well as controls (n = 7 of 181). Predator type was determined by on marks left on prey mimics and/or field camera identification.



**Figure 5.** Species richness and activity within each raptor survey station along the urban-to-rural gradient in the Great Trinity Forest, Dallas, TX. "HI01" indicates the containing the greatest level of urbanization while "LW06" indicates the station containing the lowest level of urbanization.



**Figure 6.** No relationship between proportion of total raptors observed, proportion of raptor snake depredations and percent impervious surface along the urban to rural gradient in the Great Trinity Forest, Dallas, TX (N = 18).



**Figure 7.** No relationship between the proportion of total snakes depredated by raptors as a function of the associated proportion of total raptors present along the urban to rural gradient (N = 18).

## REFERENCES & ACKNOWLEDGMENTS

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