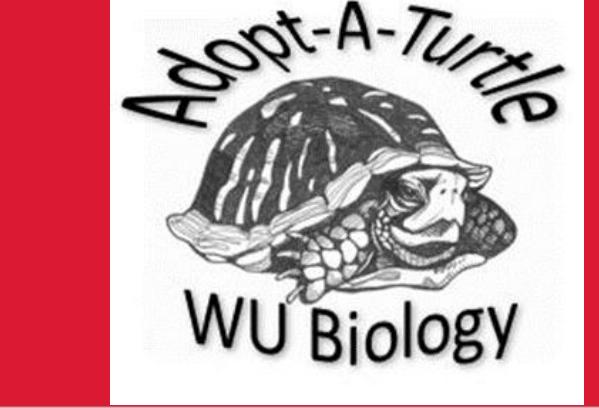
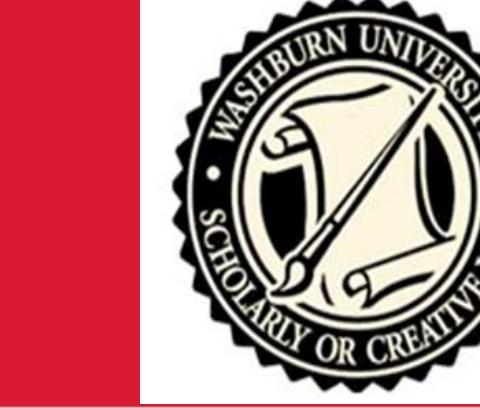
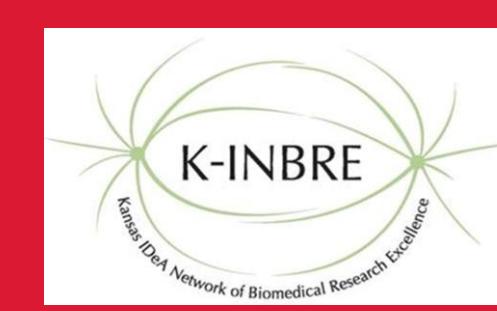


Burrow Characteristics and Ornate Box Turtle (*Terrapene ornata*) Occupancy

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Introduction

Ornate Box Turtles (*Terrapene ornata*) use a wide array of cover types for a variety of different benefits including for thermoregulatory purposes, refuge from predators and potentially wildfire, and for brumation.

As important as burrows are for this species, they typically do not dig their own burrows. They are known to partake in a form of kleptoparasitism, sharing or using holes and burrows that other animals have dug. In this study, burrows found to have turtles in them in the recent past (2022-2023), were surveyed for a number of different characteristics, including temperature and size measurements, and were borescoped on a rotating basis to capture burrow occupancy otherwise impossible to ascertain without using destructive measures. This study will benefit our overall understanding of Ornate Box Turtle (OBT) burrowing habits, which in turn, will help assist future conservation, rehabilitation, and reintroduction projects for this species.

Objectives

- To characterize burrow usage by *Terrapene ornata* in Western Nebraska.
- To determine burrow characteristics that may be predictive of *Terrapene ornata* occupancy.
- Survey burrows for all organismal usage, and to identify species that cohabit with Ornate Box Turtles in burrows.



Methods



- Burrows found to be occupied by OBTs, either during the year of the survey or during other years in which research on this species in this area was conducted, were marked with flags in Western Nebraska.
 - We only considered burrows for this survey if they exceeded 30cm in length.
- The following measurements (cm) were obtained for each burrow:
 - Length of the burrow
 - Inside diameter of the opening
 - Outside diameter of the opening
 - Circumference of the opening
- Additional aspects of the burrow location were also taken:
 - Slope face
 - Surrounding vegetation
 - Elevation
 - Broad substrate type
- Thermochrons were attached to flat washers and fishing line and placed in the burrow at a depth of 15cm.
- Burrows were then borescoped using a Teslong Inspection Camera on a rotating basis (roughly once every four days) to prevent temporal autocorrelation over the duration of the two-month survey.
- Data from thermochrons (iButton) were collected, and we analyzed the data between 7/10/23 and 7/20/23, as this is window of time was when we had the most temperature recordings per burrow.

Results

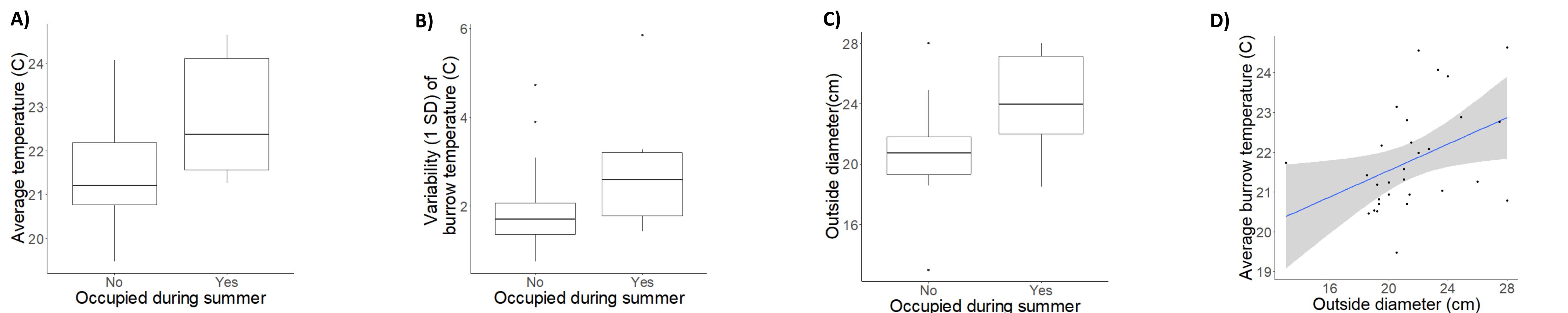


Figure 1. A: Average temperature of occupied and unoccupied burrows ($t = 2.19$; $df = 20a$; $p = 0.04$), B: Variation in burrow temperature of occupied and unoccupied burrows ($t = 2.05$; $df = 28$; $p = 0.05$), C: Outside diameter size (cm) of occupied and unoccupied burrows ($t = 1.53$; $df = 32$; $p = 0.14$), D: Outside diameter size (cm) vs average burrow temperature ($r = 0.41$; $n = 30$; $p = 0.03$).



Species Found in Burrows

Species	Occurrence
<i>Terrapene ornata</i>	0.04975
<i>Ambystoma mavortium</i> Tiger Salamander	0.004975
<i>Latrodectus mactans</i> Black Widows	0.01492
<i>Paramiscus sp.</i> Field Mouse	0.004975
Various Fly Species	0.04478
All other species	0.06965

Discussion

- Overall, burrow usage of our focal burrows by Ornate Box Turtles and other species was minimal during our survey period, likely due to below-average temperatures for nearly the entirety of our monitoring period.
- Contrary to our expectation, the average burrow temperature of occupied burrows was warmer than the average temperature of non-occupied burrows.
- Burrows with a wider range of temperatures were also found to have a higher rate of occupancy as opposed to burrows with a smaller range of temperatures.
- Outside diameter was found to have a significant relationship to warmer temperatures inside the burrow.
- Inside diameter, entrance circumference, and burrow length had no significant relation to burrow temperature or turtle occupancy.

Future Directions

- Increase number of burrows surveyed and survey area.
- To continue to survey for other species that cohabit with Ornate Box Turtles.
- To include vegetation and other surveys estimating home-range quality for individual box turtles.

Acknowledgements

Katie Brighton, Mason Chanay, Aubrey Gauntt, Erica Guldner, Samantha Kim, Keetan Munsell, Abby Trautman, Patience Wagner, Sam Wagner, Bri Wilson, Joseph Speer