

Location and release method influence short-term reintroduction success of captive-bred hatchling Texas horned lizards (Phrynosoma cornutum)



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Figure 5. Growth rates

were higher at Site 1

(F_{1.96}= 4.42, p = 0.04)

INTRODUCTION

- Texas horned lizards have declined throughout their native range.¹
- Several zoos have begun captive breeding programs of Texas horned lizards for the purposes of reintroduction to the wild.
- · Reintroduction attempts of captive-bred animals can have limited success.²
- Release methods and site selection could influence the reintroduction success of hatchling horned lizards, whose habitat requirements are poorly understood.³
- The goal of this study was to assess whether diet, growth rates, and short-term survivorship of hatchling horned lizards differed between two reintroduction sites and release methods in central Texas.

METHODS

MONITORING

- We used a 2x2 experimental design to release over 500 captive-bred lizards at Mason Mountain WMA (Mason County, TX) in 2020 and 2021 (Fig. 1).
- Lizards were placed either in clumps of 20+ lizards (clumped) or spaced 5m apart from one another (dispersed).
- Lizards were located 3-4 times a week from Sep. to Nov. using uniquely labeled harmonic radar diode tags (Fig. 2).³

GROWTH

- Lizards were weighed 1x a week.
- Growth rates were calculated as the change in an individual lizard's Figure 3. Lizard survival outcomes weight over time.
- We used ANOVAs to test for differences in growth rates between sites and release methods.

SURVIVORSHIP

- · Survival outcomes at first brumation were assigned based on tag status
- (Fig. 3).
- Alive: live lizards with known locations

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- Dead: lizards whose tags were recovered in fecal material of predators or whose carcasses were recovered
- Unknown: lizards that had shed, could not be located, etc.
- We used chi-squared tests for association to determine if the frequency of survival outcomes differed between sites and/or release methods.

Figure 4. No difference in growth rate between release methods ($F_{1.96}$ = 0.42, p =0.52)



Figure 6. Weight gain was significantly lower for lizards with clumped release at Site 2 ($F_{3,94} = 6.11$, p<0.001)



Figure 7. Survival outcomes are associated with release method ($\chi^2_{2,509}$ =15.09, p=0.005) and site ($\chi^2_{2,509}$ = 34.5, p<0.0001)



- More lizards survived when lizards were dispersed, regardless of site.
- More lizards survived at Site 1, regardless of release method.

[1] Donaldson W, AH Price, & J Morse, 1994. The current status and future prospects of the Texas horned lizard (Phynosoma cornutum) in Texas. Texos Journal of Science 46(2): 97-113. [2] Griffith, 8, JM Scott, JW Carpenter, & C Reed. 1989. Translocation as a species conservation tool: status and strategy. Science 245(4917): 477-480. [3] Vesy, MN, JL Watters, RW Moody, EM Schauber, JM Mook, & CD Siler, 2021. Survivorship and spatial patterns of an urban population

RESULTS

Figure 8. Survival outcomes are associated with release method at Site 1 ($\chi^2_{2,254}$ = 29.5, p<0.0001), but not Site 2 $(\chi^{2}_{2,254} = 2.86, p=0.24)$



DISCUSSION

Location and release method may be important factors in the short-term reintroduction success of hatchling Texas horned lizards

- Dispersing lizards may improve survival outcomes when lizards are released in suitable habitat.
- Low survivorship and growth rates at Site 2 suggest it is poor habitat. Ongoing research suggests this may be because of poor prey availability.
- •Future studies will evaluate differences in other factors such as vegetation, thermal habitat, and soil hardness between locations.

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Dispersed (2021, N=134 (2020, N=125 Release Method ite 1- Clumped Site 2- Clumper Figure 2. Hatchling horned lizard with harmonic radar diode tag.

Site 1

Site 1-

Release Site

Site 2

Site 2- Dispersed

Figure 1. Experimental design

Dispersed





