

# The Enigmatic Tawny-bellied Cotton Rat in Texas

## Funding:

“Status, Distribution, Morphology and Genetics of *Sigmodon fulviventer dalquesti* in the Chihuahuan Desert Ecoregion,” awarded to PI Caleb Phillips from the Texas Parks and Wildlife Department, \$134,447, 2017-2023.

## Project Summary:

The tawny-bellied cotton rat, *Sigmodon fulviventer dalquesti*, is a poorly understood Texas endemic that is listed as a Species of Greatest Conservation Need. *Sigmodon f. dalquesti* is only known from a single opportunistic sampling 26 years ago by Fred Stangl; 20 individuals were collected approximately 18 miles southwest of Fort Davis. The population appeared viable, as the 20 individuals included juveniles as well as reproductively active males and females. Dr. Stangl proposed subspecific status of *S. f. dalquesti* based on morphological comparisons to a New Mexican subspecies, *S. f. minimus*, in which *S. f. dalquesti* was found to be craniometrically larger and have distinct pelage characteristics. Based on proximity of distribution, he hypothesized that *S. f. dalquesti* is most closely related to *S. f. minimus*, yet the single known locality of *S. f. dalquesti* is about 200 km separated from the eastern edge of the *S. f. minimus* distribution. Subsequent phylogenetic work on the genus *Sigmodon* by Dr. Robert Bradley’s lab included comparison of *S. f. dalquesti* to a central Mexico subspecies, *S. f. fulviventer*, and found them to be a little more than 1% genetically divergent. This amount of divergence was consistent with subspecies, and based on a mammalian molecular clock roughly equates to about 100,000 years since divergence.

Thus, the collective but limited data indicates that *S. f. dalquesti* is a genetically and morphologically distinct Texas endemic. However, as noted in *The Mammals of Texas*, the range and population size remain unknown. This limited perspective, in conjunction with its listing as a Species of Greatest Conservation Need, warrant an improved understanding of *S. f. dalquesti* biology. The goals of this work were as follows:



Left to right: Voucher specimens of *S. arizonae*, *S. hispidus*, *S. ochrognathus*, *S. f. dalquesti*, and *S. f. fulviventer* in the Mammal Collection of the NSRL.

- 1) Conduct detailed morphological and phylogenetic analyses of Texas specimens in comparison to museum specimens for other subspecies throughout the distribution.
- 2) Conduct seasonal field work in and around the original capture locality to try and document the persistence of *S. f. dalquesti*.
- 3) Build niche models to predict the distribution of *S. f. dalquesti* that will be useful to guide future field work.



Phillips lab members Rachael Wiedmeier, Megan Rowe, Oscar Sandate, and Preston McDonald during fieldwork near Fort Davis, Texas.

As reported in McDonald et al. (2025), morphological analysis supported subspecific status. Phylogenetic analysis placed all *D. f. dalquesti* specimens in a highly supported clade, albeit this clade was nested within a *S. f. minimus* clade. This phylogenetic result supported *D. f. dalquesti* and *S. f. minimus* as sister taxa, and the lack of monophyly is not unexpected among subspecies. Despite eight field trips and 250 other small mammals from 16 species being captured, none were *S. f. minimus*. Although failing to capture a single specimen does suggest the possibility of extinction, it is worth noting that all trapping occurred during a prolonged drought, and *Sigmodon* in general are sensitive to drought conditions. Niche modeling provided clues about previously un-surveyed areas that will hopefully be visited in future efforts.

#### Publications:

McDonald, P. J., K. Demere, R. Martin, J. Evans, R. D. Bradley, R. D. Stevens, M. Fokar, H. Sihaloho, and C. D. Phillips. 2025. Status, distribution, morphology and genetics of *Sigmodon fulviventer dalquesti* in the Chihuahuan Desert Ecoregion. Occasional Papers, Museum of Texas Tech University 392:1–21.