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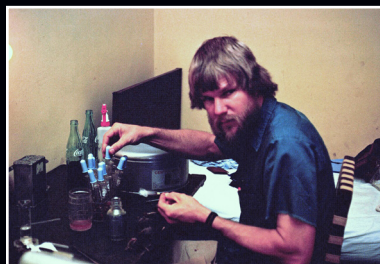
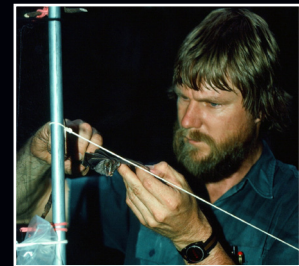
SPECIAL PUBLICATIONS

Museum of Texas Tech University

Number 71

11 October 2019

FROM FIELD TO LABORATORY: A MEMORIAL VOLUME IN HONOR OF ROBERT J. BAKER



EDITED BY

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TEMPORAL PATTERNS OF BAT ACTIVITY ON THE HIGH PLAINS OF TEXAS

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ABSTRACT

Texas is home to more wind turbines and more bat species than any other state in the United States. Insectivorous bats provide an important economical ecosystem service in this region through agricultural pest regulation. Unfortunately, bats can be impacted negatively by wind turbines, and migratory bat species particularly so. To understand how bat activity changes throughout the year in western Texas, activity was monitored through echolocation calls and opportunistic mist-netting efforts over a period of four years (2012–2015). Peaks in activity were observed from March through April, and again in September, which coincides with previously documented migratory periods for many species native to the High Plains of Texas. Findings presented herein suggest that urban habitats are preferred stopover sites for migratory bat species while traversing arid regions such as those occurring in western Texas. In addition to human-made structures, urban habitats harbor non-native trees that provide suitable roost sites, aggregations of insect prey swarming outdoor light sources, and artificial water sources. It is important to understand bat activity in western Texas, not only for the benefit of agricultural pest suppression, but also to predict how the expansion of wind energy may affect bat populations in this region.

Key words: active monitoring, agriculture, driving transect, echolocation calls, passive monitoring, West Texas, wind energy

INTRODUCTION

The High Plains ecoregion of western Texas is characterized by a relatively flat topography, an arid climate with scarce water sources, and a shortgrass prairie habitat that is largely depauperate of trees (Price et al. 1997; Griffith et al. 2007). Many bat species native to Texas are dependent on trees as roosting sites (Schmidly and Bradley 2016), thus the nearly treeless landscape of the High Plains may deter bats from using Lubbock and surrounding counties as stopover sites during migration; some bat species appear to migrate through the High Plains instead of inhabiting the region year-round. Moreover, as much as 80% of the High Plains ecoregion has been converted to agricultural lands, which contributes to the loss of native prairie habitats and reduction in water resources available for wildlife due to irrigation demands (Schmidly 2002).

Despite these inhospitable conditions, over a third of all bat species native to Texas (i.e., 12 of 33

species) have been recorded in Lubbock and adjacent counties (Ammerman et al. 2012). Museum records of three migratory bats that occur in western Texas (*Aeorestes cinereus*, *Lasiurus borealis*, and *Lasionycteris noctivagans*) suggest a seasonal peak in the presence of these species likely occurs across the High Plains (Cryan 2003). Although another bat species, *Tadarida brasiliensis*, also is migratory (Glass 1982), *A. cinereus*, *Lasiurus borealis*, and *Lasionycteris noctivagans* are the more frequent species found to collide with turbines (Arnett et al. 2008). Though museum records do not specify whether bats were caught in urban areas or not, one potential explanation for peaks in seasonal activity of migratory bats could be the availability of atypical roost sites in the region, specifically planted trees in urban green spaces (e.g., parks, golf courses, residential yards). Many bat species, including migratory species, also have been documented to roost in occupied and abandoned human-made structures, such as buildings