Identifying and Characterizing Roosts of *Lasiurus ega* and *Lasiurus intermedius*

P. Citlally Jimenez, Ben Skipper, and Loren Ammerman
Angelo State University, San Angelo, TX

Abstract

Previous research has demonstrated the southern yellow bat (*Lasiurus ega*) to roost in the dried fronds of native palms (*Sabal mexicana*) and non-native palms (*Washingtonia robusta*). Roost use by the northern yellow bat (*L. intermedius*) is similar, with the addition of Spanish moss (*Tillandsia* spp.). Quantitative assessments of these roosting substrates, however, are lacking. My objective was to identify and quantitatively characterize the diurnal roosts of *L. ega and L. intermedius* in the Lower Rio Grande Valley of Texas. Through radio-telemetry from May – November of 2015, I located a total of 20 roosts in *S. mexicana* palms used by 8 yellow bats. Comparison of characteristics between roosts and randomly selected palms showed that yellow bats selected sabal palms with significantly taller, thicker frond skirts and smaller trunk diameters. A predictability model was subsequently constructed to aid in the management of roosting habitat for these species of yellow bats.

Introduction

- Roosts and roosting habitat are important for bat lifecycles and need to be conserved (Kunz and Fenton 2003).
- Bats roosting in urban settings, much like *L. ega* and *L. intermedius* roosting in palm trees in extreme South Texas, are becoming more frequently encountered due to human landscaping practices that modify their habitat (Mirowsky 1997).
- Practices such as trimming dried fronds of palms may have an adverse effect on bats' roosting habits.
- Because little is known of their life history, rapid expansion of urban areas in South Texas has created an urgent need to monitor these two species of yellow bats for negative or positive effects of urban growth.
- **Our objective was to identify and quantitatively characterize the roosts of *L. ega* and *L. intermedius* in Sabal Palm Sanctuary in Brownsville, Texas.**

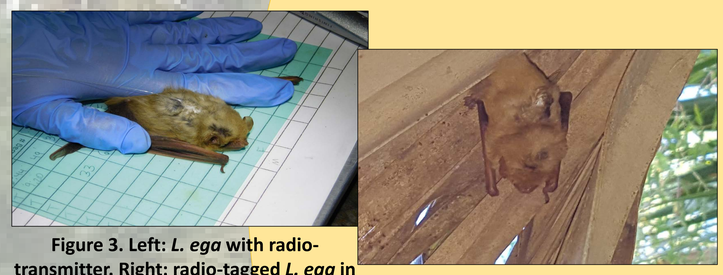

Figure 3. Left: *L. ega* with radio-transmitter. Right: radio-tagged *L. ega* in dried frond.

Methods

- Mistnetted and harp-trapped (May – Nov 2015) over flyways and water sources
- Measurements collected and radio-transmitters (Holohil Systems Ltd., Carp, Ontario) attached to adult yellow bats.
- Radio-tagged bats tracked to roost locations and GPS coordinates collected.
- Random palm locations generated within a 250m buffer from the property's resaca using ArcMap 10.1 (ESRI, Redlands, CA).
- Trunk diameter, palm heights, and dead frond skirt heights collected for roost and random trees (Figure 1).
- Percent canopy coverage analyzed for frond and non-frond vegetation through images in SamplePoint (Boothe et al. 2006).
- Means of roost and random palms were compared using Student's two-tailed t-test ($\alpha = 0.05$).

Results

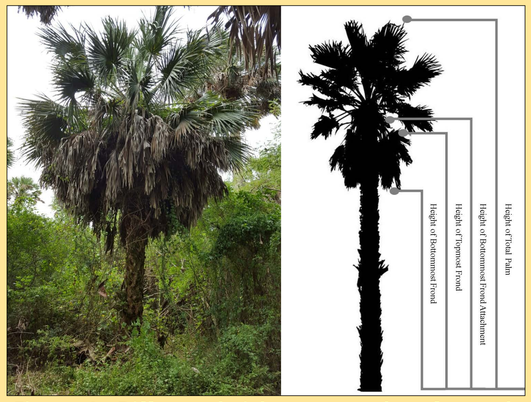

Figure 1. Different heights were taken for each roost and random palm using a clinometer at ground level; heights were calculated in meters.

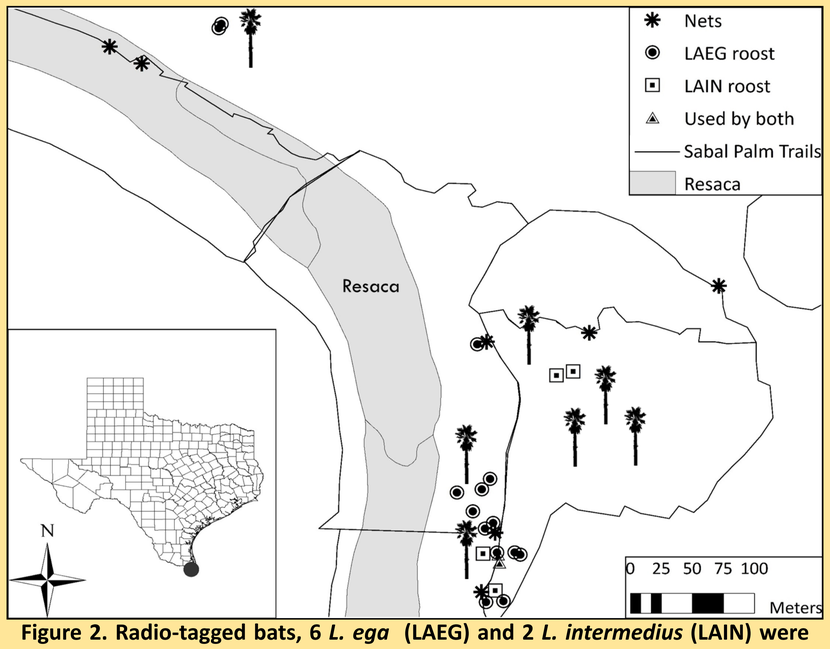

Figure 2. Radio-tagged bats, 6 *L. ega* (LAEG) and 2 *L. intermedius* (LAIN) were tracked to 20 roosts within Sabal Palm Sanctuary in Brownsville, TX.

Table 1. Measurement of characteristics of roost and random *Sabal texana* palms used by both *L. ega* and *L. intermedius*. Numbers are means ± SD.

Parameter	Roost (n = 20)	Random (n= 20)	*P*-value
Trunk Diameter (m)	0.39 ± 0.10	0.53 ± 0.16	0.003*
Heights (m)			
Total	12.34 ± 3.43	10.61 ± 3.99	0.151
Top Frond Skirt	8.18 ± 3.05	6.11 ± 2.79	0.031*
Bottom Frond Skirt	5.15 ± 2.01	4.48 ± 2.62	0.376
Frond Skirt Attachment	6.20 ± 2.15	5.07 ± 3.12	0.190
Frond Skirt Thickness	3.03 ± 1.60	1.62 ± 0.83	0.001*
Open vs. Cover Canopy (%)			
Cover	80.57 ± 9.71	81.10 ± 11.61	0.663
Open	19.08 ± 8.95	17.99 ± 9.95	0.307
Distance to a Trail (m)	16.34 ± 16.56	40.08 ± 60.74	0.090
Distance to a Resaca (m)	52.43 ± 18.83	70.03 ± 68.03	0.271

* Statistically significant

Results

- Captured 20 southern yellow bats, 5 northern yellow bats, and 75 evening bats (*Nycticeius humeralis*), effort of 11 nights.
- 76% of yellow bats (*L.. ega* and *L.. intermedius*) were captured in a triple high net placed over a trail that was approximately 50 m from a resaca. The remainder 14% were captured at a net over a resaca, a flyway, or a harp trap.
- All radio-tagged bats, (*L. ega* and *L. intermedius*), were tracked for 2-10 days during each visit; 20 sabal roost palm locations were recorded (repeated roost palms were excluded) (Figure 2).
- Roost location turnover was high.
- Most roost palms were located <50 m from a netting site that was placed near or over a Resaca
- Roost palms had a smaller trunk diameter and a taller, thicker dried frond skirt than random palms (Table 1).

Figure 4. Left: triple high mistnet within palm grove. Right: tracking towards Sabal palm grove.

Discussion

- We confirmed *L. ega* and *L. intermedius* roosting in dried palm fronds in South Texas (Mirowsky 1997). They were found roosting only in *Sabal texana* palms (Figure 3).
- Like other lasiurine bats (Menzel et al. 1998; Hutchinson and Lacki 2000), there were high day-to-day turnovers in roosts of *L. ega* and *L. intermedius*. This is consistent with the low roost fidelity expected for bats using temporary structures (Kunz and Fenton 2003; Coleman et al. 2012).
- We conclude that yellow bats roost in palms with a small trunk diameter, and taller, thicker dried frond skirts which correspond to older palms. The palm grove at Sabal Palm Sanctuary remains one of few sites in the United States to retain mature natural *Sabal texana*, whose fronds are purposely never trimmed unlike those found in urban areas (Figure 4).
- Our results suggest that trimming dried palm fronds in urban areas has a negative impact on roosting habitat for yellow bats.

References and Acknowledgements

- Booth D.T., S.E. Cox, and R.D. Berryman. 2006. Point sampling digital imagery with 'SamplePoint'. Environmental Monitoring and Assessment 123:97-108.
- Coleman, L.S., K.M. Moris, and S.B. Castleberry. 2012. Characteristics of *Lasiurus intermedius* (northern yellow bat) roosts in Sapelo Island, Georgia. Southeastern Naturalist 11(3): 534 – 536.
- Hutchinson, J.T. and M.J. Lacki. 2000. Selection of day roosts by red bats in mixed mesophytic forests. The Journal of Wildlife Management 64: 87 – 94.
- Kunz, T.H. and B. Fenton. 2003. Bat ecology. Chicago and London: The University of Chicago Press.
- Menzel, M.A., T.C. Carter, B.R. Chapman, and J. Laerm. 1998. Quantitative comparison of tree roosts used by red bats (*Lasiurus borealis*) and Seminole bats (*L. seminolus*). Canadian Journal of Zoology. 76: 630-634.
- Mirowsky, K.M. 1997. Bats in palms: precarious habitat. Bats 15:3-6.

Permits

- IACUC Approval No. 15-03
- TPWD Scientific Research Permit – SPR-0994-703

This project's success was due to the work of many. I would like to thank the following individuals and groups: Roger Rodriguez, as he provided essential contacts to determine site selection; to my gracious funding sources, for enabling the pursuit of this project (Head of the River Ranch Grant, ASU's Graduate Fellowship Program, Western Bat Working Group – Bob Berry Holohil Scholarship); to Seth Patterson and Gwyn Carmean at Sabal Palm Sanctuary, for their willing spirits that endured long trap nights; finally, I want t express my gratitude to all the volunteers from Brownsville and San Angelo, for suffering through mosquito-ridden nights and humid days in hopes of capturing and tracking yellow bats. I am grateful for, and blessed with, the strength and support to work through this project .