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**SHORT COMMUNICATION**

# A RECORD OF THE NORTHERN YELLOW BAT, *LASIURUS INTERMEDIUS* (CHIROPTERA, VESPERTILIONIDAE), FROM OMETEPE ISLAND, NICARAGUA, AND BAT DIVERSITY IMPLICATIONS FOR THIS REGION

**Thomas S. Risch[1,2]*, Stacy J. Scherman[1]**

[1] Arkansas State University, Department of Biological Sciences, Jonesboro, Arkansas, USA

[2] Arkansas State University, Arkansas Biosciences Institute, Jonesboro, Arkansas, USA

*** Corresponding Author:** *trisch@astate.edu*

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## INTRODUCTION

Conservation of species requires managers to have an understanding of their geographic distribution. Central America is a region of tremendous biodiversity (Myers et al. 2000). However, portions of the tropics remain under-sampled (Yu & Dobson 2000) and reasons for tropical fauna being under-sampled vary greatly between countries. One particularly diverse taxonomic group in Central America, including Nicaragua, are bats, order Chiroptera (Patterson & Pascual 1968, Reid 2009). However, due to under-sampling in this region, the taxonomic inventory of the bats of Nicaragua may still be incomplete, thus limiting our knowledge of total species diversity in this Central American country. One factor contributing to bat species potentially being under-sampled include inherent difficulties in detecting species, such as the challenges of detecting and categorizing low intensity echolocation calls of bats in the family Phyllostomidae (Kalko 2004) or the rarity of capturing high-flying bat species (Braun De Torrez et al. 2017).

Many high-flying bat species are within the genus *Lasiurus* (Family Vespertilionidae), also known as the hairy-tailed bats. Lasiurines have thick fur on their uropatagium's dorsal surface, which is used for insulation during roosting (Reid 2009). These bats often appear early in the evening and feeding flights are known to occur from 7 to 10 m above the ground, where most insect prey are captured in flight (Harvey et al. 2011, Nowak & Paradiso 1983). For example, the Hawaiian hoary bat (*Lasiurus cinereus semotus*) typically flew at 5-10 m above the ground (Belwood and Fullard 1984), whereas feeding buzzes for hoary bats (*L. cinereus*) in North America have been recorded as high as 67 m (Reimer et al. 2018). Lasiurines are generally found in wooded and open habitats where they roost in foliage or tree holes, changing roosts every 1 – 4 days (Carter & Menzel 2007, Nowak & Paradiso 1983). Evidence suggests bats of this genus are commonly solitary, but females of some species form small nursery colonies (Nowak & Paradiso 1983). However, northern (*Lasiurus intermedius*) and southern yellow bats (*Lasiurus ega*) have been reported to occasionally form groups (Carter & Menzel 2007). Female Lasiurines have two sets of mammary glands, likely because members of this genus regularly produce two pups per litter each season (Carter & Menzel 2007), with some species (*L. cinereus, Lasiurus seminolus,* and *L. intermedius*) producing litters of up to four pups (Nowak & Paradiso 1983). Of the 17 extant species of Lasiurines, 14 of them have a geographical range that includes a portion of the Neotropics (International Union for Conservation of Nature [IUCN] 2019).

*Lasiurus intermedius* is a medium sized bat with a mass of 14 – 31 g and a forearm length of 48 – 58 mm (Harvey et al. 2011, Reid 2009). This species has a range reported to include the southeastern United States as well as lowlands from Mexico to Honduras (Miller & Rodriguez 2016, Reid 2009, Webster et al. 1980). It is also reported in Costa Rica (Rodriguez-Herrera et al. 2003), but was not reported in Nicaragua until a single capture was reported by Medina-Fitoria (2014), yet the species is still absent from the most recent checklist of bats documented in Nicaragua (Martínez-Fonseca et al. 2020). *Lasiurus intermedius* is

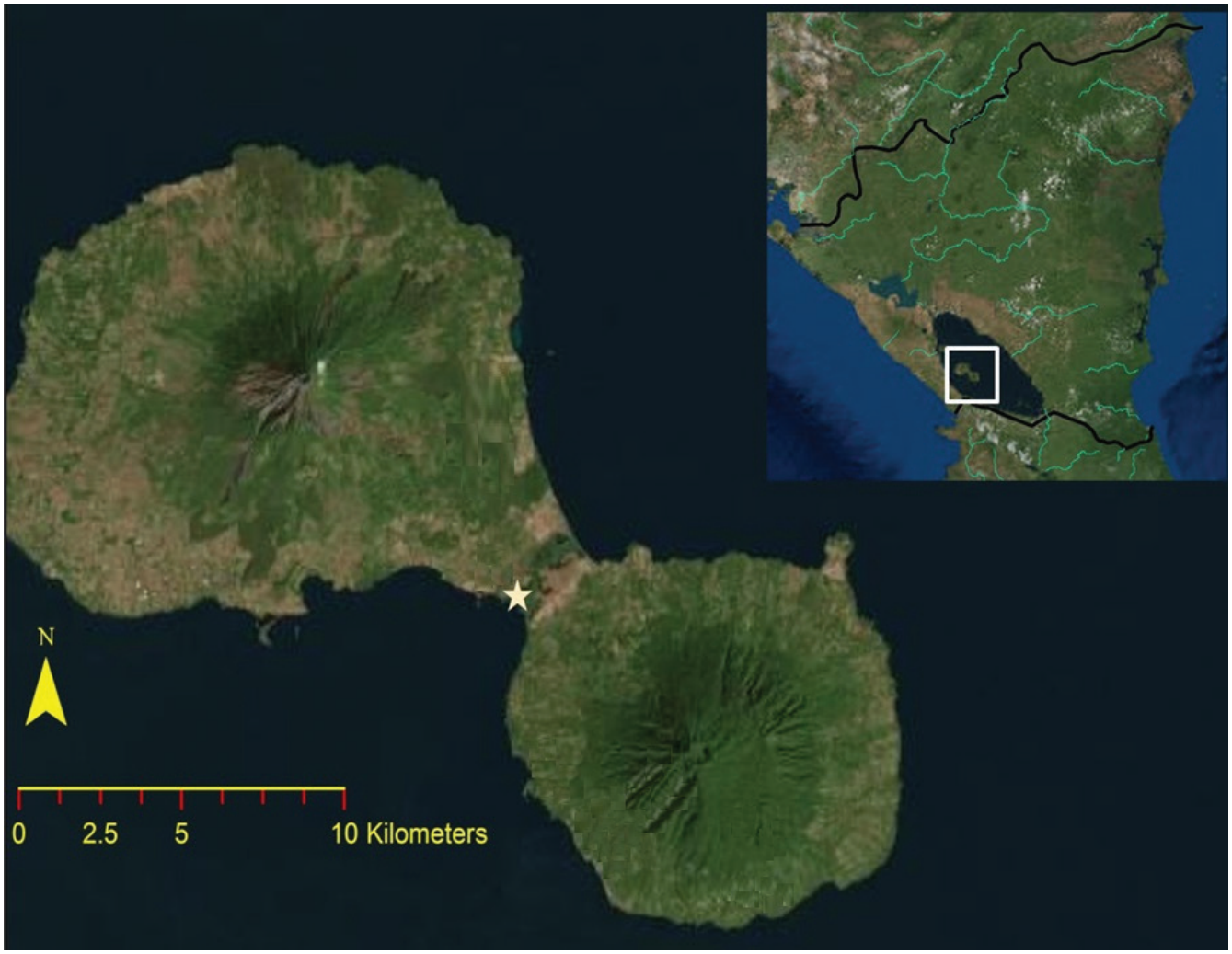


**Figure 1.** Location of capture site (white star) on Ometepe Island, Rios, Nicaragua.

uncommon in the Neotropics and there is limited information about the ecology, natural history, and biology of this species (Miller & Rodriguez 2016, Villalobos-Chaves & Dick 2014). This lack of knowledge combined with their apparent tendency to fly above the reach of mist-nets make this particular species a difficult and rare capture (Webster et al. 1980).

## MATERIALS AND METHODS

During this study we captured bats on Ometepe Island, Rios, Nicaragua (Fig. 1) with the assistance of the Maderas Rainforest Conservancy's (www.maderasrfc.org) Ometepe Biological Research Station. The netting site was on the isthmus of the island between two volcanoes (Concepcion and Maderas). Mist nets of 9 m wide by 7.2 m high were set over a spring-fed concrete-enclosed pool. The pool creates a large area of open water surrounded by forests and is largely unaffected by wind, creating an ideal drinking location for fast-flying bats.

## RESULTS AND DISCUSSION

At 21:16 on 24-May-2017, we captured a male *L. intermedius* with testes descended and some scarring on both wings. The individual had a forearm length of 52.8 mm and a mass of 28 g. The body was covered in yellowish pelage (Fig. 2a) extending down the anterior half of the dorsal side of the uropatagium (Fig. 2b). These characteristics make the identification of this bat as a *L. intermedius* unambiguous (Webster et al. 1980).

The presence of *L. intermedius* brings the total number of bat species reported in Nicaragua to 112 according to the most recent checklist of bats documented in Nicaragua (Martínez-Fonseca et al. 2020). As we contend Nicaragua is under-sampled, additional documentation of species in


**Figure 2.** Images of *Lasiurus intermedius*: (A) Color of pelage on ventral side. (B) Extent of dorsal uropatagium fur and color. (Photos courtesy of Ronald Redman)

Nicaragua are to be expected. We base this prediction from published distributions (IUCN 2019, Reid 2009) that show additional species to have a range directly North, South, or North and South of Nicaragua yet show a conspicuous distribution gap in the country. However, additional data may become available to complete these distribution gaps from the excellent work of local researchers. Regrettably, these publications may be less visible, since the data are contained in grey literature and published in Spanish. In fact, Medina-Fitoria reported *L. intermedius* in the South Pacific region of Nicaragua from a 2013 capture in his 2014 'Bats of Nicaragua Field Guide' published in Spanish. This makes our capture the second record of this species for this country. Medina-Fitoria (2010) has also addressed the bats of Ometepe Island specifically, where he does not report the presence of *L. intermedius* and the 2013 record was not from Ometepe. We suggest that those generating country-wide comprehensive species lists (e.g. IUCN 2019) include an exhaustive search for publications by local scientists in the native language. Although our experiences allow us to highlight the undocumented and under-reported bats of Nicaragua specifically, this pattern of under reported bat diversity is not unique to this country. Additionally, the recent Covid 19 pandemic has created new challenges for scientists to overcome with respect to research and conservation which will make filling in distribution gaps that much more challenging (Neupane 2020).

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