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Revised Checklist of the Bats (Mammalia: Chiroptera) of Nicaragua

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Abstract

We present an updated Nicaraguan checklist of the 111 species of bats present in Nicaragua. Twenty-seven new species representing 16 new genera and one new family have been added since Jones and Owen (1986) published the last internationally available Nicaraguan bat checklist. Fourteen additional species could occur in the country. Taxonomy and nomenclature are updated, and occurrence maps from museum specimens and capture data from local projects are included.

Key words: diversity, occurrence maps, species distribution

Resumen

Esta publicación representa una lista actualizada de las 111 especies de murciélagos presentes en Nicaragua. Veintisiete nuevas especies representantes de 16 nuevos géneros y una familia han sido añadidas desde que Jones y Owen (1986) publicaron la última lista de murciélagos de Nicaragua internacionalmente disponible. Otras catorce especies podrían ocurrir en el país. Nomenclatura y taxonomía ha sido actualizada e incluimos mapas de registros para especímenes de museos y datos locales propios.

Palabras clave: distribución, diversidad, especies, mapas de registros

Introduction

Nicaragua is one of the most bat-diverse areas in the world, and bats represent about half of all mammal species in the country (Hutson et al. 2001; Wilson and Reeder 2005; Reid 2009; Medina-Fitoria and Saldaña 2012; Wilson and Mittermeier 2019). The topography of Nicaragua is heterogeneous, with three traditionally recognized biogeographic zones—Pacific Lowlands, Caribbean Lowlands, and Central Mountains—based on climate, vegetation, and physiography (Fig. 1; MARENA 1999).

The Pacific Lowlands of Nicaragua represent about 15% of the country's landmass. This biogeographic zone is dominated by volcanic cordillera and

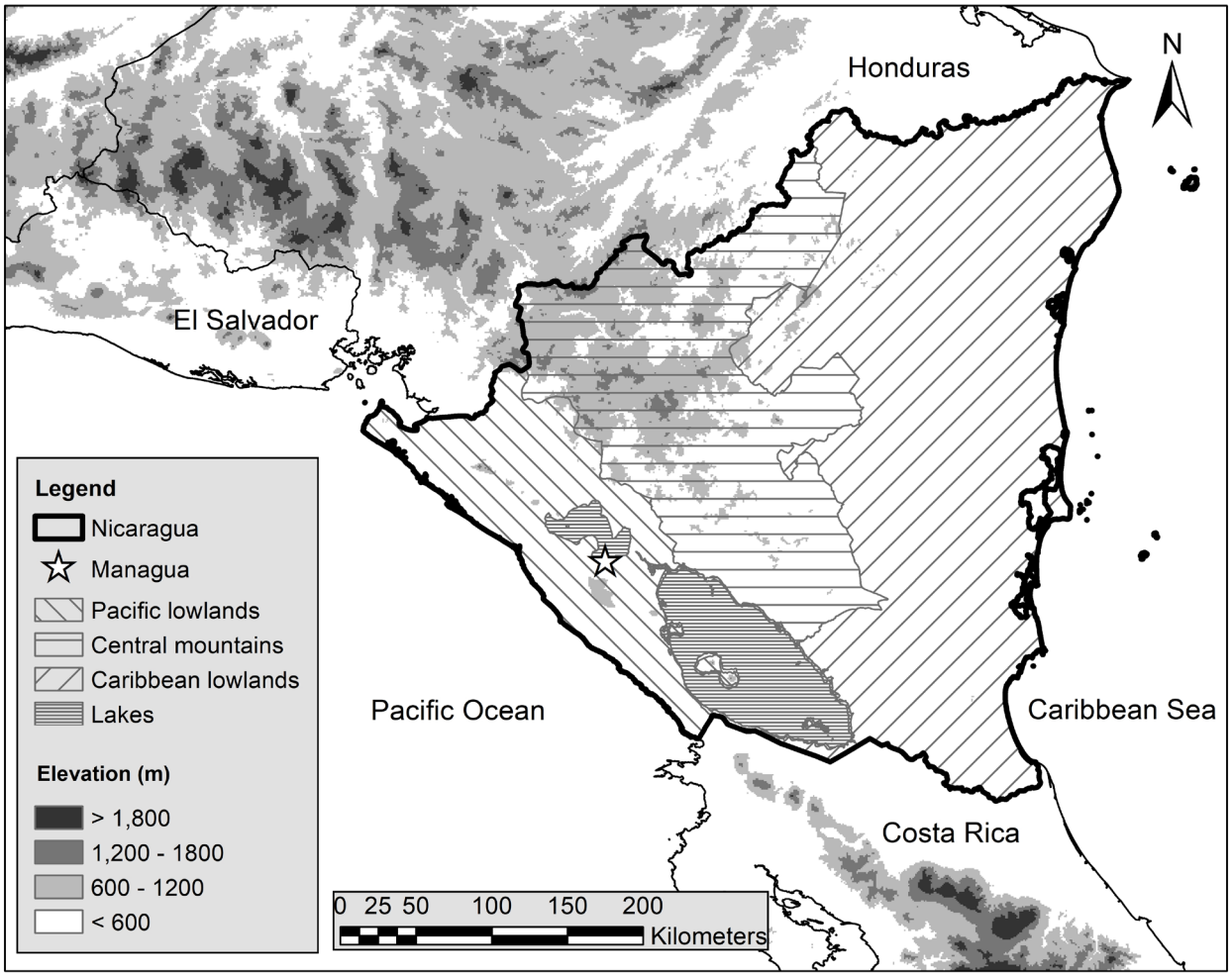

Figure 1. Topographical map of Nicaragua and neighboring countries. Nicaraguan border is bolded. Two large freshwater lakes are shown, Lake Managua (top) and Lake Nicaragua (bottom). The capital of Nicaragua, Managua, is represented by a star. Nicaragua is divided into three sections by biogeographic zone: Pacific Lowlands, Central Mountains, and Caribbean Lowlands (L to R).

plains running parallel to the Pacific Ocean. Volcanoes, reaching an elevation of 1,745 m, separate a large depression that contains the two largest freshwater lakes in Central America. The Pacific Lowlands has a well-established rainy and dry season with the rainy season starting in mid-May and continuing through November followed by the dry season. Precipitation for these seasons oscillates from 750 to 2,000 mm annually (Incer 1975; MARENA 1999). Vegetation predominantly is deciduous tropical dry forest (Holdridge 1967).

The Caribbean Lowlands constitute a large sedimentary plain comprising about 50% of the country's area. Most of this region occurs at an elevation of < 150 m (Incer 1975; MARENA 1999). Rainfall reaches a maximum of 6,000 mm per year in the extreme southeast of the country with a very short dry season; in the extreme northeast, rainfall reaches a moderate ~2,000 mm per year. Vegetation is dominated by lowland rainforest in the south and Caribbean pine savannah in the north (Incer 1975; MARENA 1999).

The Central Mountains are located between the Pacific Lowlands and Caribbean Lowlands. These highlands represent about 35% of Nicaragua's land area and extend north to the neighboring countries of Honduras and Guatemala. This region reaches the other two regions at the Nicaraguan depression (~30

m) along the southern border with Costa Rica (Incer 1975). This region has elevations up to 2,106 m and cooler temperatures (Incer 1975). Vegetation is variable, as the rain shadow effect causes the western side of the mountains to be considerably drier than the eastern side (Incer 1975; MARENA 1999).

The relative low relief of Nicaragua, and the Nicaraguan depression in particular, presents a natural barrier for many species by interrupting the continuity of adjacent ecosystems, such as cloud forest and pine forest (Incer 1975; Sunyer 2009; Bagley and Johnson 2014; Medina-Fitoria 2014). Eleven bat species reach their range limits in Nicaragua: seven of these (*Cormura brevirostris*, *Cyttarops alecto*, *Sturnira luisi*, *Vampyriscus nymphaea*, *Furipterus horrens*, *Thyroptera discifera*, and *Rhogeessa io*) reach their northernmost distribution, and four species (*Artibeus inopinatus*, *Lonchophylla robusta*, *Perimyotis subflavus*, and *Molossus aztecus*) reach their southernmost limit (Medina-Fitoria 2014).

Since Jones and Owen (1986) published *Checklist and Bibliography of Nicaraguan Chiroptera*, no other Nicaraguan bat-specific checklist has been published in an international outlet. Since the 2000s, several local publications have presented updates to the checklist and nomenclature of Nicaraguan bat species, including 26 new country records and one definitive confirmation, with several species limited to a handful or even a single individual recorded in the country (Medina-Fitoria et al. 2010; Medina-Fitoria and Saldaña 2012; Medina-Fitoria 2014; Medina-Fitoria et al. 2015). However, most of these publications had limited reach and are largely unknown outside of Nicaragua and to non-Spanish speaking researchers. This paper represents a complete and updated checklist of the bat species of Nicaragua.

METHODS

Nomenclature.—Nomenclature and common names are based on the Mammal Diversity Database (Burgin et al. 2018, mammaldiversity.org, accessed 5 December 2019), Baird et al. (2015), Moratelli and Burgin (2019), Pavan (2019), Solari et al. (2019), Tejedor (2019), Taylor (2019), and Basantes et al. (2020) to better reflect recent changes in taxonomic status of species in Central America since Wilson and Reeder (2005). Institutional acronyms for museum collections follow those by Sabaj-Perez (2016).

Occurrence maps.—Maps that illustrate localities of vouchered museum specimens from the Global Biodiversity Information Facility (GBIF.org; accessed 5 October 2020) database and additional localities from the authors' dataset of captures are provided in the Appendix. These maps are intended to serve as a general reference to the occurrences of each species in the country. Identification of the specimens relied on information published by the respective museums. Data from GBIF were acquired by defining the search based on: "Species = Chiroptera"; "Basis of record = Preserved specimen"; "Location = Including coordinates"; and "Country or Area = Nicaragua". The search generated a list of 4,181 specimens from 13 institutions (KU: 3,058; TTU: 877; MHNG: 124; MCZ: 86; UCLA: 11; LACM: 6; MVZ: 5; QM: 4; PSM: 3; UAZ: 3; UMMZ: 2; UF: 1; and WAM: 1). Occurrence maps were generated in R version 3.4.4 by superimposing GPS coordinates onto a topographic map of Nicaragua that illustrates the three main biogeographic regions.

Additional records.—Occurrence data from authors' personal datasets were included. Localities were collected using handheld GPS units (e.g., Garmin GPS 64XC) from research projects conducted from June 2000 to May 2020. All additional records are based on captures following methods similar to those presented in Kunz and Kurta (1988). Bats were captured and handled following methods outlined in the research permit (DGPNB-IC-025-2018) provided by the Ministerio de Ambiente y Recursos Naturales of Nicaragua (MARENA) and with the approval of the Northern Arizona University Institutional Animal Care and Use Committee (Protocols 11-012, 15-006, 18-008), and following the guidelines of the American Society of Mammalogists (Sikes et al. 2016). Locality data for *Rhogeessa permutandis* was provided by Baird et al. (2019). No specific coordinates were provided for specimens of five species: *Thyroptera discifera*, *Me-*

sophylla macconnellii, *Eumops auripendulus*, *Eumops nanus*, and *Molossus aztecus*; locality coordinates for these species were assigned based on the location description of museum vouchers (Miller 1986; Prestridge 2019; Orrell 2020; Slade 2020).

RESULTS

Results from the efforts of this study indicate that Nicaragua has 111 bat species representing 66 genera and 9 families. The family Phyllostomidae represents the most diverse group (9 subfamilies, 57 species) followed by Vespertilionidae (2 subfamilies, 17 species), Molossidae (1 subfamily, 15 species), Emballonuridae (1 subfamily, 10 species), Mormoopidae (5 species), Natalidae (2 species), Noctilionidae (2 species), Thyropteridae (2 species), and Furipteridae (1 species).

Conservation status.—The International Union for Conservation of Nature (IUCN) has listed three bat species that occur in Nicaragua as 'near threatened': *Bauerus dubiaquercus*, *Ectophylla alba*, and *Vampyrum spectrum* (Rodríguez and Pineda 2015; Solari 2018a, 2018b). However, Medina-Fitoria et al. (2017) listed 17 species of conservation concern using methods reported in Sanchez et al. (2007), including seven species at risk of extinction (*Lampronycteris brachyotis*, *Phylloderma stenops*, *Sturnira luisi*, *Artibeus inopinatus*, *Uroderma magnirostrum*, *Furipterus horrens*, and *Thyroptera discifera*) and ten species as threatened (*Trynicteris nicefori*, *Mimon cozumelae*, *Vampyrum spectrum*, *Mesophylla macconelli*, *Ectophylla alba*, *Natalus lanatus*, *Mormoops megalophylla*, *Rhogeessa io*, *Bauerus dubiaquercus*, and *Eumops underwoodi*). Currently, no management actions have been implemented at a national level to protect any of the species listed by Medina-Fitoria et al. (2017) or IUCN (Medina-Fitoria et al. 2018).

Species of probable occurrence in Nicaragua.—Recently, two subspecies of species known to occur in Nicaragua were elevated to species status: *Pteronotus fulvus*, formerly *P. davyi fulvus*, and *P. psilotis*, formerly *P. personatus psilotis* (Pavan and Marroig 2016, 2017; Pavan 2019). The presence of *P. fulvus* and *P. psilotis* in the country have not yet been confirmed but their ranges approach the northern border of Nicaragua with Honduras and El Salvador (Pavan 2019). Further analysis of specimens and genetic material from the northern Nicaraguan border is needed to establish whether these newly recognized species occur in the country. At least 12 other bat species may occur in the country based on the continuation of the ecosystems that these species inhabit from neighboring countries into Nicaragua. Of these, three species (*Glyphonycteris daviesi*, *Artibeus aztecus*, and *Eumops hansae*) have been recorded < 80 km north and south of Nicaragua in the neighboring countries of Costa Rica and Honduras; four species (*Anoura cultrata*, *Sturnira mordax*, *Platyrrhinus vittatus*, and *Chiroderma trinitaum*) have the northernmost limit of their range distribution close to the Costa Rican border, and four species (*Lophostoma evotis*, *Choeronycteris mexicana*, *Myotis velifer*, and *Uroderma davisi*) have their southernmost limit near the northern Nicaraguan border (Reid 2009; Medina-Fitoria 2014). Finally, *Eumops hansae* has scattered records north and south of Nicaragua, from southern Mexico to Brazil and northern Bolivia (Reid 2009; Taylor et al. 2019). We speculate that, in contrast to research progress in neighboring countries such as Costa Rica and research on mammals and bats over the last 100 years in Nicaragua (Medina-Fitoria and Martínez-Fonseca 2019), these species have not yet been recorded in Nicaragua because of the disruption in scientific study from the civil war from the 1970s through the 1990s, difficult road access, and poor funding, which makes sampling challenging in many areas (Medina-Fitoria and Martínez-Fonseca 2019; Medina-Fitoria pers. comm.).

CHECKLIST

The checklist is presented by family and subfamily following the phylogenetic order suggested by Wilson and Mittermeier (2019). Genera and species are listed in alphabetical order within their respective taxonomic rank. Numbers in the left column refer to occurrence maps provided in the Appendix. Distribution of each species is indicated as Pacific Lowlands, PL; Central Mountains, CM; and Caribbean Lowlands, CL. Elevation ranges are extrapolated from GPS locations of GBIF and additional records. *Indicates new additions since Owen and Wilson (1986); **indicates new additions since Medina-Fitoria (2014).

Map No.	Species	Common name	Distribution	Elevation range (m)
	ORDER CHIROPTERA			
	Family Emballonuridae Gervais, 1855			
	Subfamily Emballonurinae Gervais, 1855			
1.	*Balantiopteryx plicata* Peters, 1867	Gray Sac-winged Bat	PL, CM	12–1,570
2.	*Centronycteris centralis* Thomas, 1912	Thomas's Shaggy Bat	CL	34–53
3.	*Cormura brevirostris* (Wagner, 1843)	Chestnut Sac-winged Bat	PL, CL	18–201
4.	*Cyttarops alecto* Thomas, 1913	Short-eared Bat	CL	12–175
5.	*Diclidurus albus*** Wied-Neuwied, 1820	Northern Ghost Bat	CL	31
6.	*Peropteryx kappleri* Peters, 1867	Greater Dog-like Bat	PL, CL	27–317
7.	*Peropteryx macrotis* (Wagner, 1843)	Lesser Dog-like Bat	PL, CM	40–730
8.	*Rhynchonycteris naso* (Wied-Neuwied, 1820)	Proboscis Bat	PL, CL, CM	5–558
9.	*Saccopteryx bilineata* (Temmick, 1838)	Greater Sac-winged Bat	PL, CL, CM	7–819
10.	*Saccopteryx leptura* (Schreber, 1774)	Lesser Sac-winged Bat	PL, CL	7–579
	Family Noctilionidae Gray, 1821			
11.	*Noctilio albiventris* Desmarest, 1818	Lesser Bulldog Bat	PL, CL, CM	5–558
12.	*Noctilio leporinus* (Linnaeus, 1758)	Greater Bulldog Bat	PL, CL, CM	7–1,295
	Family Furipteridae Gray, 1866			
13.	*Furipterus horrens** (F. Cuvier, 1828)	Thumbless Bat	CL	60
	Family Thyropteridae Miller, 1907			
14.	*Thyroptera discifera* (Lichtenstein and Peters, 1855)	Peter's Disk-winged Bat	CL	17
15.	*Thyroptera tricolor** Spix, 1823	Spix's Disk-winged Bat	CL	17–428
	Family Mormoopidae Saussure, 1860			
16.	*Pteronotus davyi* Gray, 1838	Davy's Naked-backed Bat	PL, CL, CM	10–1,482
17.	*Pteronotus gymnonotus* (Natterer, 1843)	Big Naked-backed Bat	PL, CL, CM	11–1,161
18.	*Pteronotus mesoamericanus* Smith, 1972	Mesoamerican Common Mustached Bat	PL, CL, CM	8–1,454
19.	*Pteronotus personatus* (Wagner, 1843)	Wagner's Mustached Bat	PL, CM	10–464
20.	*Mormoops megalophylla** (Peters, 1864)	Peter's Ghost-faced Bat	PL, CM	359–1,071

Map No.	Species	Common name	Distribution	Elevation range (m)
	Family Phyllostomidae Gray, 1825			
	Subfamily Micronycterinae Van Den Bussche, 1992			
21.	*Lampronycteris brachyotis* (Dobson, 1879)	Orange-throated Bat	PL	31–563
22.	*Micronycteris hirsuta* (Peters, 1869)	Hairy Big-eared Bat	PL, CL	14–765
23.	*Micronycteris microtis* Miller, 1898	Common Big-eared Bat	PL, CL, CM	16–1,406
24.	*Micronycteris minuta* (Gervais, 1856)	Tiny Big-eared Bat	PL, CL, CM	10–614
25.	*Micronycteris schmidtorum* Sanborn, 1935	Schmidt's Big-eared Bat	PL, CL, CM	21–939
	Subfamily Desmodontinae Wagner, 1840			
26.	*Desmodus rotundus* (E. Geoffroy, 1810)	Common Vampire Bat	PL, CL, CM	8–1,675
27.	*Diaemus youngi* (Jentink, 1893)	White-winged Vampire Bat	PL, CL, CM	10–294
28.	*Diphylla ecaudata* Spix, 1823	Hairy-legged Vampire Bat	PL, CL, CM	171–1,173
	Subfamily Lonchorhininae Gray, 1866			
29.	*Lonchorhina aurita** Tomes, 1863	Common Sword-nosed Bat	PL, CL, CM	54–1,401
	Subfamily Phyllostominae Gray, 1825			
30.	*Chrotopterus auritus* (Peters, 1865)	Woolly False Vampire Bat	PL, CL, CM	30–1,454
31.	*Gardnerycteris keenani* (Handley, 1960)	Keenan's Hairy-nosed Bat	PL, CM	12–449
32.	*Lophostoma brasiliense* Peters, 1866	Pygmy Round-eared Bat	PL, CL, CM	8–765
33.	*Lophostoma silvicolum* d'Orbigny, 1836	White-throated Round-eared Bat	PL, CL	12–175
34.	*Macrophyllum macrophyllum* (Schinz, 1821)	Long-legged Bat	PL, CL	34–74
35.	*Mimon cozumelae** Goldman, 1914	Cozumelan Golden Bat	CL	38–38
36.	*Phylloderma stenops** Peters, 1865	Pale-faced Bat		30–148
37.	*Phyllostomus discolor* Wagner, 1843	Pale Spear-nosed Bat		12–1,570
38.	*Phyllostomus hastatus* (Pallas, 1767)	Greater Spear-nosed Bat		12–1,240
39.	*Tonatia bakeri* Williams, Willig, and Reid 1995	Striped-headed Round-eared Bat	PL, CL	19–164
40.	*Trachops cirrhosus* (Spix, 1823)	Fringe-lipped Bat	PL, CL	14–174
41.	*Vampyrum spectrum* (Linnaeus, 1758)	Spectral Bat	PL, CL, CM	13–1,076
	Subfamily Glossophaginae Bonaparte, 1845			
42.	*Anoura geoffroyi* Gray, 1838	Geoffroy's Tailless Bat	CM	675–1,948
43.	*Choeroniscus godmani* (Thomas, 1903)	Godman's Long-tongued Bat	PL, CL, CM	10–1,821
44.	*Glossophaga commissarisi* Gardner, 1962	Commissaris's Long-tongued Bat	PL, CL, CM	5–1,454
45.	*Glossophaga leachii* (Gray, 1844)	Gray's Long-tongued Bat	PL, CL, CM	8–1,591
46.	*Glossophaga soricina* (Pallas, 1766)	Pallas's Long-tongued Bat	PL, CL, CM	6–1,821
47.	*Hylonycteris underwoodi** Thomas, 1903	Underwood's Long-tongued Bat	PL, CL	14–748
48.	*Leptonycteris yerbabuenae*** Martinez and Villa-R. 1940	Lesser Long-nosed Bat	CM	1,247
49.	*Lichonycteris obscura* Thomas, 1895	Dark Long-tongued Bat	PL, CL, CM	12–1,285

Map No.	Species	Common name	Distribution	Elevation range (m)
	Subfamily Lonchophyllinae Griffiths, 1982			
50.	*Lonchophylla robusta* Miller, 1912	Orange Nectar Bat	CL, CM	23–1,668
	Subfamily Carollinae Miller, 1924			
51.	*Carollia castanea* H. Allen, 1890	Chestnut Short-tailed Bat	PL, CL, CM	6–1,401
52.	*Carollia perspicillata* (Linnaeus, 1758)	Seba's Short-tailed Bat	PL, CL, CM	6–1,675
53.	*Carollia sowelli* Solari, Baker, and Hoffmann 2002	Sowell's Short-tailed Bat	PL, CL, CM	4–1,821
54.	*Carollia subrufa* (Hahn, 1905)	Gray Short-tailed Bat	PL, CL, CM	8–1,286
	Subfamily Glyphonycterinae Baker, Solari, Cirranello and Simmons, 2016			
55.	*Glyphonycteris sylvestris* Thomas, 1896	Tricolored Big-eared Bat	PL, CL, CM	197–1,111
56.	*Trinycteris nicefori* (Sanborn, 1949)	Niceforo's Big-eared Bat	PL, CL	17–765
	Subfamily Stenodermatinae Gervais, 1856			
57.	*Artibeus inopinatus* Davis and Carter, 1964	Honduran Fruit-eating Bat	PL	31–104
58.	*Artibeus jamaicensis* Leach, 1821	Jamaican Fruit-eating Bat	PL, CL, CM	7–1,570
59.	*Artibeus lituratus* (Olfers, 1818)	Great Fruit-eating Bat	PL, CL, CM	4–1,668
60.	*Artibeus phaeotis* (Miller, 1902)	Pygmy Fruit-eating Bat	PL, CL, CM	0–1,570
61.	*Artibeus toltecus* (Saussure, 1860)	Toltec Fruit-eating Bat	PL, CM	18–1,675
62.	*Artibeus watsoni* Thomas, 1901	Thomas's Fruit-eating Bat	PL, CL, CM	5–1,407
63.	*Centurio senex* Gray, 1842	Wrinkle-faced Bat	PL, CL, CM	21–922
64.	*Chiroderma salvini** Dobson, 1878	Salvin's Big-eyed Bat	CM	472–1,478
65.	*Chiroderma villosum* Peters, 1860	Hairy Big-eyed Bat	PL, CL, CM	12–1,570
66.	*Ectophylla alba* H. Allen, 1892	Honduran White Bat	PL, CL	12–164
67.	*Enchisthenes hartii** (Thomas, 1892)	Velvety Fruit-eating Bat	CM	944–1,407
68.	*Mesophylla macconnelli** Thomas, 1901	MacConnell's Bat		14–14
69.	*Platyrrhinus helleri* (Peters, 1866)	Heller's Broad-nosed Bat	PL, CL, CM	12–1,570
70.	*Sturnira hondurensis* Goodwin, 1940	Honduran Yellow-shouldered Bat	CM	83–1,821
71.	*Sturnira luisi** Davis, 1980	Luis's Yellow-Shouldered Bat	CL	59
72.	*Sturnira parvidens* Goldman, 1917	Northern Yellow-shouldered Bat	PL, CL, CM	10–1,668
73.	*Uroderma convexum* Lyon, 1902	Pacific Tent-making Bat	PL, CL, CM	0–1,284
74.	*Uroderma magnirostrum* Davis, 1968	Brown Tent-making Bat	PL	39–718
75.	*Vampyressa thyone* Thomas, 1909	Northern Little Yellow-eared Bat	PL, CL, CM	12–1,381
76.	*Vampyriscus nymphaea* (Thomas, 1909)	Striped Yellow-eared Bat	CL	14–247
77.	*Vampyrodes major* G. M. Allen, 1908	Great Striped-faced Bat	CL, CM	12–1,401
	Family Natalidae Gray, 1866			
78.	*Natalus mexicanus* Miller, 1902	Mexican Funnel-eared Bat	PL	19–879
79.	*Natalus lanatus** Tejedor, 2005	Woolly Funnel-eared Bat	PL, CM	69–1,071

Map No.	Species	Common name	Distribution	Elevation range (m)
	Family Molossidae Gervais, 1856			
80.	*Cynomops mexicanus** (Jones and Genoways, 1967)	Mexican Dog-faced Bat	PL, CM	16–248
81.	*Eumops auripendulus* (Shaw, 1800)	Black Bonneted Bat	CL, CM	50–794
82.	*Eumops ferox* (Gundlach, 1861)	Fierce Bonneted Bat	PL, CM	16–406
83.	*Eumops nanus* (Miller, 1900)	Northern Dwarf Bonneted Bat	PL, CL, CM	16–794
84.	*Eumops underwoodi* Goodwin, 1940	Underwood's Bonneted Bat	PL	16–99
85.	*Molossus alvarezi* Gonzáles-Ruiz, Ramírez-Pulido and Arroyo-Cabrales, 2011	Alvarez's Mastiff Bat	PL, CL, CM	11–558
86.	*Molossus aztecus** (Saussure, 1860)	Aztec Mastiff Bat	CL, CM	50–604
87.	*Molossus coibensis* J. A. Allen, 1904	Coiban Mastiff Bat	PL	39–280
88.	*Molossus currentium* Thomas, 1901	Bonda Mastiff Bat	PL, CL	12–48
89.	*Molossus molossus* (Pallas, 1766)	Pallas's Mastiff Bat	PL, CL, CM	7–558
90.	*Molossus pretiosus* Miller, 1902	Miller's Mastiff Bat	PL, CM	16–614
91.	*Molossus rufus* E. Geoffroy, 1805	Black Mastiff Bat	PL, CM	15–718
92.	*Nyctinomops laticaudatus** (E. Geoffroy, 1805)	Broad-eared Free-tailed Bat	CM	670
93.	*Promops centralis* Thomas, 1915	Big Crested Mastiff Bat	PL	39–441
94.	*Tadarida brasiliensis*** (I. Geoffroy, 1824)	Brazilian Free-tailed Bat	CL, CM	39–711
	Family Vespertilionidae Gray, 1821			
	Subfamily Vespertilioninae Gray, 1821			
95.	*Aeorestes cinereus** (Palisot de Beauvois, 1796)	Hoary Bat	PL	44
96.	*Bauerus dubiaquercus** (Van Gelder, 1959)	Van Gelder's Bat	CM, CL	74–1,591
97.	*Dasypterus ega** (Gervais, 1856)	Southern Yellow Bat	PL, CL, CM	11–1,401
98.	*Dasypterus intermedius** (H. Allen, 1862)	Northern Yellow Bat	PL	11–43
99.	*Eptesicus brasiliensis** (Desmarest, 1819)	Brazilian Brown Bat	PL, CL, CM	16–1,111
100.	*Eptesicus furinalis* (d´Orbigny, 1847)	Argentinian Brown Bat	PL, CL, CM	8–1,285
101.	*Eptesicus fuscus** (Beauvois, 1796)	Big Brown Bat	CM	1284–1,591
102.	*Lasiurus frantzii* (Peters, 1871)	Desert Red Bat	PL, CM	11–1,261
103.	*Perimyotis subflavus** (F. Cuvier, 1832)	Eastern Pipistrelle	CM	670
104.	*Rhogeessa bickhami* Baird, Marchán-Rivadeneira, Pérez, and Baker, 2012	Black-winged Little-yellow Bat	PL, CL, CM	10–1,668
105.	*Rhogeessa io** Thomas, 1903	Thomas's Yellow Bat	PL, CL	35–53
106.	*Rhogeessa permutandis*** Baird, Light, and Bickham 2019	Nicaraguan Little-yellow Bat	CL	21
	Subfamily Myotinae Tate, 1942			
107.	*Myotis albescens* (E. Geoffroy, 1806)	Silver-tipped Myotis	PL, CL, CM	14–358
108.	*Myotis elegans* Hall, 1962	Elegant Myotis	PL, CL, CM	12–301
109.	*Myotis keaysi* J. A. Allen, 1914	Hairy-legged Myotis	CM	687–1,675
110.	*Myotis nigricans* (Schinz, 1821)	Black Myotis	PL, CL, CM	5–1,406
111.	*Myotis riparius* Handley, 1960	Riparian Myotis	PL, CL, CM	34–1,401

COMMENTS ON STATUS, TAXONOMY, AND NOMENCLATURE

Of the 27 species added to the checklist since Jones and Owens (1986), 24 species are based on new in-hand capture records (Dolan 1989; McCarthy 1993; Medina Fitoria et al. 2007, 2010, 2015, 2016; Saldaña et al. 2020), one species is based on acoustic recordings (Medina-Fitoria et al. 2016), one species was reconfirmed (Loza et al. 2018), and one is a newly-described species (Baird et al. 2019). Numerous changes in taxonomy and nomenclature have been proposed for bat populations in Nicaragua and neighboring countries, of which many were already considered by Medina-Fitoria (2014) and Heather et al. (2019).

Emballonuridae.—*Diclidurus albus* had been erroneously included in Nicaraguan mammal checklists for decades based on a specimen that was collected in Costa Rica in 1837. The species was confirmed in Nicaragua with the capture of a specimen in the southeastern Caribbean Lowlands near the border with Costa Rica in January 2017 (Loza et al. 2018).

Mormoopidae.—The former two subspecies of *Pteronotus parnellii*, *P. p. mesoamericanus* and *P. p. rubiginosus*, have been elevated to species level (Dávalos 2006; Clare et al. 2013; Solari 2016a, 2016b). The range of *P. rubiginosus* was described as two large, discontinuous patches: the Amazon Basin and the Caribbean slope of Honduras, Nicaragua, Costa Rica; and most of eastern Panama (Dávalos 2006; Solari 2016a, 2016b). However, Pavan (2019) does not recognize the occurrence of *P. rubiginosus* in Central America and limited its distribution to the Amazon Basin, assigning all former populations of *P. parnellii* in Central America to *P. mesoamericanus*. Further examination of populations in Nicaragua and Central America is needed to understand the actual range of each species. For this reason, records from GBIF tagged as *P. parnellii* and *P. rubiginosus* were plotted together on the *P. mesoamericanus* occurrence map.

Thyropteridae.—The only records in Nicaragua for *Thyroptera discifera* are based on specimens collected in 1892 and represent the northernmost records of the global distribution of the species (Miller 1896; Medina-Fitoria 2014; Solari and Villada-Cadavid 2018).

Phyllostomidae.—All Central American populations of *Anoura geoffroyi* are recognized by some authors as *A. lasiopyga* (Mantilla-Meluk and Baker 2010; Medina-Fitoria et al. 2015). However, we include it here as *A. geoffroyi* based on the revision by Solari et al. (2019).

Artibeus intermedius has been recognized as a separate species from *A. lituratus* by Davis (1984), Wilson (1991), and other publications (e.g., Heather et al. 2019). Herein, *A. intermedius* is considered a synonym of *A. lituratus palmarum* following Simmons (2005) and Solari et al. (2019). The subgenus *Dermanura* has been proposed as a sister genus of *Artibeus* level for the smaller species of fruit-bats (Owen 1987; Solari et al. 2009). Herein, *Artibeus phaeotis*, *A. toltecus*, and *A. watsoni* are listed following Baker et al. (2000), Simmons (2005), and Solari et al. (2019).

Former Central American populations of *Mimon crenulatum* have been recognized as *Gardnerycteris keenani* (Hurtado and D'Elía 2018). *Leptonycteris yerbabuenae* is the most recent addition to the known Nicaraguan bat species, with a single individual collected in the dry zone of the western slopes of the Central Mountains (Saldaña et al. 2020). Populations of *Uroderma bilobatum* from southern Mexico through western Colombia and Ecuador are now recognized as *U. convexum*, with the subspecies *U. c. molaris* present on the Nicaraguan Caribbean Lowlands (Mantilla-Meluk 2014; Solari et al. 2019). *Uroderma convexum* is elevated to species rank based on cranial features originally described by Lyon (1902) and the karyotype by Mantilla-Meluk (2014). Central American populations of *Vampyrodes caraccioli* are now recognized as *V. major* with the former now limited to eastern Colombia, the Amazon Basin, and the Atlantic forest in Brazil (Velazco and Simmons 2011; Solari et al. 2019). Basantes et al. (2020) restrict *Tonatia saurophila* to Jamaica and recognize *T. bakeri* populations from southern Mexico, Central America, western Venezuela, western Colombia, and northern Ecuador, with *T. maresi* occupying most of northern South America and the Amazon Basin.

Natalidae.—López-Wilchis et al. (2012) found no strong genetic differences between the populations of *Natalus mexicanus* and *N. lanatus* in Mexico described by Tejedor (2005). However, *N. lanatus* continues to be recognized in studies across Central America as a distinct species from *N. mexicanus* based on morphological and acoustic features (Rodríguez-Herrera et al. 2011; Medina-Fitoria and Saladaña 2012; Medina-Fitoria et al. 2014, 2015; Frank et al. 2018; Heather et al. 2019; Tejedor 2019). *Natalus lanatus* is listed herein based on Tejedor (2019) until the status of Central American populations are further studied.

Molossidae.—Taylor et al. (2019) restrict *Cynomops mexicanus* to central and southern Mexico, with Central American populations recognized as *C. greenhalli*. However, *C. mexicanus* is still widely recognized as the valid name for dog-faced bats in Central America by numerous sources (Peters et al. 2002; Owen and Jirón 2012; Rodríguez-Herrera et al. 2014; Mora et al. 2017; Heather et al. 2019). *Eumops ferox* has been separated from *E. glaucinus* in Mexico, Central America, Cuba, and Jamaica (McDonough et al. 2008; Baker et al. 2009; Taylor et al. 2019). *Eumops bonariensis* has been included in Nicaragua by several authors in the past, but populations in Central America are now recognized as *E. nanus*, and *E. bonariensis* is now restricted to southern Brazil, Uruguay, Paraguay, and northern Argentina (Eger 2008; Medina-Fitoria 2014; Taylor et al. 2019). *Molossus bondae* recently was synonymized in *Molossus currentium* (Loureiro et al. 2018; Taylor et al. 2019). Central American populations of *Molossus sinaloae* are now recognized as a distinct species, *M. alvarezi* (González-Ruiz et al. 2011; Loureiro et al. 2019; Taylor et al. 2019). *Tadarida brasiliensis* has been recorded with acoustic detectors (Anabat II) at several locations in Nicaragua by different researchers but no individual has been captured (Medina-Fitoria et al. 2016; Bruce Miller pers. comm.). This species ranges from the southern part of the continental United States to Chile and Argentina with confirmed captures in the neighboring countries of Honduras, El Salvador, and Costa Rica (Barquez et al. 2015). The occurrence map includes all acoustic detections (Medina-Fitoria et al. 2016; José G. Martínez-Fonseca unpublished data).

Vespertilionidae.—Following Baird et al. (2015), former species in the genus *Lasiurus* are now recognized as *Dasypterus intermedius*, *D. ega*, and *Aeorestes cinereus*. Further, Central American populations of *Lasiurus blossevillii frantzii* were elevated to species level as *L. frantzii* (Baird et al. 2015; Moratelli et al. 2019). Nicaragua's first endemic bat species, *Rhogessa permutandis*, was described by Baird et al. (2019) based on molecular and morphological data from museum specimens collected in 1967 near "El Rama" in the lowlands of the central Caribbean side of Nicaragua. The range of *Rhogeessa permutandis* in Nicaragua and Central America needs further study because the species is probably easily misidentified as other species of the *R. tumida* complex (Baird et al. 2019).

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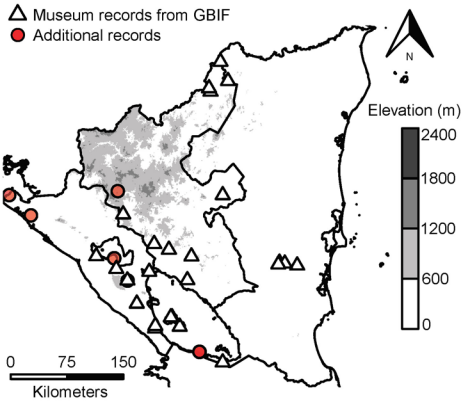
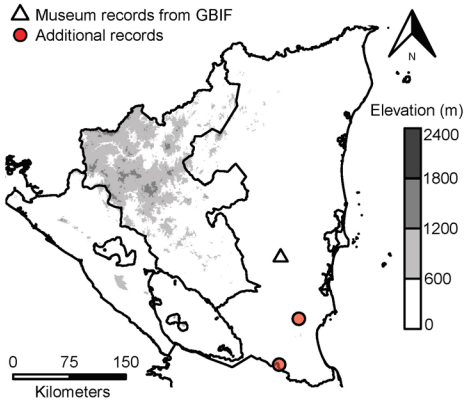
APPENDIX

Maps illustrating all known localities for each bat species present in Nicaragua. White triangles represent records from specimens with specific localities in the Global Biodiversity Information Facility (GBIF), and red circles represent additional records from the literature and from the authors' data. Map numbers correspond to additional date provided in the Checklist of species.

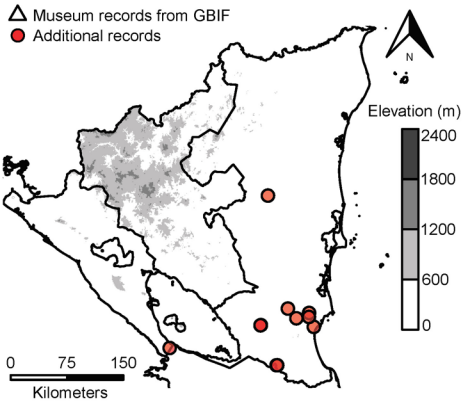
1. Balantiopteryx plicata



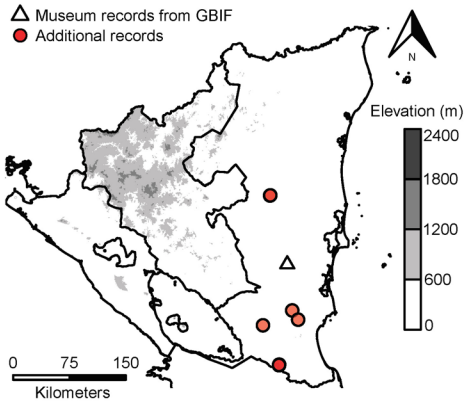
2. Centronycteris centralis



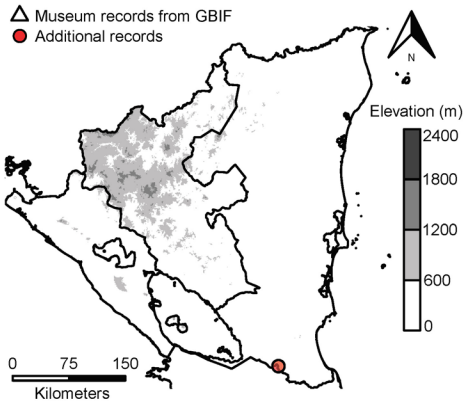
3. Cormura brevirostris



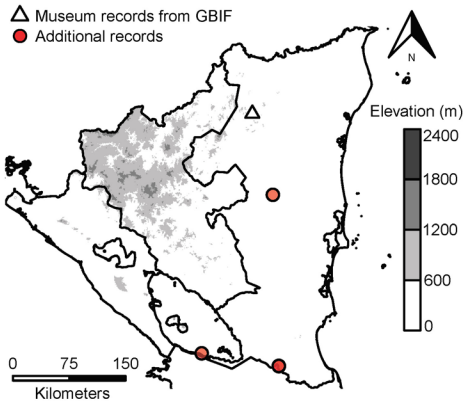
4. Cyttarops alecto



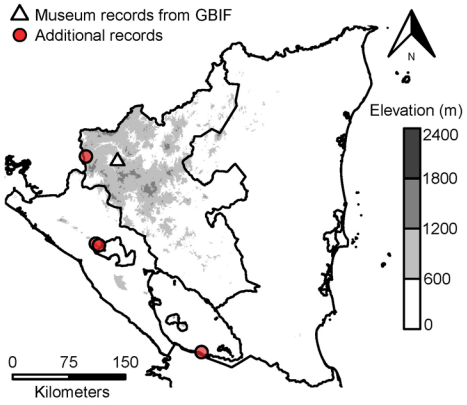
5. Diclidurus albus



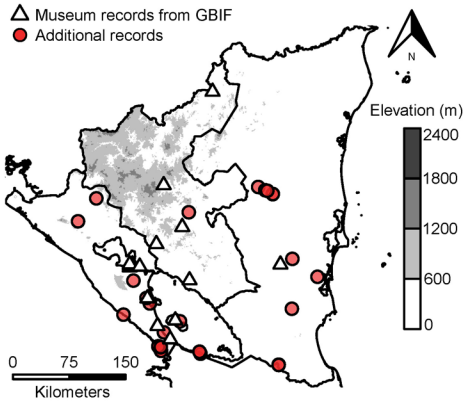
6. Peropteryx kappleri



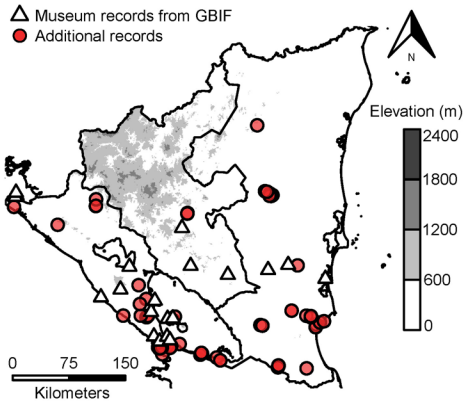
7. Peropteryx macrotis



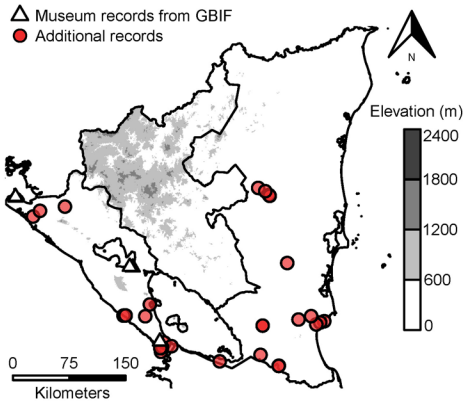
8. Rhynchonycteris naso



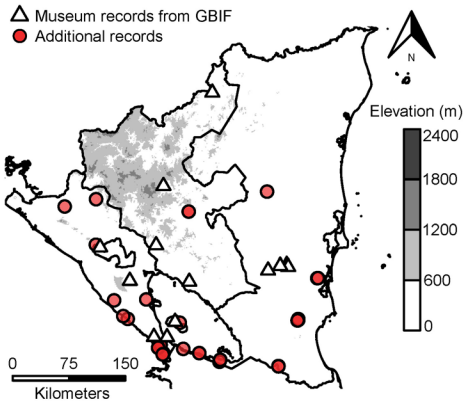
9. Saccopteryx bilineata



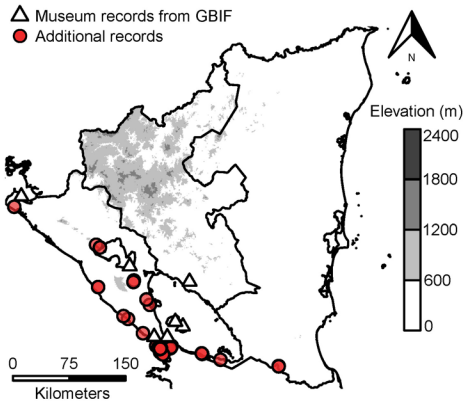
10. Saccopteryx leptura



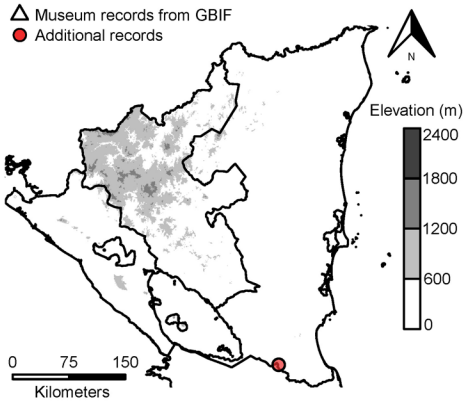
11. Noctilio albiventris



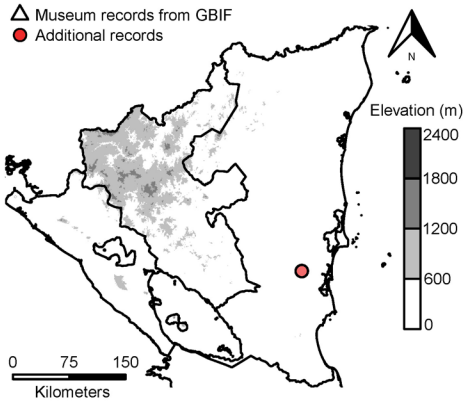
12. Noctilio leporinus



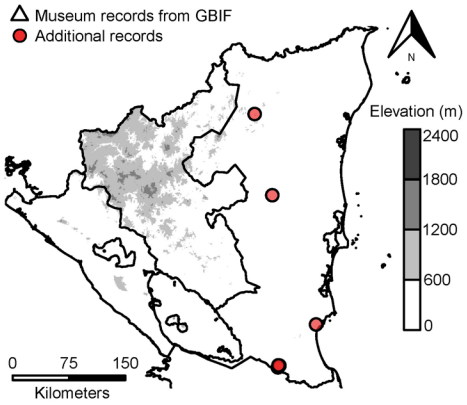
13. Furipterus horrens



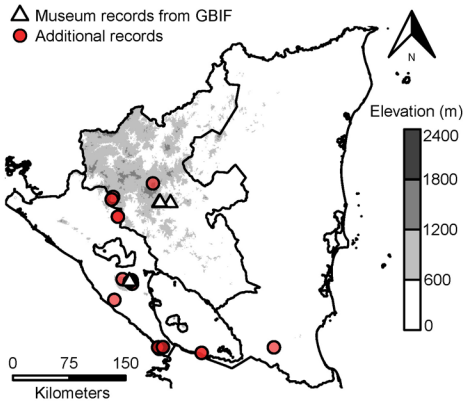
14. Thyroptera discifera



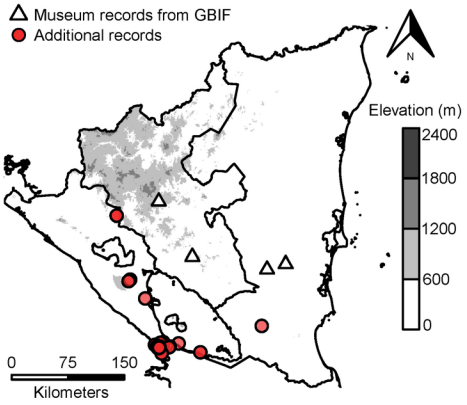
15. Thyroptera tricolor



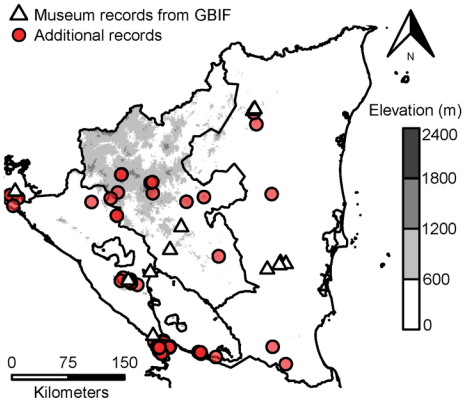
16. Pteronotus davyi



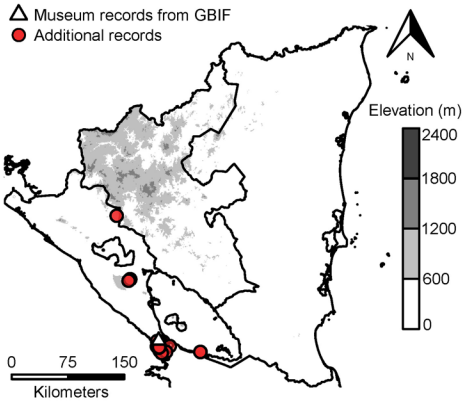
17. Pteronotus gymnonotus



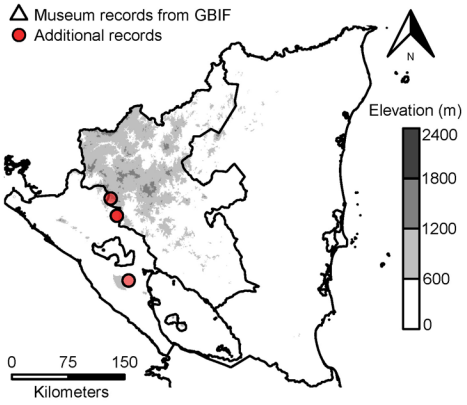
18. Pteronotus mesoamericanus



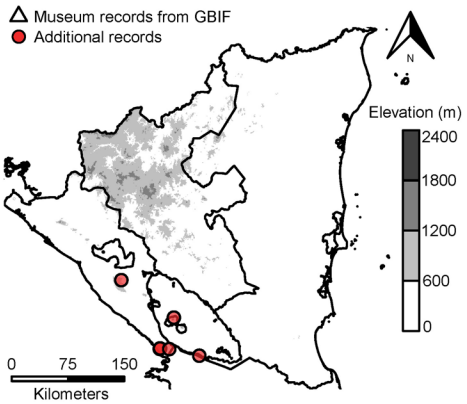
19. Pteronotus personatus



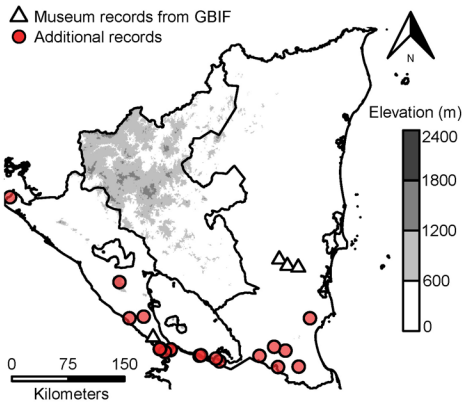
20. Mormoops megalophylla



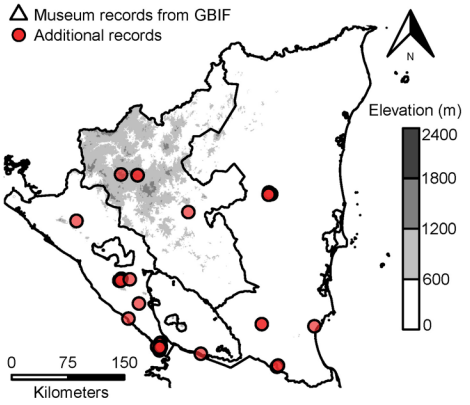
21. Lampronycteris brachyotis



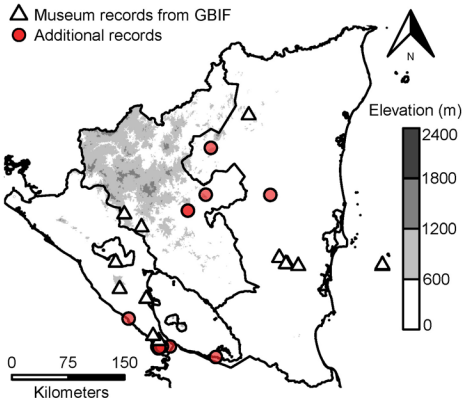
22. Micronycteris hirsuta



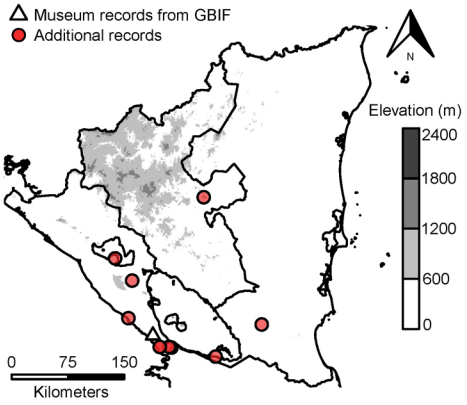
23. Micronycteris microtis



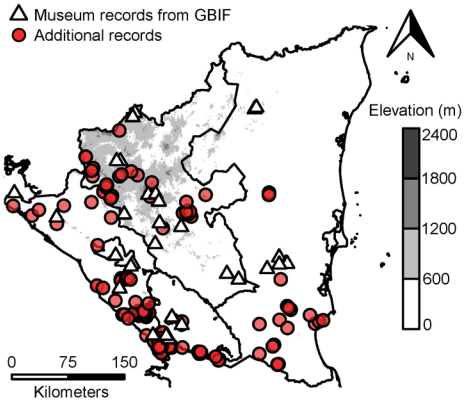
24. Micronycteris minuta



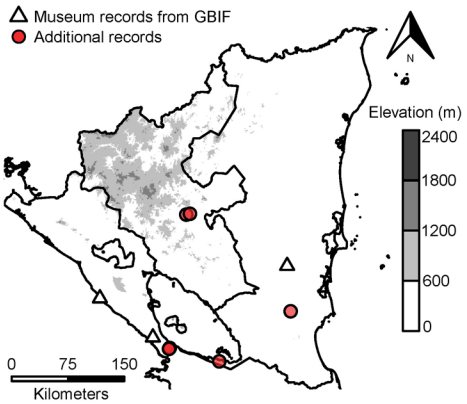
25. Micronycteris schmidtorum



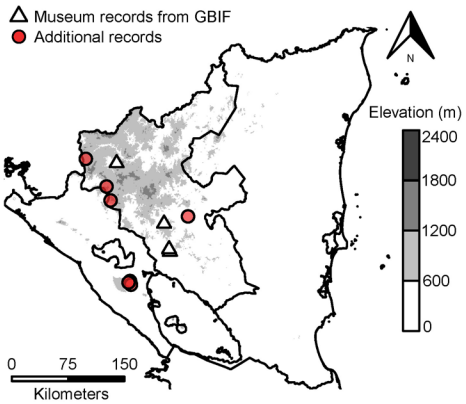
26. Desmodus rotundus



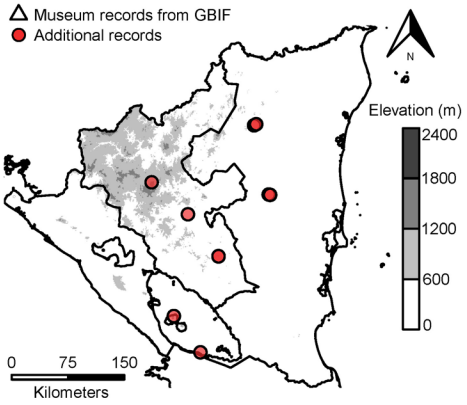
27. Diaemus youngi



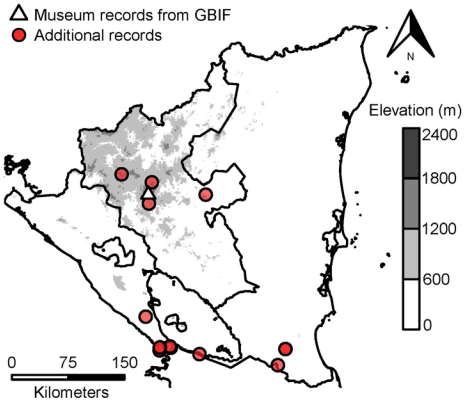
28. Diphylla ecaudata



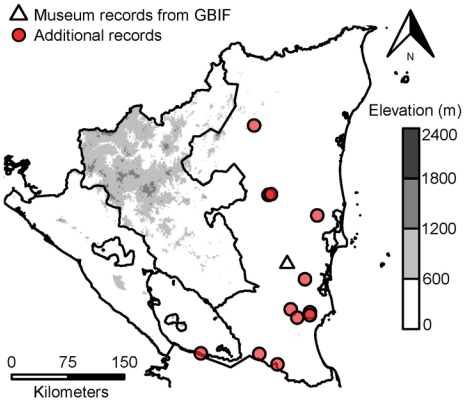
29. Lonchorhina aurita



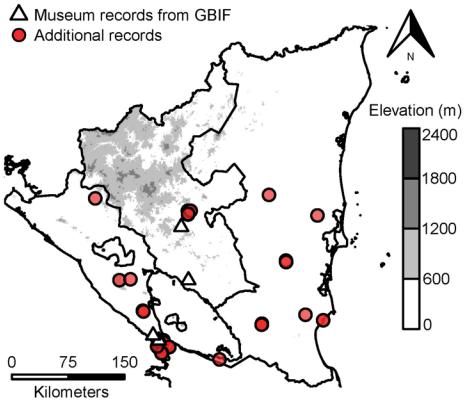
30. Chrotopterus auritus



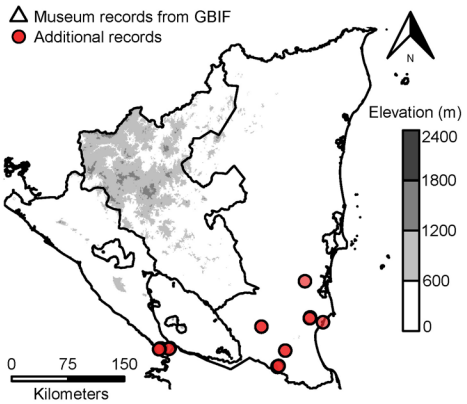
31. Gardnerycteris keenani



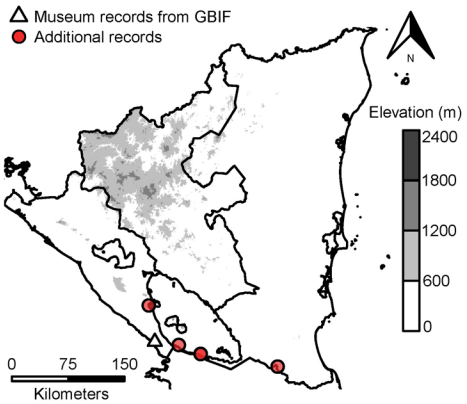
32. Lophostoma brasiliense



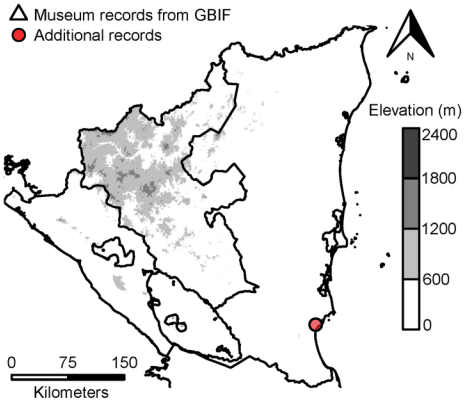
33. Lophostoma silvicolum



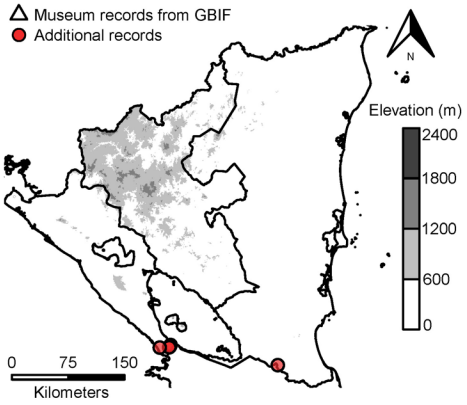
34. Macrophyllum macrophyllum



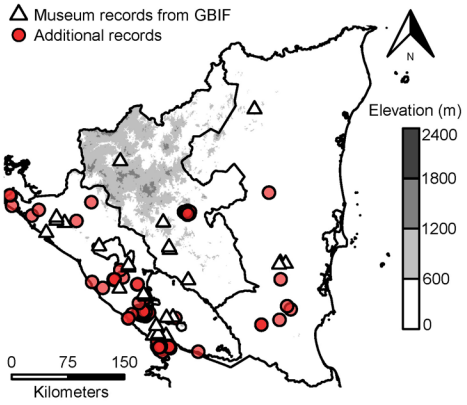
35. Mimon cozumelae



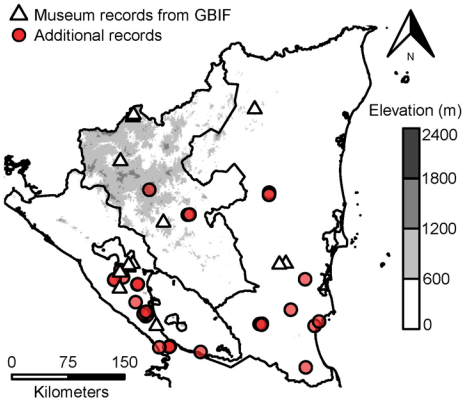
36. Phylloderma stenops



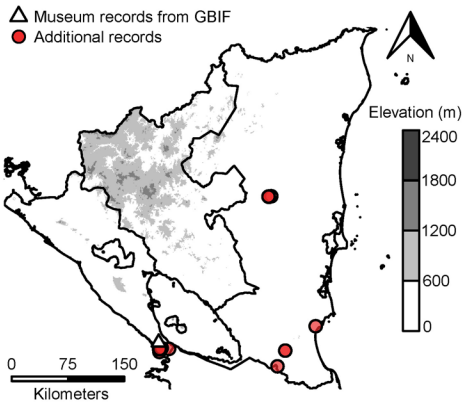
37. Phyllostomus discolor



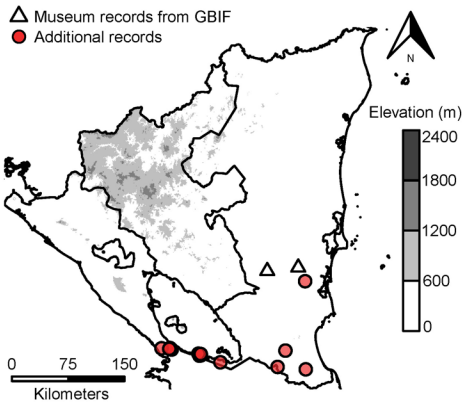
38. Phyllostomus hastatus



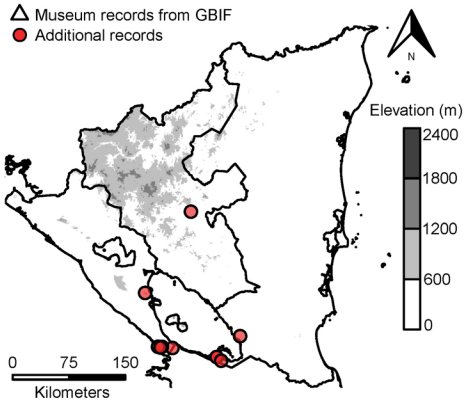
39. Tonatia bakeri



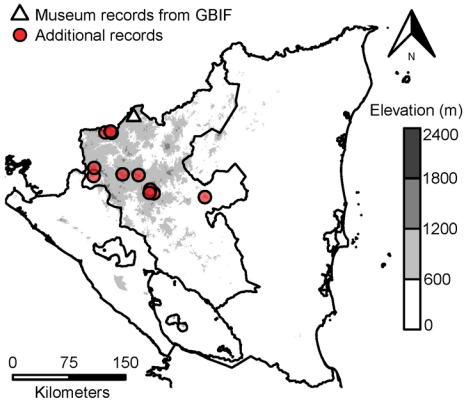
40. Trachops cirrhosus



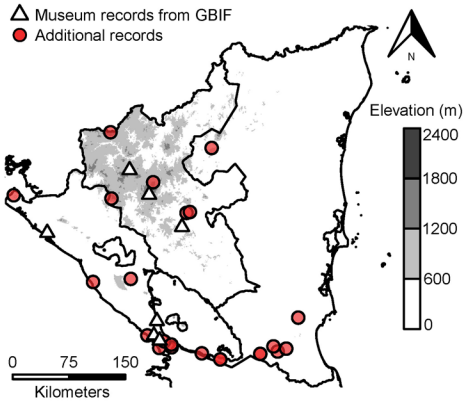
41. Vampyrum spectrum



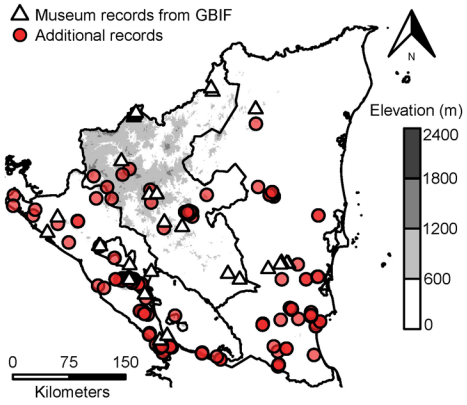
42. Anoura geoffroyi



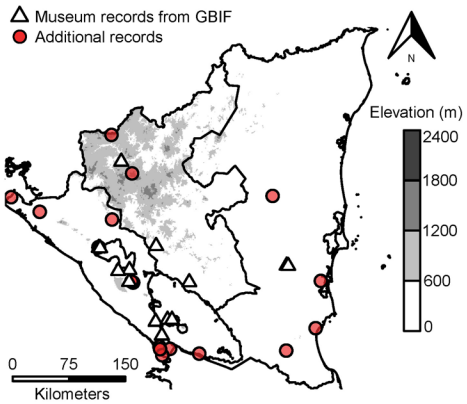
43. Choeroniscus godmani



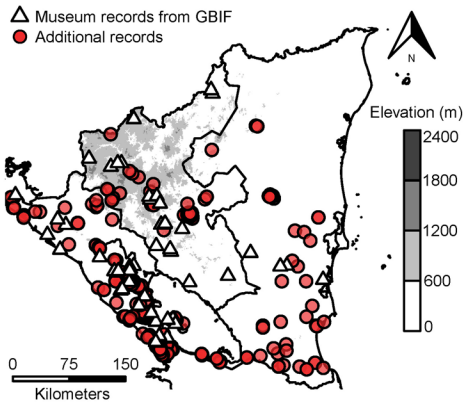
44. Glossophaga commissarisi



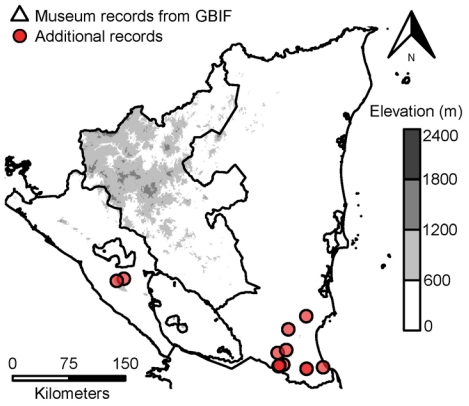
45. Glossophaga leachii



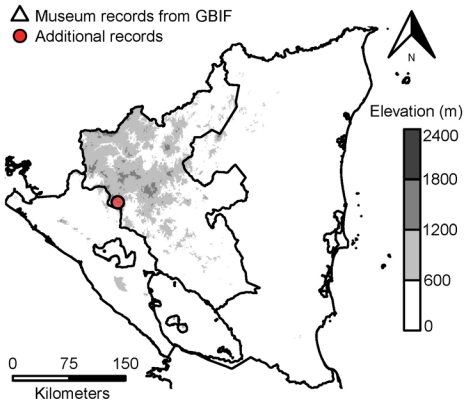
46. Glossophaga soricina



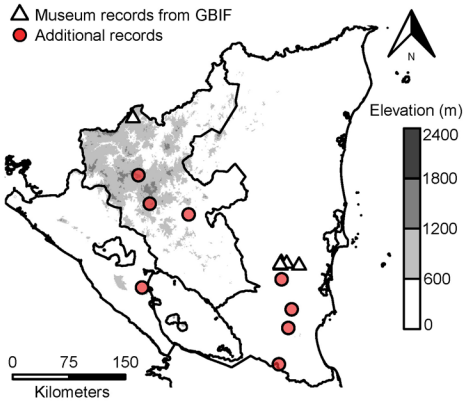
47. Hylonycteris underwoodi



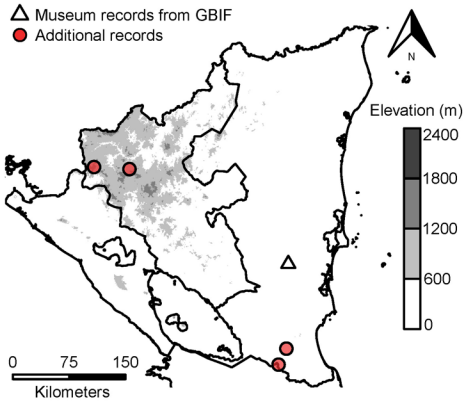
48. Leptonycteris yerbabuenae



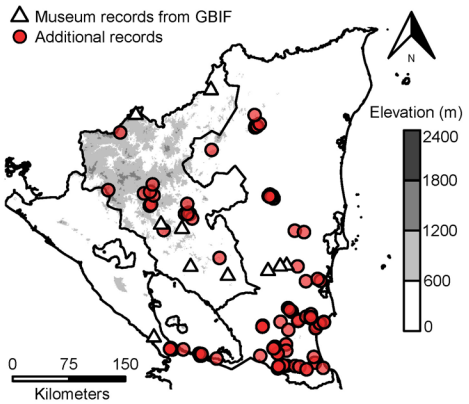
49. Lichonycteris obscura



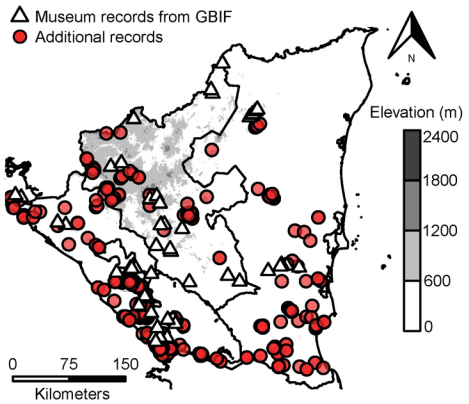
50. Lonchophylla robusta



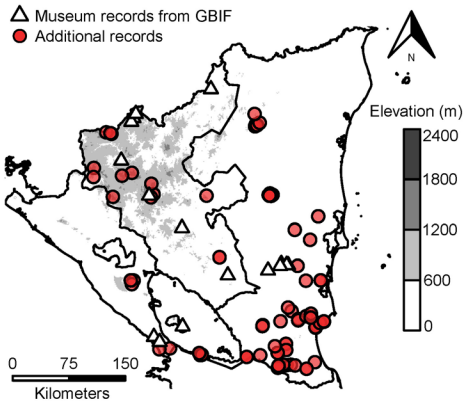
51. Carollia castanea



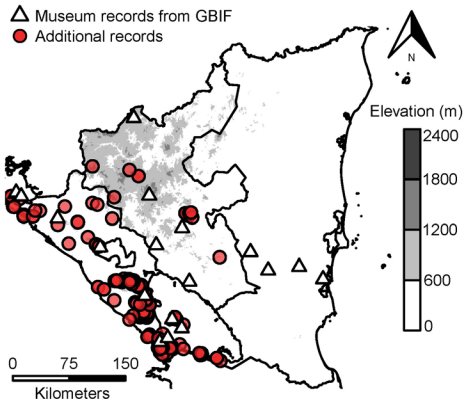
52. Carollia perspicillata



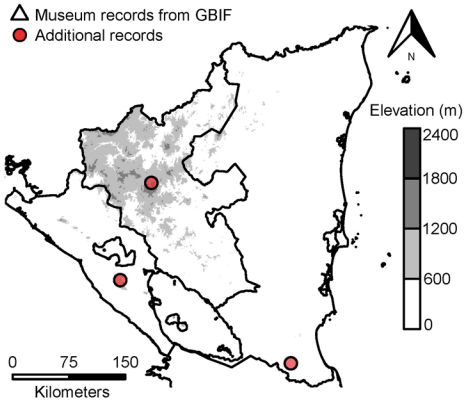
53. Carollia sowelli



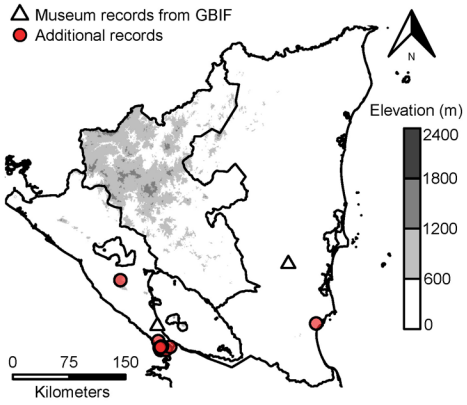
54. Carollia subrufa



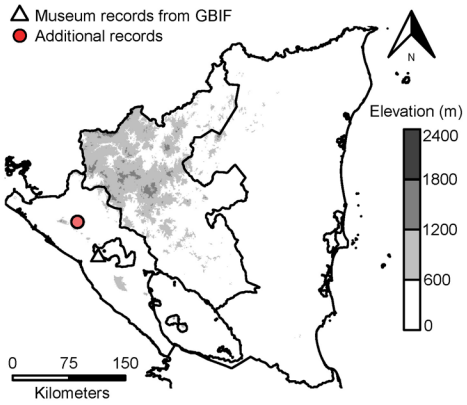
55. Glyphonycteris sylvestris



56. Trinycteris nicefori



57. Artibeus inopinatus



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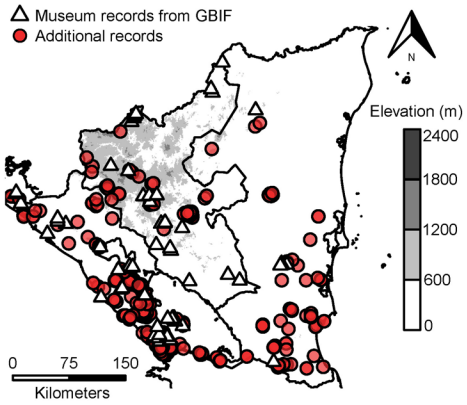

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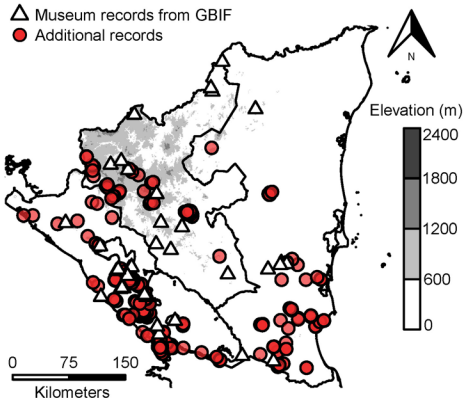

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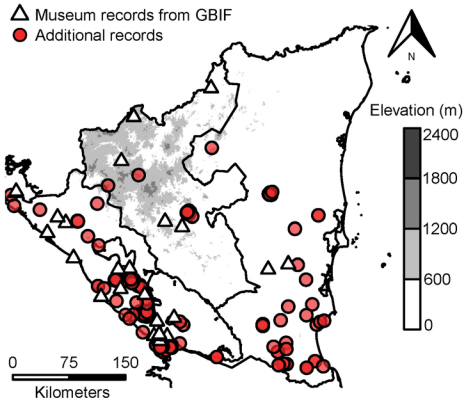

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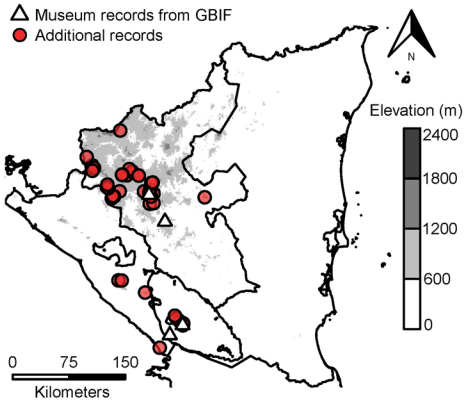
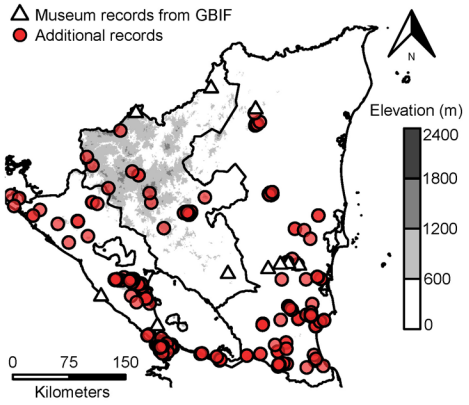


62. Artibeus watsoni



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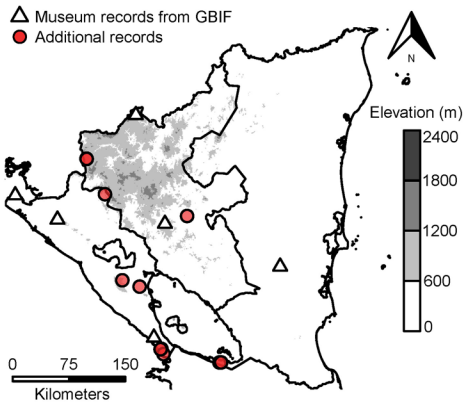

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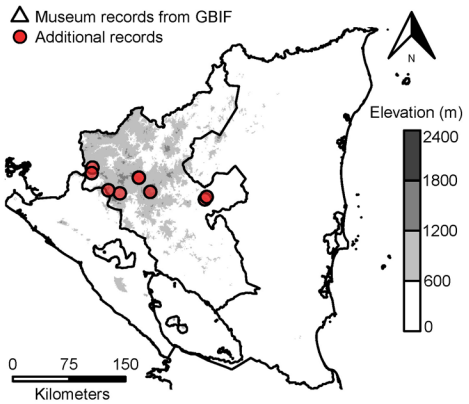

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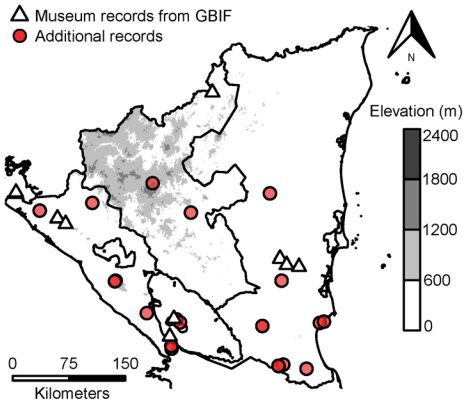

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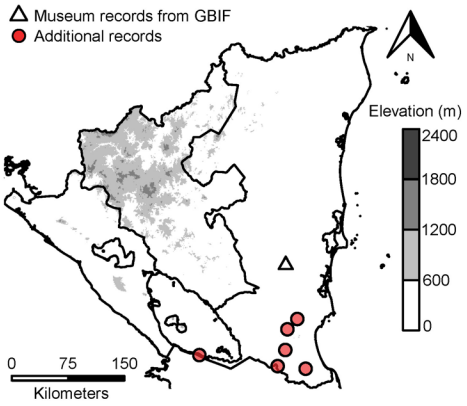

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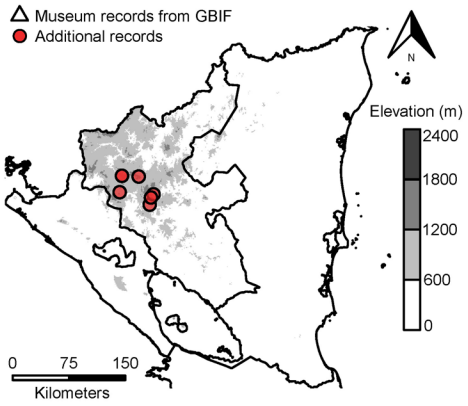

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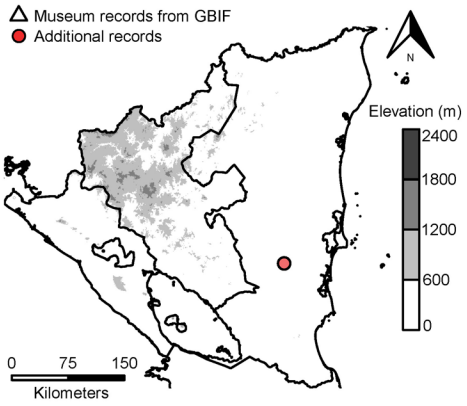
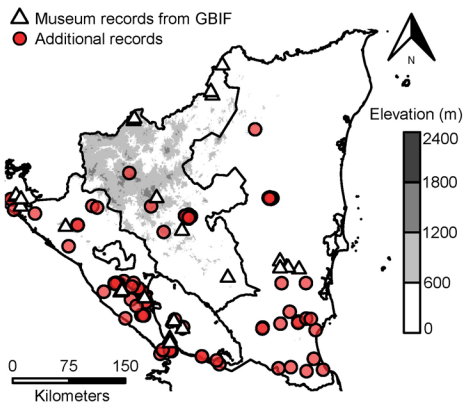
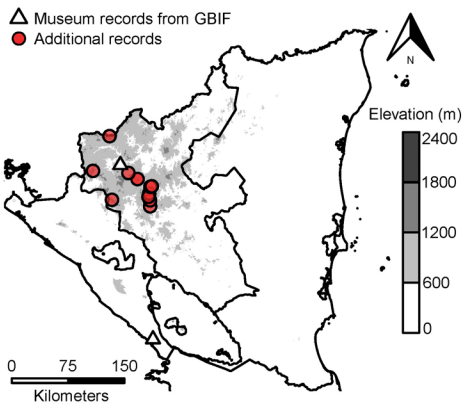


69. Platyrrhinus helleri



70. Sturnira hondurensis



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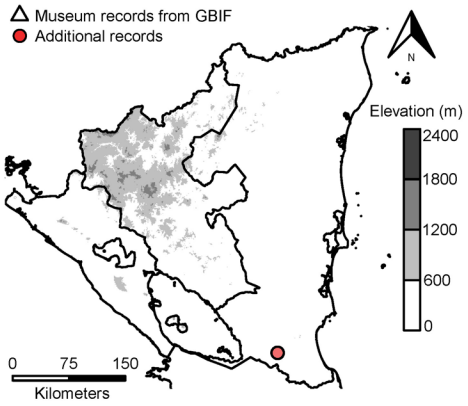

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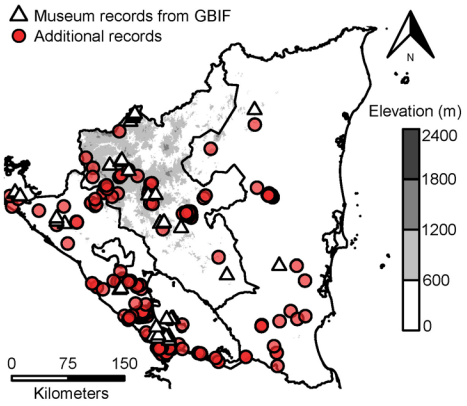

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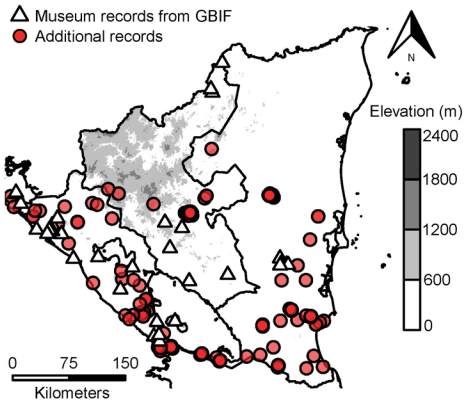

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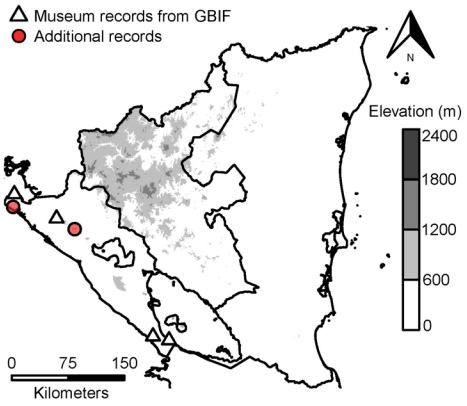

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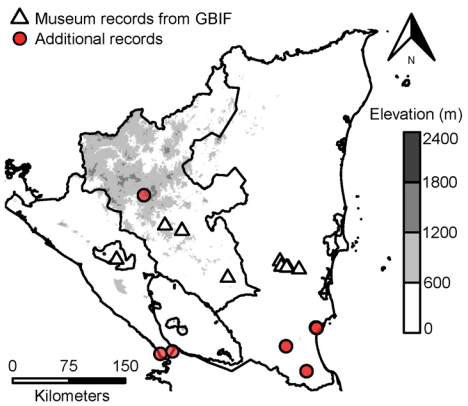

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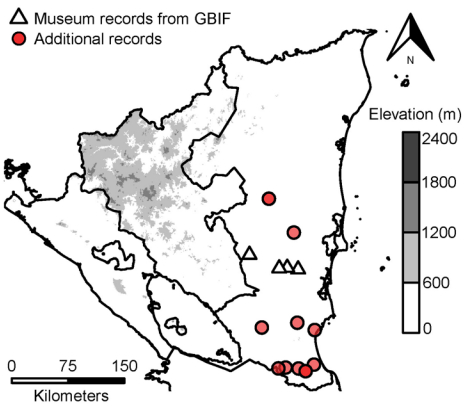

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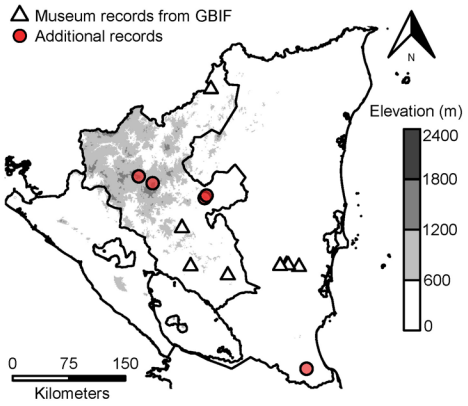
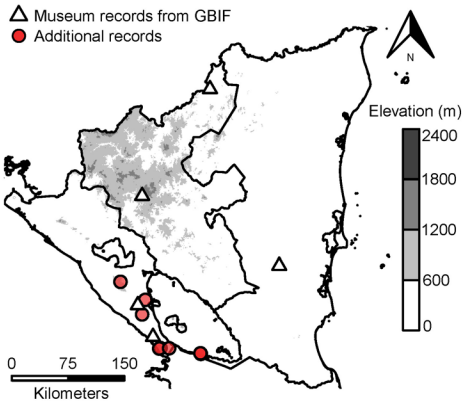


78. Natalus mexicanus



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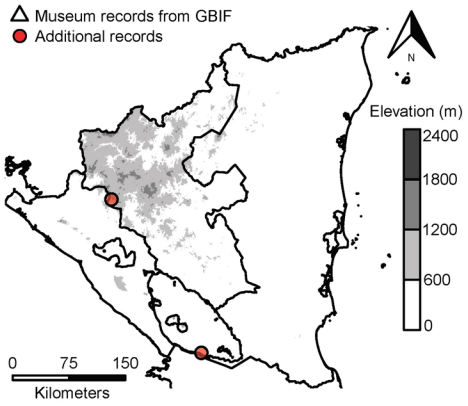

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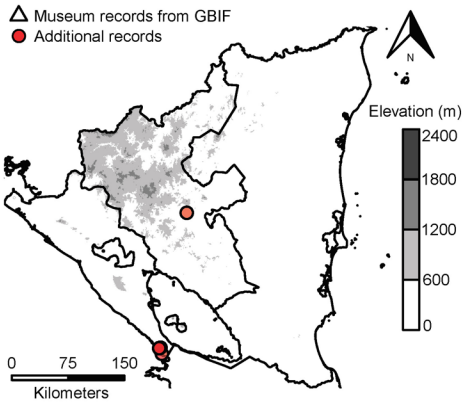

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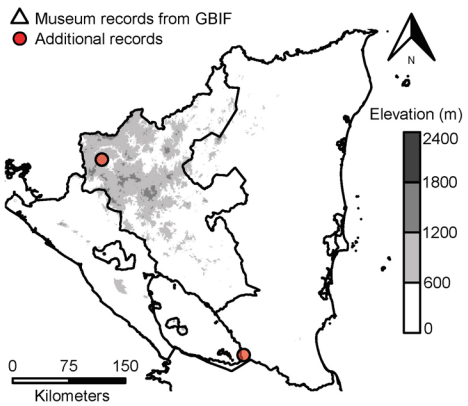

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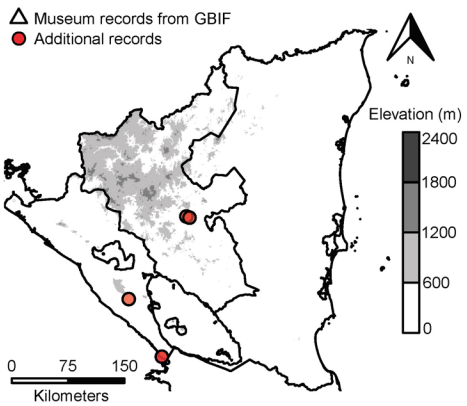

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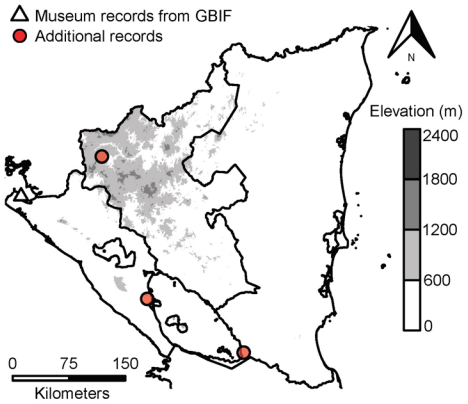

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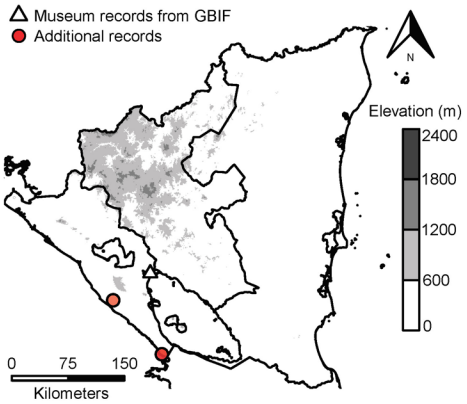
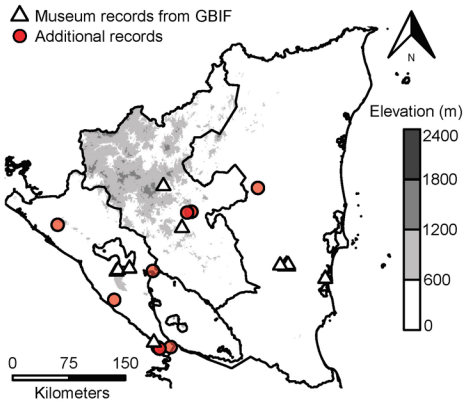


85. Molossus alvarezi



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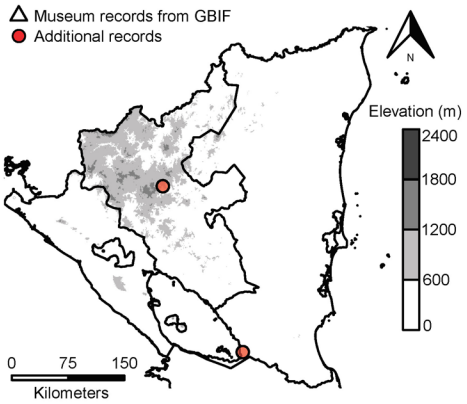

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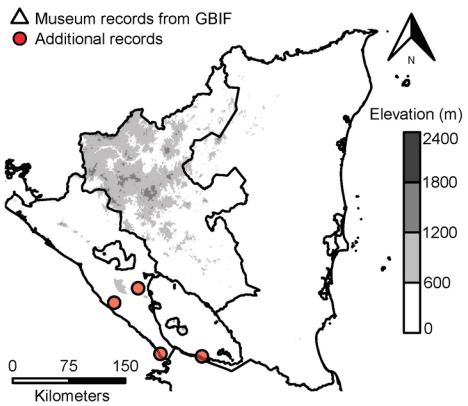

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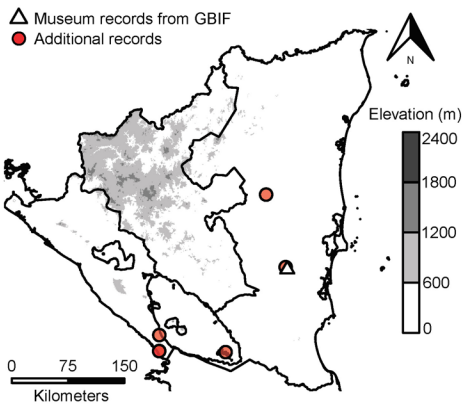
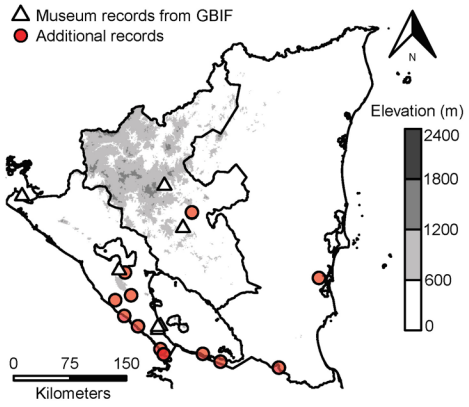


89. Molossus molossus



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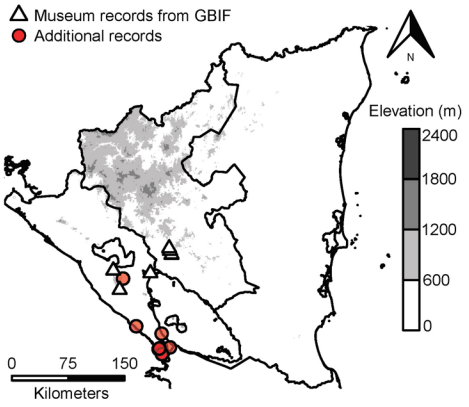

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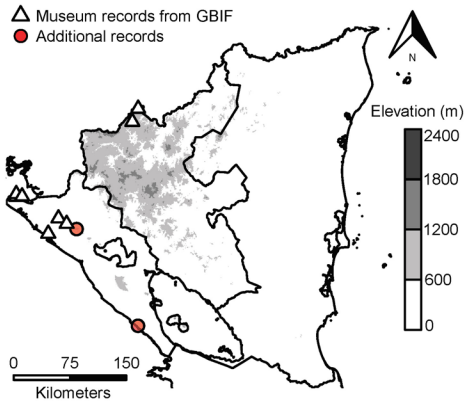
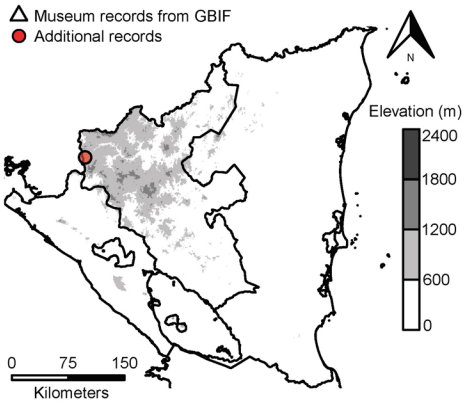


92. Nyctinomops laticaudatus



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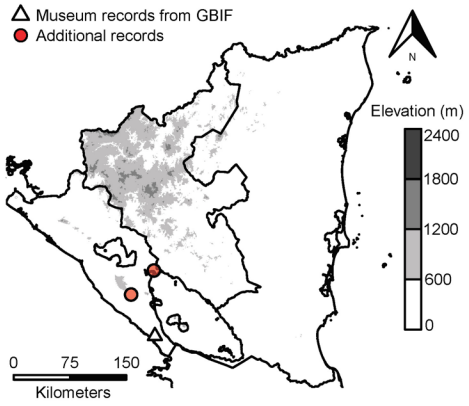
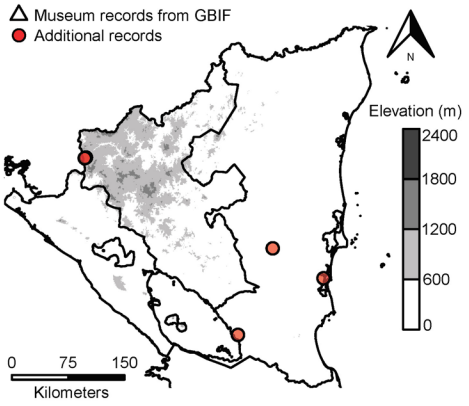


94. Tadarida brasiliensis



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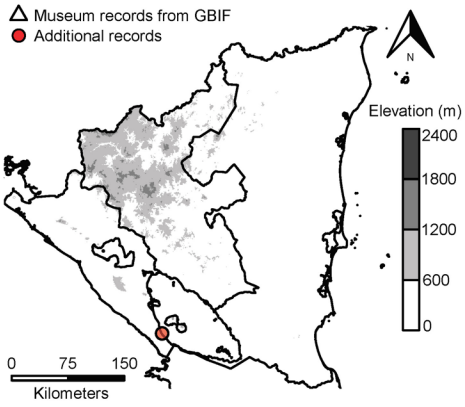
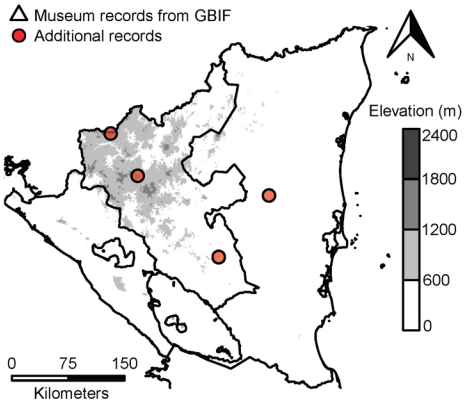
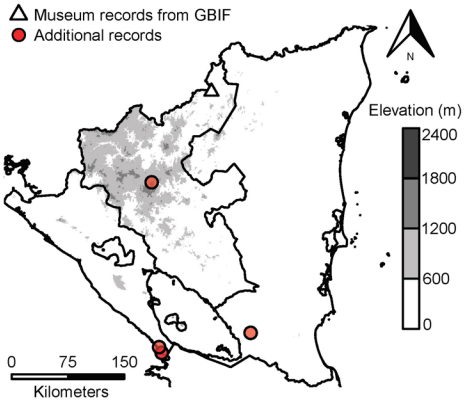


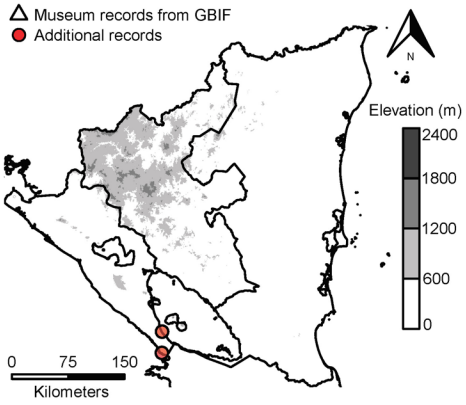
96. Bauerus dubiaquercus



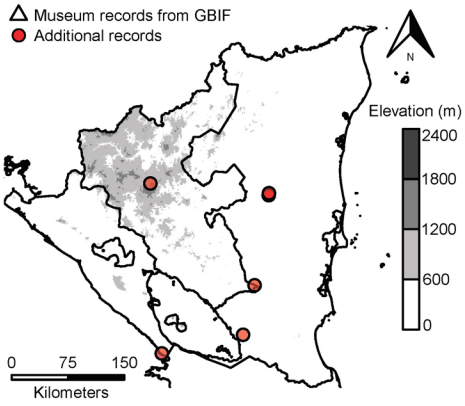
97. Dasypterus ega



98. Dasypterus intermedius



99. Eptesicus brasiliensis



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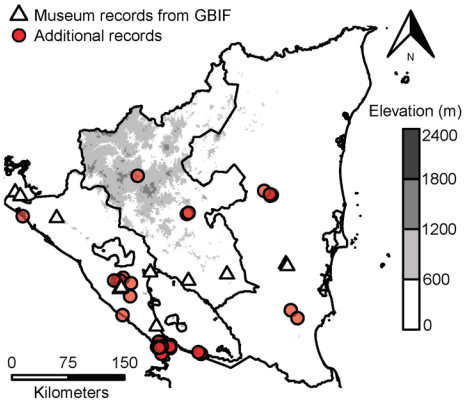

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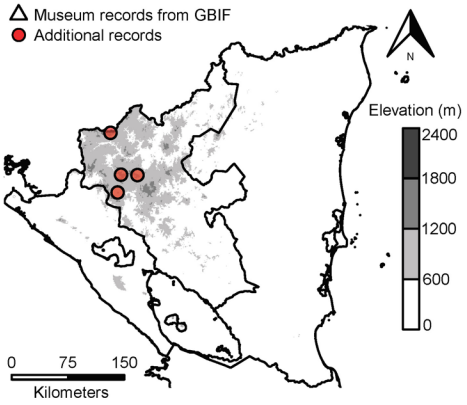

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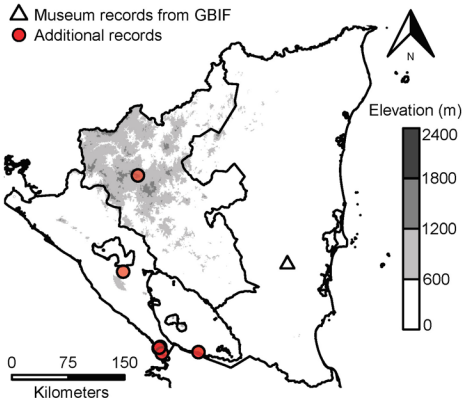

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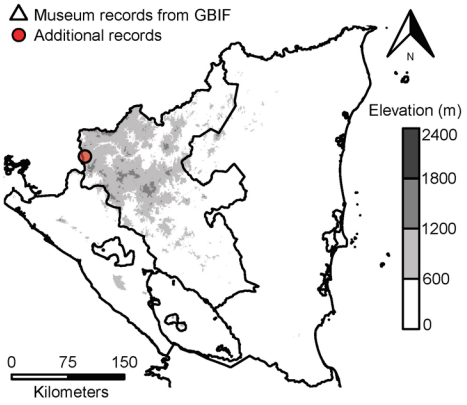
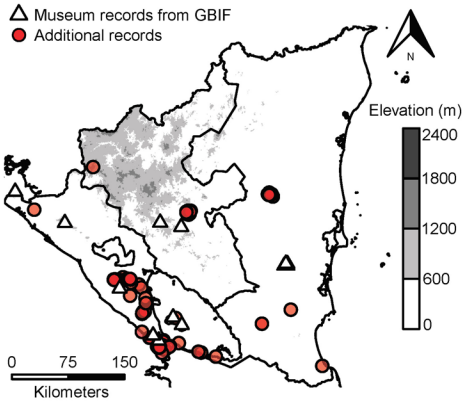


104. Rhogeessa bickhami



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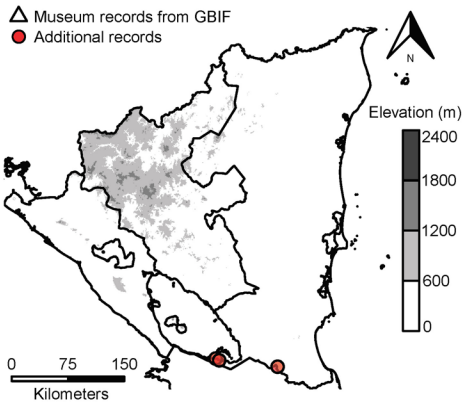

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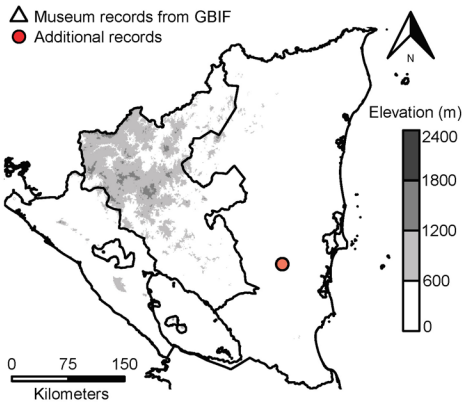

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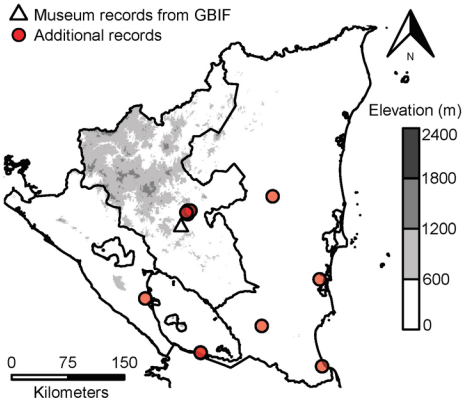

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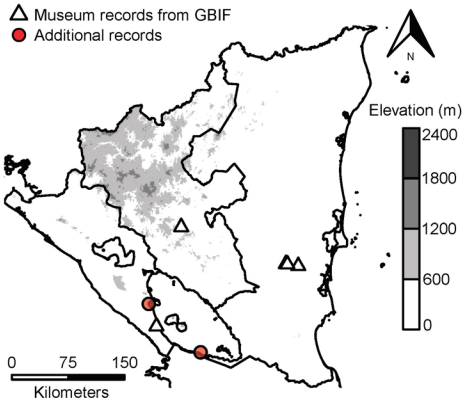

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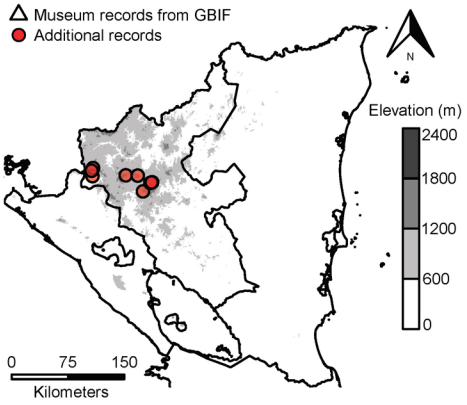

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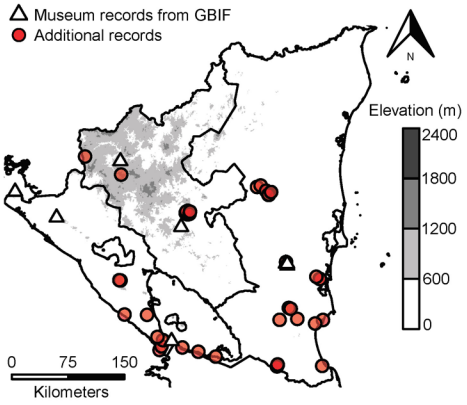

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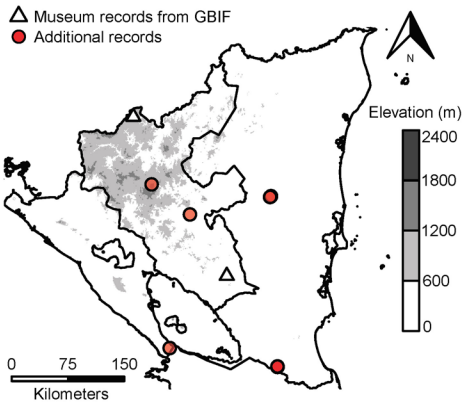

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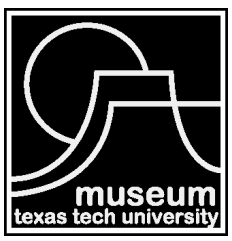

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