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Bats of the Tropical Lowlands of Western Ecuador

Juan P. Carrera, Sergio Solari, Peter A. Larsen, Diego F. Alvarado, Adam D. Brown, Carlos Carrión B., J. Sebastián Tello, and Robert J. Baker

Editorial comment. One extension of this collaborative project included the training of local students who should be able to continue with this collaboration and other projects involving Ecuadorian mammals. Ecuadorian students who have received or are currently pursuing graduate degrees subsequent to the Sowell Expeditions include: Juan Pablo Carrera (completed M.A. degree in Museum Science at Texas Tech University (TTU) in 2007; currently pursuing a Ph.D. with Jorge Salazar-Bravo at TTU); Tamara Enríquez (completed M.A. degree in Museum Science at TTU in 2007, Robert J. Baker (RJB), major advisor); René M. Fonseca (received a posthumous M.S. degree from TTU in 2004, directed by RJB); Raquel Marchán-Rivandeneira (M.S. degree in 2008 under the supervision of RJB; currently pursuing a Ph.D. at TTU directed by Richard Strauss and RJB); Miguel Pinto (M.S. degree at TTU in 2009; currently pursuing a Ph.D. at the Department of Mammalogy and Sackler Institute for Comparative Genomics at the American Museum of Natural History, City University of New York); Juan Sebastián Tello (completed a Licenciatura at Pontificia Universidad Católica del Ecuador (PUCE) in 2005 with Santiago Burneo; currently pursuing a Ph.D. at Louisiana State University directed by Richard Stevens); Diego F. Alvarado (pursuing a Ph.D. at University of Michigan with L. Lacey Knowles); and Carlos Carrión B. (completed Licenciatura in 2006 at PUCE; currently an expedition leader on the Galapagos Islands). These two Sowell expeditions also included students from other South American countries who participated in the subsequent scientific efforts to better understand the fauna of Ecuador. These students included Sergio Solari of San Marcos' University, Peru, currently Professor at Universidad de Antioquia, Medellín, Colombia, and Federico Hoffmann, who received an M.S. from University de la Republica Montevideo, Uruguay, with Enrique Lessa, and a Ph.D. at TTU, and is currently at the University of Nebraska. Further, several U.S. undergraduate and graduate students participated in these expeditions, including Trashanda Johnson (B.S., TTU), Jana Higginbotham (M.S., TTU), Michelle Haynie (Ph.D., TTU), Rex McAliley (Ph.D., TTU), Joel Brant (Ph.D., TTU), Deidre Parish (Ph.D., TTU), Marcy Revelez (M.S., TTU), Peter Larsen (M.S., TTU; currently pursing Ph.D., TTU), Carl Dick (Ph.D., TTU), and Adam Brown (M.S., TTU; currently pursuing Ph.D., University of Texas Health Science Center at San Antonio). The educational foundation of these individuals was undoubtedly strengthened by the cultural and biodiversity experiences encountered during the Sowell Expeditions. At the institutional level, half of the curated collections, each recognized holotype, and a complete set of tissues are deposited at the Museo de Zoología (QCAZ) of the Pontificia Universidad Católica del Ecuador, where fellow students and professionals can study them. Other benefits resulting from the Sowell Expeditions include publications with Ecuadorian colleagues, seminars presented to students and faculty at PUCE, environmental education and presentations to local school groups (front cover), media coverage in Ecuadorian newspapers and television networks, and assisting Ecuadorians in publishing a perspective of the Museo de Zoología Mammal Collection (e.g. Camacho and Burneo 2009). From Texas Tech's perspective this work has been a positive experience and we thank all of those involved.

Robert J. Baker
Series Editor

This paper is dedicated to the memory of our dear friend and colleague René M. Fonseca, whose leadership and knowledge of the fauna of Ecuador was the foundation of the success of the 2001 and 2004 expeditions that are the basis for this paper.

"Para tí Fonquete donde quiera que estés, muchas gracias por todo amigo."

Front cover: René M. Fonseca teaching local people in Manglares Churute Ecological Reserve about the diversity of Ecuadorian bats and their importance to the environment. Photo by Robert J. Baker.

2001 Researchers (from left to right): Standing: Trashanda Johnson, Jana Higginbotham, Federico Hoffmann, Michelle Haynie, René Fonseca, Juan Pablo Carrera, Rex McAliley, Joel Brant, Deidre Parish, Sandy Tolan, Marcy Revelez. Seated: Clyde Jones, Robert Baker, Carleton Phillips. Photo by Linda Richardson.

2004 Researchers (from left to right): Rear: Carlos Carrión, Peter Larsen, Robert Baker, Carl Dick. Front: Juan Pablo Carrera, J. Sebastián Tello, Sergio Solari, Adam Brown, and René Fonseca. Photo by staff member.

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Abstract

In 2001 and 2004, Sowell Expeditions by Texas Tech University (TTU), in collaboration with the Pontificia Universidad Católica del Ecuador (PUCE), were carried out to document the bat fauna west of the Ecuadorian Andes. This region of continental Ecuador possesses a unique combination of habitats within the Neotropics due to the confluence of the Chocó–Darién humid forest and the Peruvian–Chilean desert formation. These features combine to produce high levels of species richness and endemism for several taxa, including bats. A total of 1,580 specimens were collected from 16 localities, providing biological and distributional data for 66 species from six families: Emballonuridae, Phyllostomidae, Noctilionidae, Thyropteridae, Vespertilionidae, and Molossidae. Previously unrecognized species in the genera *Lophostoma* (Baker et al. 2004), *Micronycteris* (Fonseca et al. 2007), *Eumops* (Baker et al. 2009), and *Thyroptera* were identified based on specimens collected during these expeditions. Also, new geographic records for *Anoura aequatoris*, *A. cultrata*, *Diaemus youngi*, *Lophostoma brasiliensis*, *Macrophyllum macrophyllum*, *Trinycteris nicefori*, and *Myotis simus* were recorded for western Ecuador.

Key words: Andes Mountains, Chiroptera, Ecuador, natural history, systematics

Resumen

Durante los años 2001 y 2004 se llevaron a cabo dos expediciones Sowell al Ecuador con el objetivo de documentar las especies de murciélagos presentes en la vertiente occidental de los Andes ecuatorianos en una colaboración científica entre Texas Tech University (TTU) y la Pontificia Universidad Católica del Ecuador (PUCE). El occidente del Ecuador posee una combinación única de hábitats neotropicales debido a la influencia directa de bosques húmedos del Chocó-Darién por el norte y formaciones desérticas de Perú y Chile por el sur. Estas características han determinado una particular riqueza de especies con altos niveles de endemismo para varios grupos taxonómicos, incluidos los murciélagos. Un total de 1,580 especímenes fueron colectados en 16 localidades a lo largo de la costa proporcionando información biológica y de distribución geográfica para 66 especies de seis familias: Emballonuridae, Phyllostomidae, Noctilionidae, Thyropteridae, Vespertilionidae, y Molossidae. Se reconocen nuevas especies para los géneros *Lophostoma* (Baker et al. 2004), *Micronycteris* (Fonseca et al. 2007), *Eumops* (Baker et al. 2009), y *Thyroptera*. Además, se confirman nuevos registros geográficos de *Anoura aequatoris*, *A. cultrata*, *Diaemus youngi*, *Lophostoma brasiliensis*, *Macrophyllum macrophyllum*, *Trinycteris nicefori* y *Myotis simus* para el occidente de Ecuador.

Palabras clave: Andes, Chiroptera, Ecuador, historia natural, sistemática

INTRODUCTION

The tropical forests of the western versant of the Ecuadorian Andes are remarkably important for issues pertaining to biodiversity and conservation (Myers et al. 2000). The western versant includes tropical rain forests of the Chocó–Darien humid ecosystem and a deciduous northern extension of the Peruvian–Chilean coastal dry forest (Hershkovitz 1958; Baker 1967; Gentry 1986, 1992; Marquet 1994). These forests are bordered on the west by the Pacific Ocean and on the east by the Andes Mountains (Cerón et al. 1999). The combination of these geographic features has produced multiple unique ecological formations in western Ecuador that support many endemic species (Gentry 1986; Parker and Carr 1992; Lynch and Duellman 1997; Sierra 1999; Gardner 2008 [2007]).

Western Ecuador has been categorized as a "hotspot" for conservation activities because risk of extinction is high for many endemic species (Dodson and Gentry 1991; Myers et al. 2000; Schipper et al. 2008). The tropical region of northwestern Ecuador has one of the highest rates of deforestation, at ~4.0% per annum, and thousands of hectares of primary forest have been destroyed for use by timber and oil palm industries in the last 50 years (Dodson and Gentry 1991; Myers 1993; Sierra-Maldonado 1996; Rudel 1999). Only fragments of pristine tropical rain forest near southern Colombia remain unaltered.

Several surveys have focused on the richness and endemism for groups such as plants, birds, frogs, and mammals in northwestern Ecuador (i.e., Dodson and Gentry 1991; Parker and Carr 1992; Lynch and Duellman 1997; Jarrín-V. and Fonseca-N. 2001; Anderson and Jarrín-V. 2002; Albuja and Mena–Valenzuela 2004). The reports published by Allen (1916), Brosset (1965), Albuja (1999), and Albuja and Mena-Valenzuela (2004) provide a baseline of information on diversity, distribution, taxonomy, and systematics of bats occurring west of the Ecuadorian Andes. The most recent revisions recognized the presence of seven families, 53 genera, and 95 species of bats (Albuja and Arcos 2007; Tirira 2007).

Recently, several new species of bats have been described from western Ecuador including *Lophostoma aequatorialis* (Baker et al. 2004), *Lonchophylla chocoana* (Dávalos 2004), *Anoura fistulata* (Muchhala et al. 2005), *Lonchophylla orcesi* (Albuja and Gardner 2005), *Platyrrhinus albericoi, P. ismaeli,* and *P. matapalensis* (Velazco 2005), *Sturnira koopmanhilli* (McCarthy et al. 2006), *Lonchophylla cadenai* (Woodman and Timm 2006), *Micronycteris giovanniae* (Fonseca et al. 2007), *Lonchophylla fornicata* (Woodman 2007), *Eumops wilsoni* (Baker et al. 2009), and *Platyrrhinus nitelinea* (Velazco and Gardner 2009). Furthermore, *Balantiopteryx infusca* (Emballonuridae), *Artibeus fraterculus*, *Choeroniscus periosus*, *Platyrrhinus chocoensis, Rhinophylla alethina, Vampyriscus nymphaea* (Phyllostomidae), *Amorphochilus schnablii* (Furipteridae), *Eptesicus innoxius,* and *Rhogeessa velilla* (Vespertilionidae) are endemic to the region (Handley 1966; Baker 1967; Koopman 1982; Baud 1982; Alberico and Velasco 1991a; McCarthy et al. 2000; Baird et al. 2008). The number of newly described species and the endemic nature of the bat fauna of the western Andes document the significance of this region's biodiversity and the urgency for appropriate conservation measures in this region.

Herein, the results of the Sowell Expeditions conducted in Ecuador during 2001 and 2004 by researchers (page *ii*) from the Museum of Texas Tech University and the Museo de Zoología (QCAZ) of the Pontificia Universidad Católica del Ecuador are reported. Included is information on species diversity, taxonomy, and distribution of the bat fauna of western Ecuador.

MATERIALS AND METHODS

Study site.—Two fieldtrips (2001 and 2004) were conducted to sample bat faunas in the provinces of Esmeraldas, Guayas, and El Oro. The first survey was conducted from 1 to 8 August of 2001, and the second from 26 June to 12 August of 2004. Sixteen sites were sampled at localities between 10 and 1100 m in

elevation and within several vegetation types, including primary and secondary forest, disturbed areas, and agricultural plantations (Fig. 1).

Gazetteer.—Collecting localities for both field seasons are described below. Province, specific locality, latitude and longitude, elevation, dates of sampling, and a brief description of the major habitats are provided.

1. ESMERALDAS: Mataje (01°21'21.4" N, 78°43'27.3" W; 87 m). 11 and 13 August 2004.

Mataje is located in the northern region of Esmeraldas Province near the Colombian border. The area is humid and surrounded by primary and secondary forest. Primary forest is in greater abundance than secondary forest and consists of palms and other large trees.

2. ESMERALDAS: Estación Experimental La Chiquita (01°13'55.2" N, 78°45'57.7" W; 53 m). 2 August 2001 and 5 August 2004.

This research station is located in northern Esmeraldas Province and is managed by the Luis Vargas Torres University. The area is dominated by primary rain forest. Most of the forest of Estación Experimental La Chiquita is intact, but human impact was evident in the form of deforestation and oil palm plantations in the surrounding areas.

3. ESMERALDAS: Banana plantation near San Lorenzo (1°15'31" N, 78°46'51" W; 53 m). 3 August 2001 and 9 August 2004.

This site is located approximately 2.3 km S, 5.6 km E of San Lorenzo. The surrounding habitat is composed of secondary forest and agricultural fields associated with homesteads.

4. ESMERALDAS: Finca San José (1°0'36" N, 78°37'20" W; 144 m). 6 August 2001.

Finca San José is 29 km S, 24 km E of San Lorenzo near the Lita – San Lorenzo highway. Habitat is composed of agricultural crops and shrubs and a few larger trees surrounded by human dwellings.

5. ESMERALDAS: La Guarapera (1°16'13" N, 78°48'11" W; 44 m). 4 August 2001.

La Guarapera is 1.5 km S, 3.4 km E of San Lorenzo. This area is primarily agricultural and includes banana and oil palm plantations and human dwellings.

6. ESMERALDAS: San Francisco de Bogotá (01°05'36.8" N, 78°42'21.5" W; 63 m). 27 July 2004; 3–13 August 2004.

San Francisco de Bogotá is a small village 21 km S, 14 km E of San Lorenzo. The area includes primary forest, disturbed forest, and various types of crop and fruit plantations. Active logging of adjacent forests was occurring during our period of study.

7. GUAYAS: Bosque Protector Cerro Blanco (02°10'47.6" S, 80°01'17.7" W; 22 m). 4–9 July 2004.

Bosque Protector Cerro Blanco is approximately 8 km W of the city of Guayaquil. The Fundación Probosque manages this private reserve. This area is a remnant of tropical dry forest consisting of primary and secondary forest.

8. GUAYAS: Reserva Ecológica Manglares Churute (02°27'16.9" S, 79°37'38.6" W; 50 m). 30 June–3 July 2004.

The Ministerio del Ambiente of Ecuador manages this national reserve. The area is dominated by trees, shrubs, and mangroves, as well as banana, papaya, and mango plantations.

9. GUAYAS: Isla Puná (02°45'34.3" S, 79°55'01.5" W; 10 m). 11–13 July 2004.

Isla Puná is in the Gulf of Guayaquil. The habitat consists primarily of agricultural crops, shrubs, and secondary dry forest.

10. EL ORO: Fuerte Militar Arenillas (03°38'48.9" S, 80°09'40.8" W; 64 m). 15–20 July 2004.

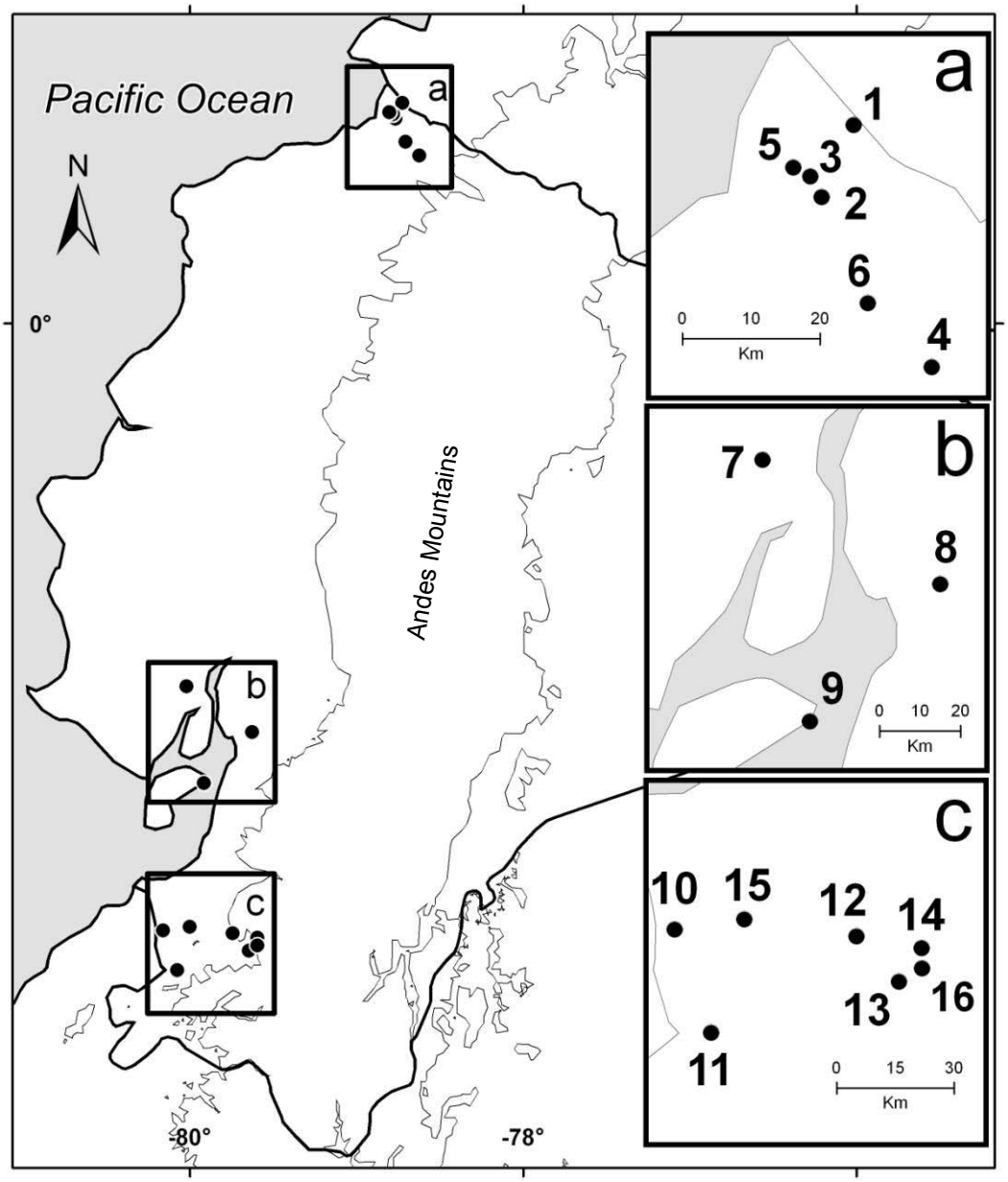

Figure 1. Map of Ecuador illustrating 16 sampling localities for bats collected in 2001 and 2004 during the Sowell Expeditions. Numbers correspond to the localities in the gazetteer. The light grey lines running north-south are isolines that represent the boundaries of the Andes Mountains.

Fuerte Militar Arenillas is near the Peruvian border. The area is dry and surrounded by primary dry forest, secondary forest, and plantations of crops.

11. EL ORO: Bosque Petrificado de Puyango (03°53'03.4" S, 80°04'41.1" W; 280 m). 21–24 July 2004.

This forest reserve is in southern Oro Province near the border with Loja Province. The Ministerio del Ambiente of Ecuador manages the reserve. The area is comprised of primary and secondary dry forest.

12. EL ORO: Jardín Botánico Moromoro (03°39'45.2"S, 79°44'41.2" W; 908 m). 30 July 2004.

The Jardín Botánico Moromoro Reserve is located between Machala and Zaruma in the Piñas district. This cloud forest is near the Buenaventura Ecological Reserve (managed by the Fundación Jocotoco) and is maintained to protect existing primary forest. The habitat within the Jardín Botánico Moromoro Reserve includes primary forest, palms, epiphytes, and shrubs.

13. EL ORO: Cerro Chiche (03°45'59.7" S, 79°38'50.9" W; 650 m). 25 and 27 July 2004.

Cerro Chiche is located in the southern area of the province near the border between Portovelo and Piñas districts. The area is dry and consists of disturbed forest, shrubs, and agricultural crops.

14. EL ORO: Zaruma (03°41'23.1" S, 79°35'43.7" W; 1,106 m). 26, 29, and 31 July 2004.

Zaruma is the highest region sampled during our study. The area includes numerous gold and silver mines. Vegetation is disturbed forest and agricultural crops, including banana plantations.

15. EL ORO: Presa Tahuín (03°37'28" S, 80°00'07" W; 125 m). 18 July 2004.

Presa Tahuín is a dam and associated body of water located in the Arenillas River basin in the southern region of El Oro. The lake generates electricity and provides water for irrigation in the southern region of the province and northern Peru. The area is surrounded by disturbed vegetation.

16. EL ORO: Portovelo–Quinta Palomares (03°44'11.4" S, 79°35'41.1" W; 633 m). 27 July 2004.

This site is located south of the El Tablón area and includes gold mines and streams. Vegetation consists of disturbed forest, fruit plantations, and shrubs.

Field methods.—Bats were captured at night using mist nets set in flyways and by hand from diurnal roosts. On average, 10–12 nets were set each night at 1700–1730h and closed at midnight. Different habitat types were sampled, including both primary forest and modified habitats (secondary growth, disturbed forest, and plantations). Bats also were captured from roosts located in hollow trees, rock crevices, mines, culverts, and abandoned houses. Captured bats were placed in clean, individual cloth bags to prevent parasite transfer. Ectoparasites were removed from the fur and wings of each individual immediately after euthanization. Voucher specimens were numbered and preserved as skin, skull, and skeleton or fluid preparations (Handley 1988). Standard field measurements were recorded for each specimen. Tissues for molecular studies were preserved in lysis buffer (Longmire et al. 1997) or 95% ethanol, and blood samples were collected using Nobuto blood filter strips (Advantec Manufacturing Inc., California). As time permitted, representative specimens were karyotyped for each species (Baker et al. 2003a). Animals were captured and handled following the standards of the American Society of Mammalogists (Gannon et al. 2007) and Texas Tech Animal Care and Use Committee (Permit # 02217-02).

Species identification.—In the field, each specimen was tentatively identified to species based on external morphology. All voucher specimens were then brought to the Natural Science Research Laboratory (NSRL) of the Museum of Texas Tech University to be positively identified based on external characters, cranial morphology, and selected cranial and dental measurements. Further, genetic analyses were performed to confirm the identity of some specimens (Hoffmann and Baker 2001, 2003; Baker et al. 2004;

Hoofer and Baker 2006; Larsen et al. 2007; Fonseca et al. 2007; Porter et al. 2007; Baker et al. 2009; Solari et al. 2009). After specimen identification, all holotype specimens, one half of the paratype voucher specimens, and tissue samples from all specimens were deposited at the Museo de Zoologia of the Pontificia Universidad Católica del Ecuador. The remaining paratype voucher specimens, as well as tissue samples from all specimens, were deposited at the NSRL.

When a specific taxon was found to be distinct at the genetic or morphological level, we verified whether its morphological diagnosis and/or geographic distribution agreed with a previously described taxon (i.e., subspecies or junior synonyms proposed for western South American or Middle American populations of the species). When no agreement existed, we hypothesized that this may represent an undescribed species. These assessments and their taxonomic outcome are discussed in the "Remarks" section of each species account.

RESULTS

A total of 1,580 specimens were obtained from the western side of the Andes Mountains in Ecuador (Table 1). These records increase the number of species known from the western side of the Ecuadorian Andes from 95 (see Albuja and Arcos 2007; Tirira 2007) to 106. New geographic records were recognized herein for *Anoura aequatoris*, *A. cultrata*, and *Myotis simus* in southwestern Ecuador, whereas *Diaemus youngi* (Pinto et al. 2007), *Lophostoma brasiliensis*, *Macrophyllum macrophyllum*, and *Trinycteris nicefori* were from the northwest. Other taxa including *Dermanura rosenbergi*, *D. rava,* and *Rhogeessa velilla* were elevated from subspecies to species status based primarily on genetic analyses of DNA sequences of specimens collected during this study (Baird et al. 2008; Solari et al. 2009). Additional noteworthy results included the discoveries of new species of *Lophostoma* (Baker et al. 2004), *Micronycteris* (Fonseca et al. 2007), and *Eumops* (Baker et al. 2009), as well as a *Thryoptera* that remains undescribed.

The taxonomic arrangement of families presented herein follows Teeling et al. (2005). Within the family Phyllostomidae, taxa are arranged by subfamily and tribe following Baker et al. (2003b). Within the Vespertilionidae, subfamilies follow Hoofer and Van Den Bussche (2003). Within families, subfamilies, and tribes, genera and species are listed alphabetically. For each species, we include species name with authority and date followed by the specific collecting localities (and number of specimens), as well as relevant remarks regarding geographic or taxonomic information and ecology.

Family Emballonuridae

Peropteryx kappleri Peters 1867

Specimens collected (4♀, 1♂).—Bosque Petrificado de Puyango (5).

Remarks.—Peropteryx kappleri was described by Peters in 1867 based on material from Suriname. We refer our specimens, and all others from Ecuador, to the nominate form *P. k. kappleri* (Hood and Gardner 2008 [2007]). This species is uncommonly collected in Ecuador and limited to the western side of the Andes, where it is known from El Oro Province (Sanborn 1937; Albuja 1999). Albuja and Mena-Valenzuela (2004) also reported specimens from Carchi Province (01°02'20" N, 78°16'30" W; 900 m). Our specimens were collected from a small crevice in a hill (280 m) near the bridge that connects El Oro and Loja Provinces, inside the Puyango Reserve. *Desmodus rotundus* also was present in this roost.

Saccopteryx bilineata (Temmink 1838)

(Plate 1A)

Specimens collected (13♀, 6♂).—San Francisco de Bogotá (1), Bosque Protector Cerro Blanco (1), Reserva Ecológica Manglares Churute (11), and Presa Tahuín (6).

Remarks.—Saccopteryx bilineata previously was reported from western Ecuador in the provinces of Esmeraldas and Guayas (Allen 1916; Sanborn 1937; Brosset 1965; Albuja and Mena-Valenzuela 2004; Salas-Z.

Table 1. Species collected and localities sampled during the Ecuadorian Sowell Expeditions. (1) Mataje, (2) Estación Experimental La Chiquita, (3) banana plantation near San Lorenzo, (4) Finca San José, (5) La Guarapera, (6) San Francisco de Bogotá, (7) Bosque Protector Cerro Blanco, (8) Reserva Ecológica Manglares Churute, (9) Isla Puná, (10) Fuerte Militar Arenillas, (11) Bosque Petrificado de Puyango, (12) Jardín Botánico Moromoro, (13) Cerro Chiche, (14) Zaruma, (15) Presa Tahuín, and (16) Portovelo – Quinta Palomares.

	Northern Localities						Central Localities			Southern Localities							
LOCALITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
EMBALLONURIDAE																	
Peropteryx kappleri											5						5
Saccopteryx bilineata						1	1	11							6		19
PHYLLOSTOMIDAE																	
MICRONYCTERINAE																	
Micronycteris giovanniae				1													1
Micronycteris hirsuta	2	4		2													8
Micronycteris megalotis		4			1	2	7		6		2	1	1				24
Micronycteris minuta						1	2										3
DESMODONTINAE																	
Desmodus rotundus						3		22	5	14	4		7	7		1	63
Diaemus youngi			1														1
LONCHORHININAE																	
Lonchorhina aurita						1											1
PHYLLOSTOMINAE																	
Macrophyllum macrophyllum						2											2
Trachops cirrhossus		2	1			1											4
Lophostoma aequatorialis	1	3				3		9		6	3		7				32
Lophostoma brasiliense						3											3
Mimon crenulatum	5	1			2	8											16
Phylloderma stenops		2	1								1						4
Phyllostomus discolor			5		5	4		3	19	3			16	2			57
Phyllostomus elongatus		5			5	16											26
Phyllostomus hastatus		3	8		7	18		7									43
Tonatia saurophila	3	7			1	9											20

Table 1. (cont.)

	Northern Localities						Central Localities			Southern Localities							
LOCALITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
Chrotopterus auritus								1									1
Vampyrum spectrum									6								6
GLOSSOPHAGINAE																	
Glossophaga soricina							8	33	12	22	2	1	1	15		3	97
Anoura aequatoris												1					1
Anoura cultrata												1					1
Lichonycteris obscura			1														1
LONCHOPHYLLINAE																	
Lonchophylla concava	2		3	3	3	5											16
Lonchophylla robusta			3		1	5											9
Lonchophylla thomasi			1	4		6											11
CAROLLIINAE																	
Carollia brevicauda		2				2	6	22		18	15	3	1	8		1	78
Carollia castanea		14		1		23						2					40
Carollia perspicillata		22			2	17		2						2			45
GLYPHONYCTERINAE																	
Trinycteris nicefori						1											1
RHINOPHYLLINAE																	
Rhinophylla alethina	2	4		4		2											12
STERNODERMATINAE																	
Sturnira lilium				1	1	1	7	18	2	19	23	2	1	2			77
Sturnira luisi		1	1		1	12	1	4	1	3			5			1	30
Sturnira oporaphilum												2					2
Artibeus fraterculus							5	23	33	29	24		14	31		18	177
Artibeus jamaicensis	12	14	7	1	6	38	6	22		13	22			5		3	149
Artibeus lituratus	3	3			2	2	3	10	5	3				2		6	39
Chiroderma trinitatum	1	5	7			2											15
Chiroderma villosum							9				2						11

Table 1. (cont.)

	Northern Localities						Central Localities			Southern Localities							
LOCALITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
Dermanura rava	1	3	9		1	17		14				1					46
Dermanura rosenbergi	1	15	1			25						3					45
Mesophylla macconnelli		1															1
Platyrrhinus chocoensis		1		1		2											4
Platyrrhinus dorsalis		1	1	3		21								2			28
Platyrrhinus helleri		2	1	2	1												6
Platyrrhinus matapalensis						2	3	6		1	3						15
Platyrrhinus nigellus												4					4
Uroderma bilobatum			5		1	5	13									2	26
Vampyressa thyone	3					2						1					6
Vampyriscus nymphaea	3	3	3			9											18
NOCTILIONIDAE																	
Noctilio leporinus							2	1		2							5
THYROPTERIDAE																	
Thyroptera sp.			2		1	2											5
VESPERTILIONIDAE																	
MYOTINAE																	
Myotis albescens			1		4	4		1		6	2					1	19
Myotis nigricans	2					4	4	10	8	2	2		1	9		23	65
Myotis riparius		5					2			2				2		3	14
Myotis simus							2			2	3					1	8
VESPERTILIONINAE																	
Eptesicus chiriquinus			2		1	2											5
Eptesicus innoxius							6	8	13	2	1		1				31
Lasiurus blossevillii							4	1		1	1						7
Lasiurus ega						1		2									3
Rhogeessa velilla							6	2		1							9

Table 1. (cont.)

	Northern Localities						Central Localities			Southern Localities						
LOCALITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
MOLOSSIDAE																	
Eumops wilsoni							7		1								8
Molossus bondae							1	9									10
Molossus molossus							4	30	4	3							41
TOTAL	41	127	64	23	46	284	109	271	115	152	115	22	55	87	6	63	1580

2008). Six specimens collected from a diurnal roost in the tunnels of the Presa Tahuín constitute new records for the El Oro Province in southwestern Ecuador. All the Ecuadorian populations correspond to the form *S. b. bilineata* (Hood and Gardner 2008 [2007]).

Family Phyllostomidae
Subfamily Micronycterinae
Micronycteris giovanniae Baker and Fonseca 2007

Specimens collected (1♂).—Finca San José (1).

Remarks.—Micronycteris giovanniae was described based on this single specimen from northwestern Ecuador. Fonseca et al. (2007) and Porter et al. (2007) provide ecological, morphological, and genetic information for this species as well as taxonomic data for other species of *Micronycteris* in northwestern Ecuador.

Micronycteris hirsuta (Peters 1969)

Specimens collected (4♀, 4♂).—Mataje (2), Estación Experimental La Chiquita (4), and Finca San José (2).

Remarks.—According to Albuja and Mena-Valenzuela (2004), *M. hirsuta* is rare along the western side of the Andes Mountains. This species has been recorded from El Paraíso in Pichincha Province, Alto Tambo and Hacienda la Granada in Esmeraldas Province, and Espuela Perdida in Manabí Province (Albuja 1999; Albuja and Mena-Valenzuela 2004). Molecular analyses based on sequence variation of mitochondrial and nuclear genes confirmed the presence of this species west of the Andes and indicated low genetic divergence among geographic regions, including South and Central American populations (Fonseca et al. 2007; Porter et al. 2007). Our specimens were netted in primary forests of the Esmeraldas Province.

Micronycteris megalotis (Gray 1842)

Specimens collected (12♀, 12♂).—Chiquita Research Station (4), La Guarapera (1), San Francisco de Bogotá (2), Bosque Protector Cerro Blanco (7), Isla Puná (6), Bosque Petrificado de Puyango (2), Jardín Botánico Moromoro (1), and Cerro Chiche (1).

Remarks.—This species was recorded in Guayaquil, Guayas Province, by Brosset (1965); in Bosque Protector Cerro Blanco, by Salas (2007); and in Estación Experimental La Chiquita, Esmeraldas Province, by Albuja (1999). Porter et al. (2007) identified a genetic distance of approximately 5% in the cytochrome-*b* gene between populations from east and west of the Andes, but this distinction has not been associated with any taxonomic changes to date. *Micronycteris megalotis* was common along the coast in primary forest, secondary forest, disturbed areas, and plantations. Some individuals were collected from a culvert and others were observed roosting in a *Ceiba* tree and in a log on the forest floor at Bosque Protector Cerro Blanco.

Micronycteris minuta (Gervais 1856)
(Plate 1B)

Specimens collected (2♀, 1♂).—San Francisco de Bogotá (1) and Bosque Protector Cerro Blanco (2).

Remarks.—Micronycteris minuta previously was recorded exclusively in the humid forests of northwestern Ecuador (Albuja 1999; Tirira 1999, 2004; Albuja and Mena-Valenzuela 2004) based on specimens collected in Alto Tambo in Esmeraldas Province (Albuja 1989). The records from Bosque Protector Cerro Blanco increase the distribution range for this species to the southern part of the coast, which is concordant with the report by Pacheco et al. (2007) from Quebrada Los Naranjos (03º50'15" S, 80º11'44.99" W; 550 m) in Tumbes Department, Peru. Molecular analyses document a genetic distance of over 5% among geographic populations in South America, which may indicate species level variation (Porter et al. 2007). *Micronycteris minuta hypoleuca* J. A. Allen 1900, with type locality in Magdalena, Colombia, has not been examined genetically; these data will be needed to understand species boundaries if *M. minuta* as currently recognized proves to be a species complex.

Subfamily Desmodontinae
Desmodus rotundus (E. Geoffroy 1810)

Specimens collected (29♀, 34♂).—San Francisco de Bogotá (3), Reserva Ecológica Manglares Churute (22), Isla Puná (5), Fuerte Militar Arenillas (14), Bosque Petrificado de Puyango (4), Cerro Chiche (7), Zaruma (7), and Portovelo–Quinta Palomares (1).

Remarks.—Desmodus rotundus was observed roosting in a small rock crevice near the Puyango Reserve and a single specimen was caught inside a gold mine in Zaruma. Also, a colony comprised primarily of males was collected from a small building within the Reserva Ecológica Manglares Churute. Our specimens correspond to the subspecies *D. r. murinus* J. A. Wagner 1840 (Kwon and Gardner 2008 [2007]).

Diaemus youngi (Jentink 1893)

Specimens collected (1♂).—Banana plantation near San Lorenzo (1).

Remarks.—This specimen is the first record of *D. youngi* for Ecuador (Pinto et al. 2007). Previously, Cabrera and Yepes (1940), Albuja (1999), and Tirira (2007) hypothesized that this species likely inhabits eastern Ecuador but no voucher specimen documented such distribution. Pacheco et al. (2007) reported the presence of this species from Angostura (03º45'23"S, 80º23'15" W; 74 m) in Tumbes Department, Peru, from a single specimen, which was the first record of this species from western Peru. Our specimen was netted in a disturbed habitat surrounded by banana plantations associated with several occupied houses and domestic animals, including chickens roosting in adjacent trees.

Subfamily Lonchorhininae
Lonchorhina aurita Tomes 1863
(Plate 1C)

Specimens collected (1♀).—San Francisco de Bogotá (1).

Remarks.—Lonchorhina aurita has been recorded on both sides of the Andes. Anthony (1923) described *L. aurita occidentalis* from Guayas Province, but Williams and Genoways (2008 [2007]) did not recognize it as a valid subspecies. One specimen was collected under a bridge over a small stream in secondary forest near a fruit plantation.

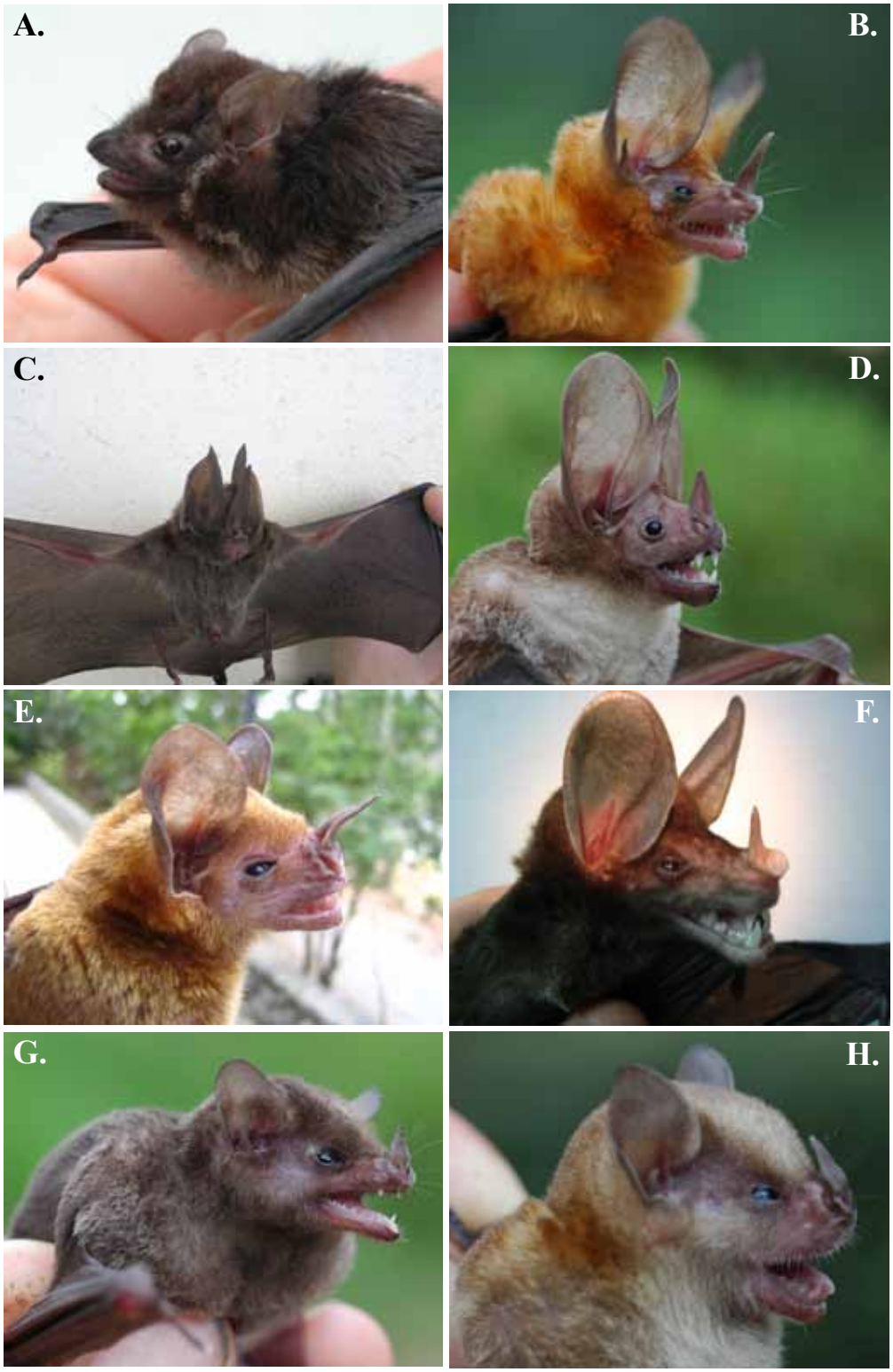

Plate 1. Bats collected during the Sowell Expedition 2004. A. *Saccopteryx bilineata*; B. *Micronycteris minuta*; C. *Lonchorhina aurita*; D. *Lophostoma aequatorialis*; E. *Phylloderma stenops*; F. *Vampyrum spectrum*; G. *Glossophaga soricina*; H. *Sturnia lilium*. Photos A, B, D, G, and H by Robert J. Baker. Photo C by Peter A. Larsen. Photos E and F by Carl W. Dick.

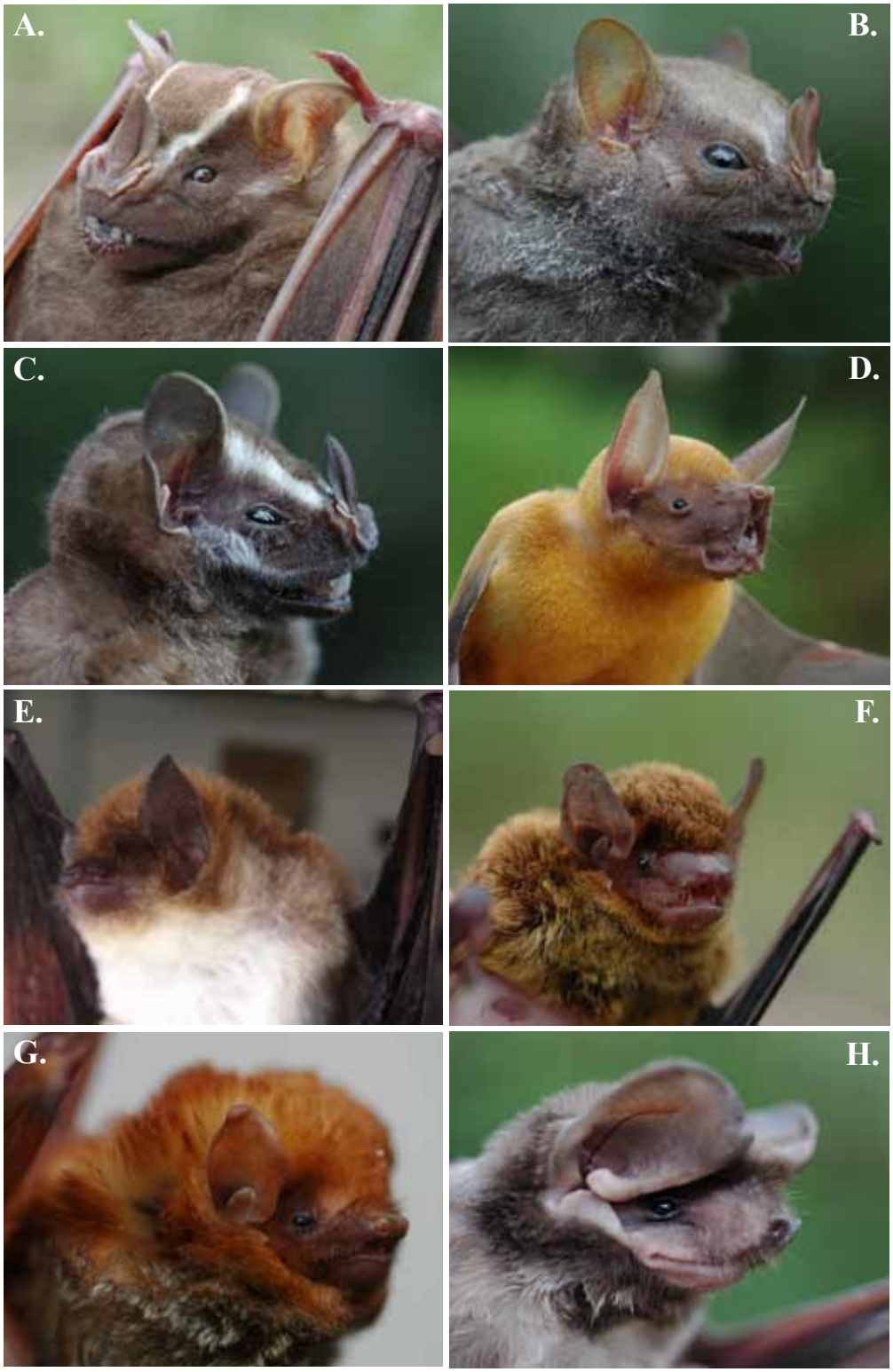

Plate 2. Bats collected during the Sowell Expedition 2004. A. *Artibeus lituratus*; B. *Chiroderma villosum*; C. *Uroderma bilobatum*; D. *Noctilio leporinus*; E. *Thyroptera* sp.; F. *Eptesicus innoxius*; G. *Lasiurus blossevillii*; H. *Eumops wilsoni*. Photos A, B, C, D, F, G, and H by Robert J. Baker. Photo E by Carl W. Dick.

Subfamily Phyllostominae
Tribe Macrophyllini
Macrophyllum macrophyllum (Schinz 1821)

Specimens collected (2♂).—San Francisco de Bogotá (2).

Remarks.—The specimens from Esmeraldas Province constitute the first record for this species in western Ecuador (Albuja 1999). *Macrophyllum macrophyllum* is known from Bonda, Santa Marta, Colombia (Allen 1900), on the western side of the Cordillera Oriental and its distribution extends to Middle America. This species was netted over a stream in a disturbed forest near agricultural areas.

Trachops cirrhosus (Spix 1823)

Specimens collected (2♀, 2♂).—Estación Experimental La Chiquita (2), banana plantation near San Lorenzo (1), and San Francisco de Bogotá (1).

Remarks.—This species was netted in primary forest, disturbed forest, and a banana plantation, but only one specimen (from San Francisco de Bogotá) was netted near water, where toads and frogs were calling around the time of capture. The biology and systematics of *T. cirrhosus* were reviewed by Cramer et al. (2001); these authors assigned all Ecuadorian populations to the subspecies *T. c. cirrhosus*.

Tribe Phyllostomini
Lophostoma aequatorialis Baker, Fonseca, Parish, Phillips, and Hoffmann 2004
(Plate 1D)

Specimens collected (18♀, 14♂).—Mataje (1), Estación Experimental La Chiquita (3), San Francisco de Bogotá (3), Reserva Ecológica Manglares Churute (9), Fuerte Militar Arenillas (6), Bosque Petrificado de Puyango (3), and Cerro Chiche (7).

Remarks.—Records from Guayas and El Oro Provinces increase the distributional range of *L. aequatorialis* along the southern coast to considerably drier regions than from the north, where it was described. Baker et al. (2004) provided information regarding the taxonomic status and systematics of this taxon. This species was common in primary and secondary forest habitats within both northern humid and southern dry forests. There is a second species, *Lophostoma silvicolum occidentalis*, described from the western versant of the Andes in Peru and Ecuador that is probably sister to *L. aequatorialis*. Cytochrome-*b* gene sequence data of several individuals collected during our study does not provide evidence of significant geographic or genetic structure typical of two species in this sample. Further study of the nature of this variation within *L. aequatorialis/occidentalis* is merited. Cytochrome-*b* sequence data does indicate that whatever species-level name(s) are ultimately applied, there is a *Lophostoma* species present in western Ecuador that is not distributed east of the Andes.

Lophostoma brasiliense Peters 1866

Specimens collected (1♀, 2♂).—San Francisco de Bogotá (3)

Remarks.—*Lophostoma brasiliense* has been recorded from eastern Ecuador (Albuja 1999; Tirira 2004). The specimens collected in Esmeraldas Province extend the distribution of this species into western Ecuador. This species is considered monotypic by Williams and Genoways (2008 [2007]).

Mimon crenulatum (E. Geoffroy 1803)

Specimens collected (9♀, 7♂).—Mataje (5), Estación Experimental La Chiquita (1), La Guarapera (2), and San Francisco de Bogotá (8).

Remarks.—*Mimon crenulatum* was relatively common and was found in a diverse range of ecological conditions along the western side of the Andes in Ecuador, as indicated by Albuja (1999). Our specimens had a yellowish-cream medial stripe along the back as well as similarly colored spots behind the ears. Pacheco et al. (2007) collected the first specimen from Peru at Quebrada Los Naranjos (03º50'15" S, 80º11'44.99" W; 550 m) and Quebrada Angostura (03º45'23" S, 80º23'15" W; 74 m) in Tumbes Department. The subspecies recognized for western Ecuador is *M. c. keenani* Handley 1960 (Williams and Genoways 2008 [2007]).

Phylloderma stenops Peters 1865
(Plate 1E)

Specimens collected (4♀).—Estación Experimental La Chiquita (2), banana plantation near San Lorenzo (1), and Bosque Petrificado de Puyango (1).

Remarks.—This species was known from the western side of the Andes based on three previous records from Esmeraldas and Pichincha Provinces (Castro and Nolivos 1998; Trujillo and Albuja 2005). Our record from Bosque Petrificado de Puyango considerably extends the range of this species to the south in western Ecuador. There was considerable color variation within our sample of *P. stenops*; specimens were gray-brown in San Lorenzo and Estación Experimental La Chiquita, but the specimen from Puyango was lighter in color. The subspecies recognized for Ecuadorian populations is *P. s. stenops* W. Peters 1865 (Williams and Genoways 2008 [2007]).

Phyllostomus discolor Wagner 1843

Specimens collected (22♀, 35♂).—Banana plantation near San Lorenzo (5), La Guarapera (5), San Francisco de Bogotá (4), Reserva Ecológica Manglares Churute (3), Isla Puná (19), Fuerte Militar Arenillas (3), Cerro Chiche (16), and Zaruma (2).

Remarks.—Phyllostomus discolor is abundant in the northern humid forests on both sides of the Andes (Albuja 1999; Albuja and Mena-Valenzuela 2004; Tirira 2007). *Phyllostomus discolor* was common in our sample and was collected in primary forest, disturbed forest, and fruit plantations and was observed roosting inside an abandoned house on Isla Puná. Our specimens from El Oro Province extend the southern geographic range of this species on the western side of the Andes in Ecuador.

Phyllostomus elongatus (E. Geoffroy 1810)

Specimens collected (15♀, 11♂).—Estación Experimental La Chiquita (5), La Guarapera (5), and San Francisco de Bogotá (16).

Remarks.—Specimens from San Francisco de Bogotá were collected from a roost inside a culvert, 2 km outside the village limits. Albuja (1999) lists 22 specimens from Esmeraldas. *P. elongatus* is common on both sides of the Andes.

Phyllostomus hastatus (Pallas 1767)

Specimens collected (16♀, 26♂, 1 undet.).—Estación Experimental La Chiquita (3), banana plantation near San Lorenzo (8), La Guarapera (7), San Francisco de Bogotá (18), and Reserva Ecológica Manglares Churute (7).

Remarks.—Santos et al. (2003) included all Ecuadorian populations in the subspecies *P. h. panamensis* J. A. Allen (1904) with the type locality in Chiriqui, Panama. However, Williams and Genoways (2008 [2007]) restricted the South American distribution of this subspecies to the western side of the Andes Mountains and north and west of Lake Maracaibo in Venezuela.

Tonatia saurophila Koopman and Williams 1951

Specimens collected (10♀, 10♂).—Mataje (3), Estación Experimental La Chiquita (7), La Guarapera (1), and San Francisco de Bogotá (9).

Remarks.—Molecular analyses using cytochrome-*b* gene sequence data showed that *T. saurophila* populations from western Ecuador were genetically distinct, diverging from populations in Bolivia and Guyana (Baker et al. 2004). The most appropriate name for these western populations would be *T. s. bakeri* from Darién, Panama (Williams et al. 1995). Our specimens were collected in primary and secondary forests.

Tribe Vampyrini
Chrotopterus auritus (Peters 1856)

Specimens collected (1♂).—Reserva Ecológica Manglares Churute (1).

Remarks.—With a previous record from Machalilla National Park in the Manabí Province (Albuja and Muñoz 2000), our specimen constitutes the second record from western Ecuador and extends the southern limit of the range of *C. auritus* to Guayas Province. Pacheco et al. (2007) reported the first record of this

species from western Peru from Quebrada Faical (03º49'19" S, 80º15'30" W; 350 m) in Tumbes Department, based on a specimen collected in primary forest. Our specimen of this uncommon bat also was collected in primary forest.

Vampyrum spectrum (Linnaeus 1758)
(Plate 1F)

Specimens collected (5♀, 1♂).—Isla Puná (6).

Remarks.—This species was collected in San Ramón–Isla Puná, Guayas Province, by G. H. H. Tate in 1923, based on records in the American Museum of Natural History database. Five of our six specimens of *V. spectrum* were collected near a large *Ceiba* tree that contained bird feathers and bones, suggesting that the tree was a feeding roost. Our specimens were collected during a single night and we observed at least one additional individual flying after nets were closed. Although this species has a wide distribution along the Neotropics (Simmons 2005), Pacheco et al. (2007) reported it for the first time in northwestern Peru, based on a single specimen collected in Quebrada Angostura (03º45'23" S, 80º23'15" W; 74 m) in Tumbes Department. This species was netted from a disturbed area near a livestock ranch.

Subfamily Glossophaginae
Tribe Glossophagini
Glossophaga soricina (Pallas 1766)
(Plate 1G)

Specimens collected (55♀, 40♂, 2 undet.).—Bosque Protector Cerro Blanco (8), Reserva Ecológica Manglares Churute (33), Isla Puná (12), Fuerte Militar Arenillas (22), Bosque Petrificado de Puyango (2), Jardín Botánico Moromoro (1), Cerro Chiche (1), Zaruma (15), and Portovelo–Quinta Palomares (3). .

Remarks.—Glossophaga soricina was the most common nectar-feeding bat in our collection. Individuals also were collected at a gold mine in Zaruma. Although considerable pelage color variation was present across our series of specimens, cytochrome-*b* gene sequences indicated that all specimens represented a single species (Hoffmann and Baker 2001). It should be noted that populations of *G. soricina* in western Ecuador were genetically distinct from conspecifics distributed east of the Andes (Hoffmann and Baker 2001). Therefore, the subspecific name *G. s. valens* Miller 1913 (type locality "Balsas," Amazonas, Peru) would be available for western populations (Griffiths and Gardner 2008 [2007]).

Tribe Choeronycterini
Anoura aequatoris (Lönnberg 1921)

Specimens collected (1♂).—Jardín Botánico Moromoro (1).

Remarks.—We followed Mantilla-Meluk and Baker (2006) in recognition of *Anoura aequatoris* (Lönnberg 1921), type locality in western Ecuador (Illambo, Gualea, Pichincha Province), as a valid species and specifically distinct from *A. caudifer* (type locality Rio de Janeiro, Brazil). This specimen constitutes the first record in the southern region of the western side of the Ecuadorian Andes (see Albuja 1999). It was found in the same habitat and locality as *A. cultrata* (see below). Mantilla-Meluk and Baker (2009) reported *A. aequatoris* for southern Colombia including localities adjacent to Ecuador in the Colombian department of Nariño. Some of the specimens identified as *Anoura aequatoris* by Mantilla-Meluk and Baker (2006) were previously reported by Cadena et al. (1998) as *A. caudifer*.

Anoura cultrata Handley 1960

Specimen collected (1♂).—Jardín Botánico Moromoro (1).

Remarks.—This specimen constitutes the first record of *A. cultrata* for southwestern Ecuador (see Albuja 1999; Tirira 2004, 2007). It was captured in sympatry with *A. aequatoris*. Cadena et al. (1998) reported this species from Nariño Department in Colombia, and Albuja (1989) reported a specimen from El Pailón in Carchi Province in northwestern Ecuador.

Lichonycteris obscura Thomas 1895

Specimen collected (1♀).—Banana plantation near San Lorenzo (1).

Remarks.—Lichonycteris obscura has been reported from western Ecuador based on three specimens collected from the Centro Científico (Scientific Center)

Río Palenque (Pichincha Province), Sade (Esmeraldas Province), and Manta Real (Azuay Province) (Albuja 1999; Albuja and Mena-Valenzuela 2004; Griffiths and Gardner 2008 [2007]). This species appears to be locally rare throughout its distribution (Hill 1985).

Tribe Lonchophyllinae

Lonchophylla concava Goldman 1914

Specimens collected (9♀, 6♂, 1 undet.).—Mataje (2), Banana plantation near San Lorenzo (3), Finca San José (3), La Guarapera (3), and San Francisco de Bogotá (5).

Remarks.—Lonchophylla concava was reported from Manabí Province of western Ecuador by Baker (1974). Although it was considered to represent *L. mordax* by Koopman (1993) and Albuja (1999), Albuja and Gardner (2005) indicated that *L. concava* is the correct name for this species in western Ecuador, with *L. mordax* being restricted to eastern South America. The individuals from Mataje were collected from a large culvert on the military base. This species also was collected in disturbed forest and fruit plantations in Esmeraldas Province.

Lonchophylla robusta Miller 1912

Specimens collected (7♀, 2♂).—Banana plantation near San Lorenzo (3), La Guarapera (1), and San Francisco de Bogotá (5).

Remarks.—Lonchophylla robusta is similar (externally) to the newly described *L. chocoana* Dávalos (2004), but skull and teeth characteristics clearly distinguish these species. From preliminary observations, our specimens showed slight size differences from typical *L. robusta* from eastern Ecuador and eastern Peru.

Lonchophylla thomasi J. A. Allen 1904

Specimens collected (3♀, 8♂).—Banana plantation near San Lorenzo (1), Finca San José (4), and San Francisco de Bogotá (6).

Remarks.—This is the smallest species of *Lonchophylla* and it appears to be distributed on both sides of the Andes. We found no conspicuous morphological differences between specimens from western Ecuador and those from Amazonian Ecuador. However, a phylogenetic analysis of cytochrome-*b* sequences (Dávalos and Jansa 2004) revealed a geographic division within *L. thomasi*, but no specimens from northwestern South America were included in that analysis. Recent morphological studies (Woodman and Timm 2006; Woodman 2007) suggested *L. thomasi* represents a species complex.

Subfamily Carolliinae

Carollia brevicauda (Schinz 1821)

Specimens collected (35♀, 42♂, 1 undet.).— Estación Experimental La Chiquita (2), San Francisco de Bogotá (2), Bosque Protector Cerro Blanco (6), Reserva Ecológica Manglares Churute (22), Fuerte Militar Arenillas (18), Bosque Petrificado de Puyango (15), Jardín Botánico Moromoro (3), Cerro Chiche (1), Zaruma (8), and Portovelo–Quinta Palomares (1).

Remarks.—Specimens collected in El Oro Province constitute the first voucher records for southwestern Ecuador (Albuja 1999). Genetic data (Hoffmann and Baker 2003) revealed minor intraspecific differences, with 0.2 to 3.2% divergence, and grouped specimens from eastern and western Ecuador.

Carollia castanea H. Allen 1890

Specimens collected (20♀, 20♂).—Estación Experimental La Chiquita (14), San José Farm (1), San Francisco de Bogotá (23), and Jardín Botánico Moromoro (2).

Remarks.—This species seems to be common in western Ecuador, however the individuals from Jardín Botánico Moromoro constitute the first vouchers from southwestern Ecuador (see Albuja 1999; Albuja and Mena-Valenzuela 2004). Molecular analyses based on cytochrome-*b* sequences indicated high divergence among populations from western and eastern Ecuador (Hoffmann and Baker 2003). Subsequent analyses including karyotypic and morphological information indicated that *C. castanea* is restricted to Middle America and northwestern South America (including western Ecuador and Colombia), whereas populations

from southeastern Ecuador, Peru, Bolivia and Brazil represented two species, *C. benkeithi* and one yet undescribed taxon (Solari and Baker 2006).

Carollia perspicillata (Linnaeus 1758)

Specimens collected (24♀, 21♂).—Estación Experimental La Chiquita (22), La Guarapera (2), San Francisco de Bogotá (17), Reserva Ecológica Manglares Churute (2), and Zaruma (2).

Remarks.—A detailed analysis using cytochrome-*b* gene sequence data showed a close relationship between western Ecuador and Middle American populations (Hoffmann and Baker 2003) of *C. perspicillata*. McLellan and Koopman (2008 [2007]) suggested that the name *C. p. azteca* Saussure (1860) may apply to Ecuadorian populations.

Subfamily Glyphonycterinae
Trinycteris nicefori (Sanborn 1949)

Specimen collected (1♀).—San Francisco de Bogotá (1).

Remarks.—A single specimen of *T. nicefori* was collected from the primary forests of Esmeraldas Province and constitutes the first record of this species from western Ecuador (see Tirira 2007). This genus previously was recognized as a member of the *Micronycteris* complex (Simmons and Voss 1998).

Subfamily Rhinophyllinae
Rhinophylla alethina Handley 1966

Specimens collected (6♀, 6♂).—Mataje (2), Estación Experimental La Chiquita (4), Finca San José (4), and San Francisco de Bogotá (2).

Remarks.—Rhinophylla alethina is endemic to the Chocó region of Colombia and Ecuador (Handley 1966; Albuja 1999) and is morphologically and genetically distinct from other species of the genus (Wright et al. 1999). This species was found only in northwestern Ecuador in primary forest, secondary forest, and banana plantations.

Subfamily Sternodermatinae
Tribe Sturnirini
Sturnira lilium (E. Geoffroy 1810)
(Plate 1H)

Specimens collected (33♀, 44♂).—Finca San José (1), La Guarapera (1), San Francisco de Bogotá (1), Bosque Protector Cerro Blanco (7), Reserva Ecológica Manglares Churute (18), Isla Puná (2), Fuerte Militar Arenillas (19), Bosque Petrificado de Puyango (23), Jardín Botánico Moromoro (2), Cerro Chiche (1), and Zaruma (2).

Remarks.—This is a common and widely distributed species. Although distinct phylogroups have been recognized within *S. lilium* (e.g., Ditchfield 2000), no subspecific names (see Jones and Phillips 1976) have been proposed for these genetically defined groups. This species was common along the western side of the Ecuadorian Andes in primary and disturbed forest and fruit plantations.

Sturnira luisi Davis 1980

Specimens collected (18♀, 12♂).—Estación Experimental La Chiquita (1), banana Plantation near San Lorenzo (1), La Guarapera (1), San Francisco de Bogotá (12), Bosque Protector Cerro Blanco (1), Reserva Ecológica Manglares Churute (4), Isla Puná (1), Fuerte Militar Arenillas (3), Cerro Chiche (5), and Portovelo–Quinta Palomares (1).

Remarks.—Sturnira luisi was common along the western side of the Andes in primary forest, disturbed forest, and fruit plantations. Although Simmons (2005) listed *S. luisi* as a valid species, based on morphological evidence (e.g., Simmons and Voss 1998), some authors consider *S. luisi* as conspecific with *S. tildae* (e.g., Brosset and Charles-Dominique 1990).

Sturnira oporaphilum **(**Tschudi 1844)

Specimens collected (1♀, 1♂).— Jardín Botánico Moromoro (2).

Remarks.—Although a number of authors recognize *S. oporaphilum* as distinct from *S. ludovici* (e.g.,

McCarthy et al. 2006), Gardner (2008a [2007]) lists *S. o. ludovici* H. E. Anthony 1924 as the subspecies occurring in Ecuador, Colombia, and Venezuela.

Sturnira oporaphilum previously was known from several localities in Esmeraldas and Pichincha Provinces in western Ecuador (Albuja 1999; Albuja and Mena-Valenzuela 2004). Our records from El Oro Province considerably extend the range of this species to the south in an undisturbed ecosystem. Morphological traits distinguishing *erythromos*, *bogotensis*, and *ludovici* have limited application and, as a result, the distribution of these Andean species from Colombia to Peru is unclear (Pacheco and Patterson 1992). Presently, genetic data from properly identified specimens is not available for further resolution.

Tribe Stenodermatini

Artibeus fraterculus Anthony 1924

Specimens collected (89♀, 88♂).—Bosque Protector Cerro Blanco (5), Reserva Ecológica Manglares Churute (23), Isla Puná (33), Fuerte Militar Arenillas (29), Bosque Petrificado de Puyango (24), Cerro Chiche (14), Zaruma (31), and Portovelo–Quinta Palomares (18).

Remarks.—This species was the most commonly collected during our study. Nine specimens were hand collected from a termite nest at a farm located in Reserva Ecológica Manglares Churute. *Artibeus fraterculus* has a limited geographic range, restricted to the dry forests west of the Andes; however, within that range it is common and occupies both primary and disturbed habitats. Specimens collected at the type locality (Portovelo) were included in recent genetic analyses by Larsen et al. (2007), the results of which indicate a close relationship of *A. fraterculus* to Middle American species (*A. hirsutus* and *A. inopinatus*).

Artibeus jamaicensis Leach 1821

Specimens collected (84♀, 64♂, 1 undet.).—Mataje (12), Estación Experimental La Chiquita (14), banana plantation near San Lorenzo (7), Finca San José (1), La Guarapera (6), San Francisco de Bogotá (38), Bosque Protector Cerro Blanco (6), Reserva Ecológica Manglares Churute (22), Fuerte Militar Arenillas (13), Bosque Petrificado de Puyango (22), Zaruma (5), and Portovelo–Quinta Palomares (3).

Remarks.—Following the restricted definition by Larsen et al. (2007), this species should be rare or absent east of the Andes in South America. Genetic data showed that populations of *A. jamaicensis* from western Ecuador are distinct from *A. jamaicensis* from Central America (Larsen et al. 2007). The appropriate name for these populations would be *A. j. aequatorialis* Andersen 1906 with type locality Zaruma, Ecuador.

Artibeus lituratus (Olfers 1818)
(Plate 2A)

Specimens collected (18♀, 20♂, 1 undet.).—Mataje (3), Estación Experimental La Chiquita (3), La Guarapera (2), San Francisco de Bogotá (2), Bosque Protector Cerro Blanco (3), Reserva Ecológica Manglares Churute (10), Isla Puná (5), Fuerte Militar Arenillas (3), Zaruma (2), and Portovelo–Quinta Palomares (6).

Remarks.—Within our sample, this is the only species of large *Artibeus* found on both sides of the Andes. In the field, *A. lituratus* may be confused with *A. jamaicensis* on the western side of the Andes; however, *A. lituratus* is larger than *A. jamaicensis* and the facial stripes are more distinct in *A. lituratus*. Some differences in skull and dentition also distinguish these species (see Andersen 1908). Additional genetic data are available in Larsen et al. (2007)

Chiroderma trinitatum Goodwin 1958

Specimens collected (12♀, 3♂).—Mataje (1), and Estación Experimental La Chiquita (5), banana plantation near San Lorenzo (7), and San Francisco de Bogotá (2).

Remarks.—This species is the smallest in the genus and it is sometimes confused with species of *Vampyriscus* (based on external morphology). Genetic data for *C. trinitatum* published by Baker et al. (1994) indicated a sister relationship to *C. doriae* (the largest species in the genus) from eastern and southern Brazil and Paraguay. Northwestern populations correspond to the subspecies *C. t. gorgasi* Handley 1960 (Gardner 2008b [2007]).

Chiroderma villosum Peters 1860
(Plate 2B)

Specimens collected (2♀, 9♂).—Bosque Protector Cerro Blanco (9) and Bosque Petrificado de Puyango (2).

Remarks.—Specimens collected in Guayas and El Oro Provinces represent an extension of the geographic range to southwestern Ecuador (see Albuja 1999; Albuja and Mena-Valenzuela 2004). *Chiroderma villosum* was netted in primary forest and fruit plantations from central and southern coastal Ecuador. The western populations from Ecuador and Colombia were assigned to the subspecies *C. v. jesupi* Allen 1900 (Gardner 2008b [2007]).

Dermanura rava Miller 1902

Specimens collected (22♀, 24♂).—Mataje (1), Estación Experimental La Chiquita (3), banana plantation near San Lorenzo (9), La Guarapera (1), San Francisco de Bogotá (17), Reserva Ecológica Manglares Churute (14), and Jardín Botánico Moromoro (1).

Remarks.—Dermanura rava is distinguished from *D. phaeotis* by Solari et al. (2009) based on genetic and morphological data. The northern localities where our specimens were collected are near the type locality of San Javier, Esmeraldas (Miller 1902). This species has a broad geographic range, extending from southwestern Ecuador to Panama, and inhabits dry and wet forests, although it is more commonly collected in dry forests.

Dermanura rosenbergi Thomas 1897

Specimens collected (16 ♀, 29 ♂).—Mataje (1), Estación Experimental La Chiquita (15), banana plantation near San Lorenzo (1), San Francisco de Bogotá (25), and Jardín Botánico Moromoro (3).

Remarks.—Dermanura rosenbergi is distinguished from *D. glauca* by Solari et al. (2009) based on genetic and morphological data. The northern localities where our specimens were collected are near the type locality of Cachavi, Esmeraldas (Thomas 1897). *Dermanura rosenbergi* is restricted to the wet forests of the Chocó, with an apparent isolated population in El Oro Province.

Mesophylla macconnelli Thomas 1901

Specimen collected (1♂).—Estación Experimental La Chiquita (1).

Remarks.—A single specimen was collected from secondary forest mixed with agricultural areas of fruit crops. This species has been associated with *Ectophylla* and *Vampyressa*, but genetic data (chromosomes and DNA sequences) document it is more closely related to *Vampyressa* (sensu Baker et al. 2003b and Hoofer and Baker 2006).

Platyrrhinus chocoensis Alberico and Velasco 1991

Specimens collected (2♀, 1♂, 1 undet.).—Estación Experimental La Chiquita (1), San José Farm (1), and San Francisco de Bogotá (2).

Remarks.—Platyrrhinus chocoensis is endemic to the Chocó region from Colombia and northwestern Ecuador (Velazco 2005). Although externally similar to *P. dorsalis*, *P. chocoensis* is distinguished from that species by external and cranial characters (Alberico and Velasco 1991b).

Platyrrhinus dorsalis (Thomas 1900)

Specimens collected (16♀, 12♂).—Estación Experimental La Chiquita (1), banana plantation near San Lorenzo (1), Finca San José (3), San Francisco de Bogotá (21), and Zaruma (2).

Remarks.—The only previous record of *P. dorsalis* for El Oro Province was from Mina Miranda, almost 1.5 km. N Zaruma (Gardner and Carter 1972). Two individuals caught in culverts near San Francisco de Bogotá showed an interesting pale coloration. Velazco and Patterson (2008) included cytochrome-*b,* ND2, D-Loop, and RAG 2 sequences from seven of our specimens from western Ecuador in their review of the genus.

Platyrrhinus helleri Peters 1866

Specimens collected (2♀, 4♂).—Estación Experimental La Chiquita (2), banana plantation near San Lorenzo (1), Finca San José (2), and La Guarapera (1).

Remarks.—This species previously had been recorded in southwestern Colombia from Quebrada Docordo in Chocó Department, Quebrada Huanqui in Cauca Department, and Rio Sabaletas in Valle del Cauca Department (Velazco 2005). Our specimens from Esmeraldas Province increase the range of *P. helleri* to the southern Chocoan region and confirm the presence of this species in northwestern Ecuador. It appears that this species is restricted, in Ecuador, to the humid Pacific lowlands, contrary to the situation with *P. matapalensis* (see next account).

Platyrrhinus matapalensis Velazco 2005

Specimens collected (8♀, 7♂).—San Francisco de Bogotá (2), Bosque Protector Cerro Blanco (3), Reserva Ecológica Manglares Churute (6), Fuerte Militar Arenillas (1), and Bosque Petrificado de Puyango (3).

Remarks.—Velazco (2005) described this species based on specimens from Matapalo, Zarumilla Province, Tumbes Department, in northern Peru. This species is widely distributed along the western Andean slopes from northern Peru to Esmeraldas Province in Ecuador. Velazco and Patterson (2008) included cytochrome-*b,* ND2, D-Loop, and RAG 2 sequences from four of our specimens from southwestern Ecuador in their molecular analysis of the genus, and hypothesized a sister relationship between *P. matapalensis* and Central American specimens of *P. helleri*. These western Ecuadorian populations previously were recognized as conspecific with *P. helleri* (Ferrel and Wilson 1991).

Platyrrhinus nigellus (Gardner and Carter 1972)

Specimens collected (1♀, 3♂).— Jardín Botánico Moromoro (4).

Remarks.—Platyrrhinus nigellus is intermediate in size between *P. dorsalis* and *P. matapalensis* (Velazco 2005) and is found primarily in lower montane forests. These bats have darker, almost black, dorsal hair and a whitish mid-dorsal stripe. All of our specimens were collected from an isolated hill in Moromoro, where other "montane" species were netted. Recently, Velazco and Gardner (2009) described *P. nitelinea* from Puente de Moromoro, El Oro Province (03˚44' S, 79˚44' W) based on morphological characters. This new species seems to be a larger *Platyrrhinus* and it is distributed from western Colombia to southwestern Ecuador.

Uroderma bilobatum Peters 1866
(Plate 2C)

Specimens collected (12♀, 14♂).—Banana plantation near San Lorenzo (5), La Guarapera (1), San Francisco de Bogotá (5), Bosque Protector Cerro Blanco (13), and Portovelo–Quinta Palomares (2).

Remarks.—Although *U. bilobatum* is common on both sides of the Andes, no previous records are known from El Oro Province (Albuja 1999; Albuja and Mena-Valenzuela 2004). The records from Portovelo extend the range of this species to the coastal southwest. This species previously was reported from Esmeraldas Province by Allen (1916), Brosset (1965), and Hoffmann et al. (2003). *Uroderma bilobatum* has been studied extensively using karyotypes (Baker et al. 1972; Baker et al 1975; Baker 1979), morphology (Baker et al. 1972), and gene sequences (Hoffmann et al. 2003), and many alternative evolutionary scenarios have been debated (Greenbaum 1981; Barton 1982; Lessa 1990; Owen and Baker 2001). The material from the western side of the Andes in northern South America further documents the complexity of these interpretations. Davis (1968) reported a major morphological break between populations from Colombia and Ecuador, and suggested that Central American specimens were associated with those from Colombia, for which the name would be *U. b. convexum*. On the other hand, he assigned Ecuadorian specimens from the western side of the Andes to *U. b. thomasi*, and further indicated that this similarity between *thomasi*-sized specimens from the eastern side of the Andes and those from the dry deciduous forest on the western side of the Andes documented previous trans-Andean dispersal. Hoffmann et al. (2003) indicated that specimens of *U. bilobatum* from western Ecuador were genetically indistinguishable (karyotypes

and cytochrome-*b* sequences) from Middle American populations (as far north as Honduras) and assigned these specimens to *U. b. convexum*. What is unclear in Davis's work is whether the material that was the basis of his conclusions for characteristics of Colombian *U. bilobatum* contained sufficient material from the Chocó to define the boundaries of morphological change. Clearly, additional study of the genetic and morphological characteristics of *U. bilobatum* from the western side of the Andes is merited.

Vampyressa thyone Thomas 1909

Specimens collected (6♂).—Mataje (3), San Francisco de Bogotá (2), and Jardín Botánico Moromoro (1).

Remarks.—Previously reported from Guayas Province, including the original type locality (Thomas 1909a), Esmeraldas Province (Albuja 1989), and Pichincha Province (Lee et al. 2006). The genus *Vampyressa* was restricted to include *V. melissa*, *V. pusilla*, and *V. thyone* (Hoofer and Baker 2006). This taxon has been listed as a junior synonym of *pusilla* (Petterson 1968), however Lim et al. (2003) concluded that *thyone* and *pusilla* should be accorded specific status.

Vampyriscus nymphaea (Thomas 1909)

Specimens collected (11♀, 7♂).—Mataje (3), Estación Experimental La Chiquita (3), banana plantation near San Lorenzo (3), and San Francisco de Bogotá (9).

Remarks.—*Vampyriscus nymphaea* is found primarily in the Chocó region of northwestern South America that extends to Central America (Albuja and Mena-Valenzuela 2004). Most of our specimens came from secondary forest near agricultural plots, but some were collected from patches of primary forest. Molecular data for mitochondrial cytochrome-*b* and ND3-ND4 genes and the nuclear RAG-2 gene confirmed that this species, along with *V. bidens*, does not form a monophyletic lineage with *Vampyressa*. Thus, to create a monophyletic genus, the name *Vampyriscus* should be recognized for these species (Baker et al. 2003b; Hoofer and Baker 2006).

Family Noctilionidae
Noctilio leporinus (Linnaeus 1758)
(Plate 2D)

Specimens collected (3♀, 2♂).—Bosque Protector Cerro Blanco (2), Reserva Ecológica Manglares Churute (1), and Fuerte Militar Arenillas (2).

Remarks.—This species has been recorded in the Bosque Protector Cerro Blanco (Angel and Salas 2003; Alava and Carvajal 2004; Salas-Z. 2008). Based on their geographic distribution (Davis 1973; Gardner 2008d [2007]), the western populations of Colombia and Ecuador may correspond to the subspecies *mastivus* Vahl 1797. Genetic data (Lewis-Oritt et al. 2001) indicate that this fish-eating bat is recently evolved and little geographic genetic variation distinguishes the widespread population from the Antilles, Central America, and Amazonian regions. Pacheco et al. (2007) reported this bat from Quebrada Faical (03º49'19" S, 80º15'30" W; 350 m) in Tumbes Department, confirming the presence of this species on the western side of the Peruvian Andes.

Family Thyropteridae
Thyroptera sp.
(Plate 2E)

Specimens collected (3♀, 2♂).—Banana plantation near San Lorenzo (2), La Guarapera (1), and San Francisco de Bogotá (2).

Remarks.—These specimens were morphologically similar to *T. tricolor* (Solari et al. 2004), but some additional traits appear unique and merit further study. Applicability of the name *albigula* (G. M. Allen 1923) needs to be evaluated. Although typically associated with vegetation near streams, all of our specimens were netted in secondary forest and crop plantations.

Family Vespertilionidae
Subfamily Myotinae
Myotis albescens (E. Geoffroy 1806)

Specimens collected (11♀, 8♂).—Banana plantation near San Lorenzo (1), La Guarapera (4), San Francisco de Bogotá (4), Reserva Ecológica Manglares

Churute (1), Fuerte Militar Arenillas (6), Bosque Petrificado de Puyango (2), and Portovelo–Quinta Palomares (1).

Remarks.—Morphological variation has been recorded in *M. albescens*, which occurs on both sides of the Andes (LaVal 1973). The type locality of *M. albescens* is in Paraguay and therefore if the material from western Ecuador is deemed conspecific, it would be a remarkable range for a small Vespertilionid.

Myotis nigricans (Schinz 1821)

Specimens collected (17♀, 47♂, 1 undet.).—Mataje (2), San Francisco de Bogotá (4), Bosque Protector Cerro Blanco (4), Reserva Ecológica Manglares Churute (10), Isla Puná (8), Fuerte Militar Arenillas (2), Bosque Petrificado de Puyango (2), Cerro Chiche (1), Zaruma (9), and Portovelo–Quinta Palomares (23).

Remarks.—Several specific names have been proposed for populations from northwestern South America (reviewed in LaVal 1973). Baker (1974) reported *M. n. nigricans* from Esmeraldas Province, but Koopman (1978) used the combination *M. n. punensis* for specimens from northwestern Peru, and suggested that populations on either side of the Andes were distinct from one another.

Myotis riparius Handley 1960

Specimens collected (6♀, 8♂).—Estación Experimental La Chiquita (5), Bosque Protector Cerro Blanco (2), Fuerte Militar Arenillas (2), Zaruma (2), and Portovelo–Quinta Palomares (3).

Remarks.—Our analyses of mitochondrial cytochrome-*b* sequences contained minimal divergence within the geographic localities listed above. Our field identifications included a number of individuals misidentified as *M. nigricans*, however the divergence from a specimen of *M. nigricans* from near the type locality in Brazil indicates it is improbable that the specimens listed above are referable to *M. nigricans*. This species was reported by Pacheco et al. (2007) based on six specimens collected in Angostura, Quebrada Campo Verde (03º50'44" S, 80º11'11" W; 570 m), Carrizalillo (03º43'56.71" S, 80º11'10.42" W; 125 m), and Quebrada Los Naranjos (03º50'15" S, 80º11'44.99" W; 550 m) in Tumbes Department, northwestern Peru.

Myotis simus O. Thomas 1901

Specimens collected (6♀, 2♂).—Bosque Protector Cerro Blanco (2), Fuerte Militar Arenillas (2), Bosque Petrificado de Puyango (3), and Portovelo–Quinta Palomares (1).

Remarks.—Myotis simus is endemic to South America and appears to be restricted to rain forests of the Amazon Basin in Colombia, Bolivia, Brazil, Ecuador, and Peru (LaVal 1973; Wilson 2008b [2007]). In Ecuador, this species has been collected in Limoncocha, Sucumbios Province (00°24' S, 76°38' W) (Albuja 1999), Río Capahuarí, Napo Province (02°18' S, 77°00' W), and Boca del Río Curaray, Pastaza Province (01°22' S, 76°57' W) (LaVal 1973). Our specimens are morphologically and genetically similar to *Myotis simus* and, if that were the proper species identification, would constitute a new geographic record for western Ecuador. However, our specimens were collected from dry localities, contrary with the typical habitat type recorded for the species.

Subfamily Vespertilioninae
Tribe Nycticeini
Eptesicus chiriquinus Thomas 1920

Specimens collected (3♀, 2♂).—Banana plantation near San Lorenzo (2), La Guarapera (1), and San Francisco de Bogotá (2).

Remarks.—Simmons (2005) recognized this species as valid for Ecuadorian populations. Our specimens agree in most details with the revised diagnosis from Simmons and Voss (1998), and they are clearly distinct from *E. andinus* and *E. brasiliensis*. Pacheco et al. (2007) reported this species for the first time in western Peru based on a specimen collected in Quebrada Los Naranjos (03º50'15" S, 80º11'44.99" W; 550 m) in Tumbes Department.

Eptesicus innoxius (Gervais 1841)
(Plate 2F)

Specimens collected (17♀, 14♂).—Bosque Protector Cerro Blanco (6), Reserva Ecológica Manglares Churute (8), Isla Puná (13), Fuerte Militar Arenillas (2), Bosque Petrificado de Puyango (1), and Cerro Chiche (1).

Remarks.—*Eptesicus innoxius* was reported for Ecuador based on 18 specimens from El Oro and Guayas Provinces (Davis 1966). Additionally, Albuja (1999) reported 25 specimens collected from Barraganete, Bolívar Province (01º27' S, 79º18' W; 430 m). We noticed a large degree of variation in fur color, ranging from light-tobacco to brown, with different lengths of dorsal hair. Other names used for these populations include *E. i. espadae* (Cabrera 1901), from Los Rios Province, and *E. i. punicus* (Thomas 1909b), from Guayas Province.

Tribe Lasiurini
Lasiurus blossevillii (Lesson and Garnot 1826)
(Plate 2G)

Specimens collected (4♀, 3♂).—Bosque Protector Cerro Blanco (4), Reserva Ecológica Manglares Churute (1), Fuerte Militar Arenillas (1), and Bosque Petrificado de Puyango (1).

Remarks.—This species previously has been recorded in primary forest at Bosque Protector Cerro Blanco (Salas-Z 2008). This is a remarkably beautiful bat with long hair and bright reddish tones/shades, unlike specimens from northern localities in Mexico and the United States. Previously listed as *L. borealis* (e.g., Koopman 1993), it is now recognized as a distinct species (Baker et al. 1988). Based on distribution, our records from western Ecuador would correspond to *L. b. frantzii* (see Baker et al. 1988).

Lasiurus ega (P. Gervais 1856)

Specimens collected (1♀, 2♂).—San Francisco de Bogota (1) and Reserva Ecológica Manglares Churute (2).

Remarks.—Within the large distribution of this species (see Kurta and Lehr 1995), these populations would be referable to *L. e. punensis* J. A. Allen 1914, with the type locality in Guayas Province. Some variation in dorsal coloration occurs among our specimens, which resembles the pelage of subspecies within the range of *L. ega*. This species is sometimes listed as a different genus, *Dasypterus* (e.g., Barquez et al. 1999). Gardner and Handley (2008 [2007]) recognize *L. ega fuscatus* as the subspecies in western Colombia and western Ecuador.

Tribe Antrozoini
Rhogeessa velilla Thomas 1903

Specimens collected (4♀, 5♂).—Bosque Protector Cerro Blanco (6), Reserva Ecológica Manglares Churute (2), and Fuerte Militar Arenillas (1).

Remarks.—Although this species has been recorded from western Ecuador as *Rhogeessa io* (Albuja and Mena-Valenzuela 2004), there are no previous records from Guayas and El Oro Provinces. *Rhogeessa io* has a diploid number of 30 whereas *R. velilla* from western Ecuador has a diploid number of 42. Our specimens considerably extend the geographic range to the south, and Pacheco et al. (2007) verified the presence of *Rhogeessa io* in northwestern Peru based on specimens from Quebrada Los Naranjos (03º50'15" S, 80º11'44.99" W; 550 m), Tumbes Department. Based on our field observations, this species is an early flyer and was usually netted at dusk. The karyotype from our specimens is indistinguishable from that described for *R. genowaysi* from Chiapas, Mexico (Baker 1984). Use of the name *velilla* (Baird et al. 2008) is based on its potential distribution and type locality in Isla Puná, Guayas Province (Goodwin 1958), but a morphological comparison remains to be drawn. *Rhogeessa velilla* is restricted to the western Andean versant of the dry forest of southern Ecuador. This species is part of the *R. tumida* complex and is sister to other taxa currently distributed on the Atlantic coasts of Central America and Mexico (Baird et al. 2008). Such data supports specific status for *R. velilla*.

Family Molossidae

Eumops wilsoni Baker, McDonough, Swier, Larsen, Carrera, and Ammerman 2009
(Plate 2H)

Specimens collected (3♀, 5♂).— Bosque Protector Cerro Blanco (7) and Isla Puná (1).

Remarks.—These specimens initially were identified as *Eumops glaucinus*, as reported from western Ecuador (Guayaquil) by Sanborn (1932), Eger (1977), and Albuja (1999). However, McDonough et al. (2008) revised the *E. glaucinus* complex and divided it into four species: *E. ferox*, distributed in the Caribbean, Mexico, and Central America; *E. floridanus*, restricted to Florida, USA; *E. glaucinus*, restricted to South America east of the Andes; and an undescribed taxon restricted to the western versant of the Andes in Ecuador and Peru. Subsequently, Baker et al. (2009) described this taxon as *E. wilsoni* based on genetic uniqueness (karyotypes, cytochrome-*b* sequence, and AFLP analysis). All specimens collected during our survey were netted in Guayas Province. The specimen collection from Isla Puná represents a new record for this locality. Morphologically similar specimens have been reported from Guayaquil and genetically similar specimens have been reported from northwestern Peru (Sudman et al. 1994). The habitat for this species appears to be dry forest with adequate open understory within which this large species can forage. It is probable that this species is restricted to the dry forests of northwestern Peru and southwestern Ecuador.

Molossus bondae J. A. Allen 1904

Specimens collected (7♀, 3♂).—Bosque Protector Cerro Blanco (1) and Reserva Ecológica Manglares Churute (9).

Remarks.—Eger (2008 [2007]) considered Ecuadorian populations as *M. bondae bondae*, although López-González and Presley (2001) applied the name *M. currentium bondae* to populations from western Ecuador. Our specimens were collected inside primary and secondary forest.

Molossus molossus (Pallas 1766)

Specimens collected (26♀, 15♂).—Bosque Protector Cerro Blanco (4), Reserva Ecológica Manglares Churute (30), Isla Puná (4), and Fuerte Militar Arenillas (3).

Remarks.—Although this species is common and widespread across the Neotropics and is associated with human dwellings, these specimens constitute the first documented records for El Oro Province (Albuja 1999). Interesting pelage color variations were found across our sample, including strikingly different red and black color phases. This species was found roosting in large trees at the Reserva Ecológica Manglares Churute. Specimens from Isla Puná and Daule were described as *daulensis* by J. A. Allen (1916); therefore, if applicable, it would be an appropriate name for these populations (Eger 2008 [2007]).

DISCUSSION

Some species of bats known from western Ecuador were not collected during the Sowell Expeditions. Table 2 summarizes the complete list of bats known from western Ecuador, including both our collections and noteworthy records gathered from the literature, including: *Balantiopteryx infusca* (McCarthy et al. 2000), *Centronycteris centralis* (Simmons and Handley 1998), *Anoura fistulata* (Muchhala et al. 2005), *Lonchophylla chocoana* (Dávalos 2004), *Lonchophylla orcesi* (Albuja and Gardner 2005), *Lonchophylla cadenai* (Woodman and Timm 2006), *Lonchophylla fornicata* (Woodman 2007), *Glyphonycteris daviesi* (Pine et al. 1996), *Platyrrhinus albericoi* (Velazco 2005), *Sturnira koopmanhilli* (McCarthy et al. 2006), and *Platyrrhinus nitelinea* (Velazco and Gardner 2009). Other species on the western versant of Ecuador were compiled from Brosset (1965), Baker (1974), Albuja (1999), Angel and Salas (2003), Albuja and Mena-Valenzuela (2004), Albuja and Arcos (2007), Tirira (2007), Arroyo-Cabrales (2008a, b [2007]), Davis and Gardner (2008 [2007]), Eger (2008 [2007]), Marques-Aguiar (2008a, b [2007]), Gardner (2008c, d, e [2007]), Salas-Z. (2008), and Wilson (2008a, b [2007]). These records indicate that at least 40 bat species are known

Table 2. Complete list of species of bats from western Ecuador. An asterisk (*) indicates new species, and a dagger (†) shows new geographic records collected during the Sowell Expeditions to Ecuador.

TAXON	Collected during Sowell Expeditions	Data on species recently revised, updated or described
EMBALLONURIDAE		
Balantiopteryx infusca		McCarthy et al. 2000
Centronycteris centralis		Hood and Gardner 2008 [2007]
Cormura brevirostris		Albuja and Mena-Valenzuela 2004
Diclidurus albus		Hood and Gardner 2008 [2007]
Peropteryx kappleri	X	Hood and Gardner 2008 [2007]
Rhynchonycteris naso		Albuja and Mena-Valenzuela 2004
Saccopteryx bilineata	X	Albuja and Mena-Valenzuela 2004
Saccopteryx leptura		Hood and Gardner 2008 [2007]
PHYLLOSTOMIDAE		
Micronycterinae		
*Micronycteris giovanniae**	X	Fonseca et al. 2007
Micronycteris hirsuta	X	Porter et al. 2007
Micronycteris megalotis	X	Porter et al. 2007
Micronycteris minuta	X	Porter et al. 2007
Desmodontinae		
Desmodus rotundus	X	Kwon and Gardner 2008 [2007]
Diaemus youngi†	X	Pinto et al. 2007
Lonchorhininae		
Lonchorhina aurita	X	Williams and Genoways 2008 [2007]
Phyllostominae		
Macrophyllum macrophyllum†	X	Williams and Genoways 2008 [2007]
Trachops cirrhossus	X	Williams and Genoways 2008 [2007]
*Lophostoma aequatorialis**	X	Baker et al. 2004
Lophostoma brasiliense†	X	Williams and Genoways 2008 [2007]
Lophostoma silvicolum		Williams and Genoways 2008 [2007]
Mimon crenulatum	X	Williams and Genoways 2008 [2007]
Phylloderma stenops	X	Williams and Genoways 2008 [2007]
Phyllostomus discolor	X	Williams and Genoways 2008 [2007]
Phyllostomus elongatus	X	Williams and Genoways 2008 [2007]
Phyllostomus hastatus	X	Santos et al. 2003
Tonatia saurophila	X	Williams and Genoways 2008 [2007]
Chrotopterus auritus	X	Williams and Genoways 2008 [2007]
Vampyrum spectrum	X	Williams and Genoways 2008 [2007]
Glossophaginae		
Glossophaga soricina	X	Griffiths and Gardner 2008 [2007]

Table 2. (cont.)

TAXON	Collected during Sowell Expeditions	Data on species recently revised, updated or described
Anoura aequatoris†	X	Mantilla-Meluk and Baker 2006
Anoura cultrata†	X	Griffiths and Gardner 2008 [2007]
Anoura fistulata		Muchhala et al. 2005
Anoura geoffroyi		Griffiths and Gardner 2008 [2007]
Choeroniscus minor		Griffiths and Gardner 2008 [2007]
Choeroniscus periosus		Griffiths and Gardner 2008 [2007]
Lichonycteris obscura	X	Griffiths and Gardner 2008 [2007]
Lonchophillinae		
Lonchophylla cadenai		Woodman and Timm 2006
Lonchophylla chocoana		Dávalos 2004
Lonchophylla concava	X	Griffiths and Gardner 2008 [2007]
Lonchophylla hesperia		Griffiths and Gardner 2008 [2007]
Lonchophylla fornicata		Woodman 2007
Lonchophylla orcesi		Albuja and Gardner 2005
Lonchophylla robusta	X	Griffiths and Gardner 2008 [2007]
Lonchophylla thomasi	X	Griffiths and Gardner 2008 [2007]
Carolliinae		
Carollia brevicauda	X	Hoffman and Baker 2003
Carollia castanea	X	Solari and Baker 2006
Carollia perspicillata	X	Hoffman and Baker 2003
Glyphonycterinae		
Glyphonycteris daviesi		Williams and Genoways 2008 [2007]
Trinycteris nicefori†	X	Williams and Genoways 2008 [2007]
Rhinophyllinae		
Rhinophylla alethina	X	McLellan and Koopman 2008 [2007]
Sternodermatinae		
Sturnira bidens		Gardner 2008a [2007]
Sturnira bogotensis		Gardner 2008a [2007]
Sturnira erythromos		Gardner 2008a [2007]
Sturnira koopmanhilli		McCarthy et al. 2006
Sturnira lilium	X	Gardner 2008a [2007]
Sturnira luisi	X	Gardner 2008a [2007]
Sturnira oporaphilum	X	Gardner 2008a [2007]
Sturnira sp. A		Gardner 2008a [2007]
Artibeus fraterculus	X	Marques-Aguiar 2008a [2007]
Artibeus jamaicensis	X	Larsen et al. 2007
Artibeus lituratus	X	Marques-Aguiar 2008a [2007]
Chiroderma salvini		Gardner 2008b [2007]

Table 2. (cont.)

TAXON	Collected during Sowell Expeditions	Data on species recently revised, updated or described
Chiroderma trinitatum	X	Gardner 2008b [2007]
Chiroderma villosum	X	Gardner 2008b [2007]
Dermanura rava	X	Solari et al. 2009
Dermanura rosenbergi	X	Solari et al. 2009
Enchistenes hartii		Marques-Aguiar 2008b [2007]
Messophylla macconnelli	X	Arroyo-Cabrales 2008a [2007]
Platyrrhinus albericoi		Velazco and Patterson 2008
Platyrrhinus chocoensis	X	Velazco and Patterson 2008
Platyrrhinus dorsalis	X	Velazco and Patterson 2008
Platyrrhinus helleri	X	Velazco and Patterson 2008
Platyrrhinus ismaeli		Velazco and Patterson 2008
Platyrrhinus matapalensis	X	Velazco and Patterson 2008
Platyrrhinus nigellus	X	Velazco and Patterson 2008
Platyrrhinus nitelinea		Velazco and Gardner 2009
Uroderma bilobatum	X	Hoofer and Baker 2006
Vampyressa thyone	X	Arroyo-Cabrales 2008b [2007]
Vampyrodes caraccioli		Gardner 2008c [2007]
Vampyryscus nymphaea	X	Hoofer and Baker 2006
NOCTILIONIDAE		
Noctilio leporinus	X	Gardner 2008d [2007]
FURIPTERIDAE		
Amorphochilus schnablii		Gardner 2008e [2007]
THYROPTERIDAE		
Thyroptera discifera		Wilson 2008a [2007]
Thyroptera tricolor		Wilson 2008a [2007]
*Thyroptera sp.**	X	
VESPERTILIONIDAE		
Myotinae		
Myotis albescens	X	Wilson 2008b [2007]
Myotis keaysi		Wilson 2008b [2007]
Myotis nigricans	X	Wilson 2008b [2007]
Myotis oxyotus		Wilson 2008b [2007]
Myotis riparius	X	Wilson 2008b [2007]
Myotis simus†	X	Wilson 2008b [2007]
Vespertilioninae		
Eptesicus andinus		Davis and Gardner 2008 [2007]
Eptesicus chiriquinus	X	Davis and Gardner 2008 [2007]

Table 2. (cont.)

TAXON	Collected during Sowell Expeditions	Data on species recently revised, updated or described
Eptesicus innoxius	X	Davis and Gardner 2008 [2007]
Lasiurus blossevillii	X	Gardner and Handley 2008 [2007]
Lasiurus ega	X	Gardner and Handley 2008 [2007]
Rhogeessa velilla	X	Baird et al. 2008
MOLOSSIDAE		
Eumops auripendulus		Eger 2008 [2007]
Eumops perotis		Eger 2008 [2007]
*Eumops wilsoni**	X	Baker et al. 2009
Molossops aequatorianus		Eger 2008 [2007]
Molossus bondae	X	Eger 2008 [2007]
Molossus molossus	X	Eger 2008 [2007]
Nyctinomops macrotis		Eger 2008 [2007]
Promops centralis		Eger 2008 [2007]
Tadarida brasiliensis		Eger 2008 [2007]

to occur in western Ecuador that were not recorded during this study, bringing the chiropteran diversity of western Ecuador to 106 species.

The Sowell Expeditions to western Ecuador resulted in the addition of 11 species (7 geographic records, 3 new species, and 1 unrecognized species) to the known bat diversity for the area, when combined with previous reports published by Albuja (1999), Tirira (1999), Albuja and Mena-Valenzuela (2004), Albuja and Arcos (2007), and Tirira (2007). Although our sampling was not repetitious for localities and was not geographically even (sampling was concentrated in the northern and southern end of western Ecuador) or temporally spread (all sampling was conducted June to August), the increase in species diversity and the range extensions reported are noteworthy (Table 2). These results, we believe, come from a comprehensive approach that includes the use of molecular systematic tools (Baker et al. 2003b), increased taxon sampling (Larsen et al. 2007), and detailed studies of complete museum voucher specimens (Solari et al. 2009). We expect that future field surveys, emphasizing Manabí and Los Ríos Provinces and the mid-elevation slopes of the western Ecuadorian Andes, will increase not only the known bat diversity but also our understanding of species origins and potential conservation strategies. The Sowell Expeditions resulted in four unrecognized species, three of which have since been described: *Lophostoma aequatorialis* (Baker et al. 2004), *Micronycteris giovanniae* (Fonseca et al. 2007), and *Eumops wilsoni* (Baker et al. 2009). The fourth species was a *Thyroptera* that may be a form that has an available name or may be an undescribed species. Furthermore, the voucher specimens for *Macrophyllum macrophyllum*, *Trinycteris nicefori*, and *Diaemus youngi* represent new distributional records for western Ecuador, thus demonstrating the potential of this region for new scientific discoveries and future work.

Western Ecuador constitutes a mosaic of different environments (Hershkovitz 1958). The southwestern portion of the country encloses dry ecosystems that are similar to those found along the Pacific Coast of Middle America, but they are ecologically isolated by the presence of the humid environments of Biogeographic Chocó (Hershkovitz 1958; Rangel 2004). The formation of the Chocoan region is a relatively recent event associated with the final period of the Andean uplifting (5 to 3 Mya) (Rangel 2004). Prior to the final uplifting of the Andes, xerophytic environments associated with the effect of the Alisios winds extended their distribution along the northern coast of South America and proto Central America (Graham 2006). The comple-

tion of the Isthmus of Panama and the deviation of the Humboldt marine current resulted in the predominant hyper-humid environments of Central Chocó. Thus, with the formation of the Chocan region, an ecological hiatus exists in western Ecuador (Rangel 2004).

Our records indicate differences in bat species composition between northwestern and southwestern Ecuador (Table 1) and similarities between northwestern Ecuador and western Colombia (see Mantilla-Meluk et al. 2009). This result is expected considering the direct influence of the Chocó – Darién humid region in the Esmeraldas Province in the north and the Peruvian–Chilean desert formation in the southern Guayas and El Oro Provinces. The diversity of vegetation types and ecosystems in northwestern Ecuador has allowed a large number of species of Emballonuridae, Noctilionidae, Phyllostomidae, and Thyropteridae to coexist. In the dry environments of southwestern Ecuador species of Molossidae and Vespertilionidae are more highly represented. The noteworthy results achieved during the Sowell Expeditions to Ecuador suggest the importance of continued intensive field surveys of bat faunas along the country, especially in Manabí and Los Ríos Provinces as well as middle and higher elevations of the western versant of the Ecuadorian Andes.

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