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Updated list of the mammals of Costa Rica, with notes on recent taxonomic changes

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Abstract

Although Costa Rica occupies a mere 0.03% of the Earth's land area, it nevertheless has recorded within its borders approximately 5% of the global diversity of mammals, thus making it one of the world's megadiverse countries. Over the past ten years, 22 species have been added to the country's inventory, bringing the total number known as here documented to 271; Chiroptera account for ten of these, having grown to 124 from 114; rodents have increased by eight species, from 47 to 55, with the caveat that we include three invasive species of Muridae that have gone feral. In contrast, the number of orders has decreased by one, by Artiodactyla incorporating the former Cetacea. Notes are provided for all taxonomic novelties since the last update. Since the first taxonomic compendium of the mammals of Costa Rica in 1869, the number of known species has grown by approximately 1.22 species year^{-1} ($R^2 = 0.96$). Since 1983 however, this growth rate has been 1.64 species year^{-1} ($R^2 = 0.98$). Despite this strong growth, an asymptote in the number of known species has not been reached. Conservation remains a primary need: over 60% of the country's mammal species show population trends that are decreasing (13%), unknown (37%), or not assessed (11%), based on IUCN criteria. These analyses suggest that much remains to be known regarding the number of mammal species living in Costa Rica, but also that much more remains to be done to safeguard Costa Rica's exceptional biodiversity heritage.

Key words: Cetartiodactyla, Conservation, IUCN criteria, Mammal orders, Megadiverse

Introduction

Costa Rica is a megadiverse country (Quesada-Román & Pérez-Umaña 2020): the number of species present in the country is disproportionately high relative to the area of the country, as well as in comparison with the biodiversity of other countries (Canhos *et al*. 2015). Mammals are a clear example of this relationship because the country contains approximately 5% of the global species diversity of this group (Mora *et al*., 2021a) while occupying only 0.03% of the World's land area. Achieving the current status of knowledge as to the number of mammal species in Costa Rica has taken over 150 years of effort on the part of natural historians, collectors, and many researchers studying the biology of Costa Rica (Rodríguez–Herrera 2005): one of the first such lists (Franzius 1869) only included 61 species. Subsequent analyses and compilation of information have resulted in significant increases in the number of species known. Besides the obvious geographic gaps in collecting, one difficult issue in elucidating the actual number of species present is the potential number of cryptic species present in the area: one estimate suggests that the number of mammal species known in the Neotropics represents an underestimate of one third relative to the "real" number of species present (Lim 2012).

The most recent list of mammal species of Costa Rica, by Rodríguez–Herrera *et al*. (2014), reported changes and additions to the species known for the country up to that date. Several species have been added since, mainly as a result of the documentation of species in Costa Rica that already were known from other nearby countries. In addition, new mammal species have been described based on novel discoveries or as the result of research involving morphology and genetics of species or groups of species presenting problematic taxonomic conundra. These works

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also have resulted in changes to the names of some of the species present in the country due to better definitions of the distribution of the species involved in the analyses, or as a result of phylogenetic analyses refining hypothesized relationships, with an end point product of improved taxonomies. The latter research resulting in updates of the phylogeny and taxonomy of species constitute an essential basis and framework for management and conservation actions that must be taken to preserve populations and enhance their environment, among other important uses. The present work aims to provide an updated list of the species of mammals that have been documented for Costa Rica. In addition, we include brief comments for each of the changes included in the list. An updated list of mammals in Costa Rica has multiple purposes, where both academic-scientific and practical ones stand out, for example, the use by tour guides to provide reliable and updated information to their audiences.

Materials and methods

To compile this updated list of mammal species in Costa Rica, we used the list by Rodríguez–Herrera *et al*. (2014) as a starting point. We first reviewed taxonomic changes based on the pertinent literature published subsequent to that date. We undertook as comprehensive a literature review as possible. Based on references found and assessed, we also added to the list any new records of mammal species for the country, as well as any newly described species present in Costa Rica. We only reviewed the collection of bats and rabbits (Chiroptera and Lagomorpha, respectively) from the American Museum of Natural History (New York, NY) and rabbits at the United States National Museum, Smithsonian Institution (Washington, D.C.). Information on the remaining orders of mammals recorded in Costa Rica otherwise is derived from the literature. Primary literature and taxonomic authority citations are included only for those taxa discussed in the body of the text below; taxonomic authorities for the names in the checklist are included for consistency but are not cited unless discussed in the text.

RESULTS

Brief history of regional taxonomic compendia.

The mammal fauna of Costa Rica began to be systematically documented in the mid-19th century (Rodríguez–Herrera *et al*., 2005); these authors provided data and key historical lists of the mammals of Costa Rica in chronological order as follows: von Frantzius (1869): 61 species; Alfaro (1897): 167 species; Goodwin (1946): 196 species; Wilson (1983): 203 species; Rodríguez & Chinchilla (1996): 223 species; Wilson *et al*. (2002): 232 species, Rodríguez–H *et al*. (2002): 238 species, of which 209 are terrestrial species. The most recent list, that of Rodríguez–Herrera *et al*. (2014) resulted in 249 species of mammals with a documented presence in Costa Rica. Other compilations of mammals of Costa Rica had been published that also contained lists of species, including Mora & Moreira (1984), Carrillo *et al*. (1999), Mora (2000), and Wainwright (2007). Some of these works based their number of species on literature reviews while others also included reviews of museum collections to support the inclusion of species.

Recent changes and additions to the list of mammal species of Costa Rica.

Several recent publications have added species to the number of mammals of Costa Rica, e.g., Ramírez-Fernández *et al*. (2015); Villalobos-Chaves *et al*. (2016); Woodman & Timm (2017); and Villalobos-Chaves *et al*. (2018). The latter authors pointed out that by 2018 there were 253 species of living mammals recorded in Costa Rica, including 115 bats. Salas-Solano *et al*. (2020) noted that with additions from González-Maya *et al*. (2017), Sáenz-Bolaños *et al*. (2019), and York *et al*. (2019), the number of mammal species in Costa Rica had increased to 261, including 121 bats.

As noted above, from 2014 to 2022 there have been extensive reports of new species for Costa Rica based on distribution (range documentation), and due to changes in the taxonomy of several others. There also have been rediscoveries: for example, the presence of *Lasiurus castaneus* (Chiroptera) after 31 years without records of the species in the country (Villalobos-Chaves & Dick 2014), and especially *Furipterus horrens*, which had not been

detected in Costa Rica for 44 years when a colony 100 – 130 individuals was found by workers in a cabin at a tourist site in the north of the country (Alfaro-Lara *et al*. 2018). Between 2014–2023, 19 species have been added to the number of mammals of Costa Rica; in addition, 16 species either were subject to a name change, or it was determined that the species present in Costa Rica was distinct from the original name–bearing taxon (taxonomic change). We include six additional species in the category of "expected to be present" because they have yet to be documented in the country, but we hypothesize that they are strongly likely to be present. An additional four species may potentially be present, but there is as of yet no documentation of this potential presence. These are included below not in the list, but rather in the text only, as "species expected to potentially be present." In addition, 13 species were moved to different genera, a new family was formalized, and one order was reclassified. The case of the subfamilies and tribes of Phyllostomidae is particular because taxonomic categories in this family have been the subject of controversy for decades (Cirranello *et al*. 2016). We do not enter into the fray insofar as changes at this level are concerned: rather, we adopt the taxonomic framework of Cirranello *et al*. (2016) and Simmons and Cirranello (2022). Finally, two species were removed from the list of Rodríguez-Herrera *et al*. (2014): *Natalus lanatus* and *Sturnira hondurensis*. These changes are summarized in Table 1.

TABLE 1. Summary of changes in the composition of orders of mammals represented in Costa Rica from 2002 to the current list.

Order	Families			Genera			Species			Endemic species[1]		
	2002	2014	current	2002	2014	current	2002	2014	current	2002	2014	current
Didelphimorphia	3	1	1	7	6	6	8	9	11	0	0	1
Sirenia	1	1	1	1	1	1	1	1	1	0	0	0
Cingulata	1	1	2	2	2	2	2	2	2	0	0	0
Pilosa	3	4	4	5	5	5	5	5	5	0	0	0
Primates	2	2	2	4	4	4	4	4	4	1	1	0[2]
Rodentia	8	8	9	25	29	32	45	47	55[3]	13	16	7[1]
Lagomorpha	1	1	1	1	1	1	3	3	3	1	1	0[1]
Eulipotyphla	1	1	1	1	1	1	4	4	5	2	2	1[1]
Chiroptera	9[4]	9[4]	9	57	61	65	109	114	124	1	3	0[1]
Carnivora	6	6	6	18	19	21	23	24	25	0	0	0
Perissodactyla	1	1	1	1	1	1	1	1	1	0	0	0
Artiodactyla	2	2	3[5]	3	4	23[5]	4	4	35[5]	0	0	0
Cetacea	5	5	0[5]	17	19	0[5]	29	31	0[5]	0	0	0
Total	43	43	40	142	155	162	238	249	271	18	23	9[1]

Footnotes:

1. The substantial difference between this report (lower number) and those of Rodríguez–H *et al.* (2002) and Rodríguez-Herrera *et al.* (2014) is because we only include species endemic to Costa Rica, rather than endemic as well to Costa Rica and Panama, or Costa Rica and Nicaragua.
2. The Primate taxon considered endemic in previous reports is a subspecies of a more widespread species, *Saimiri oerstedii*, distributed in Costa Rica and Panama. We therefore do not consider it among the endemic species of Costa Rica.
3. This number includes the three species of non–native Muridae that are found peridomestically (Musser 1977), but also often are found wild in nature.
4. Chiroptera included nine families both in Rodríguez–H *et al.* (2002) and Rodríguez-Herrera *et al.* (2014), but apparently were miscounted as having 10 families (Rodríguez–H *et al.* 2002; Rodríguez-Herrera *et al.*, 2014). We present here the actual total documented.
5. As indicated below, we include all cetaceans taxa within Artiodactyla.

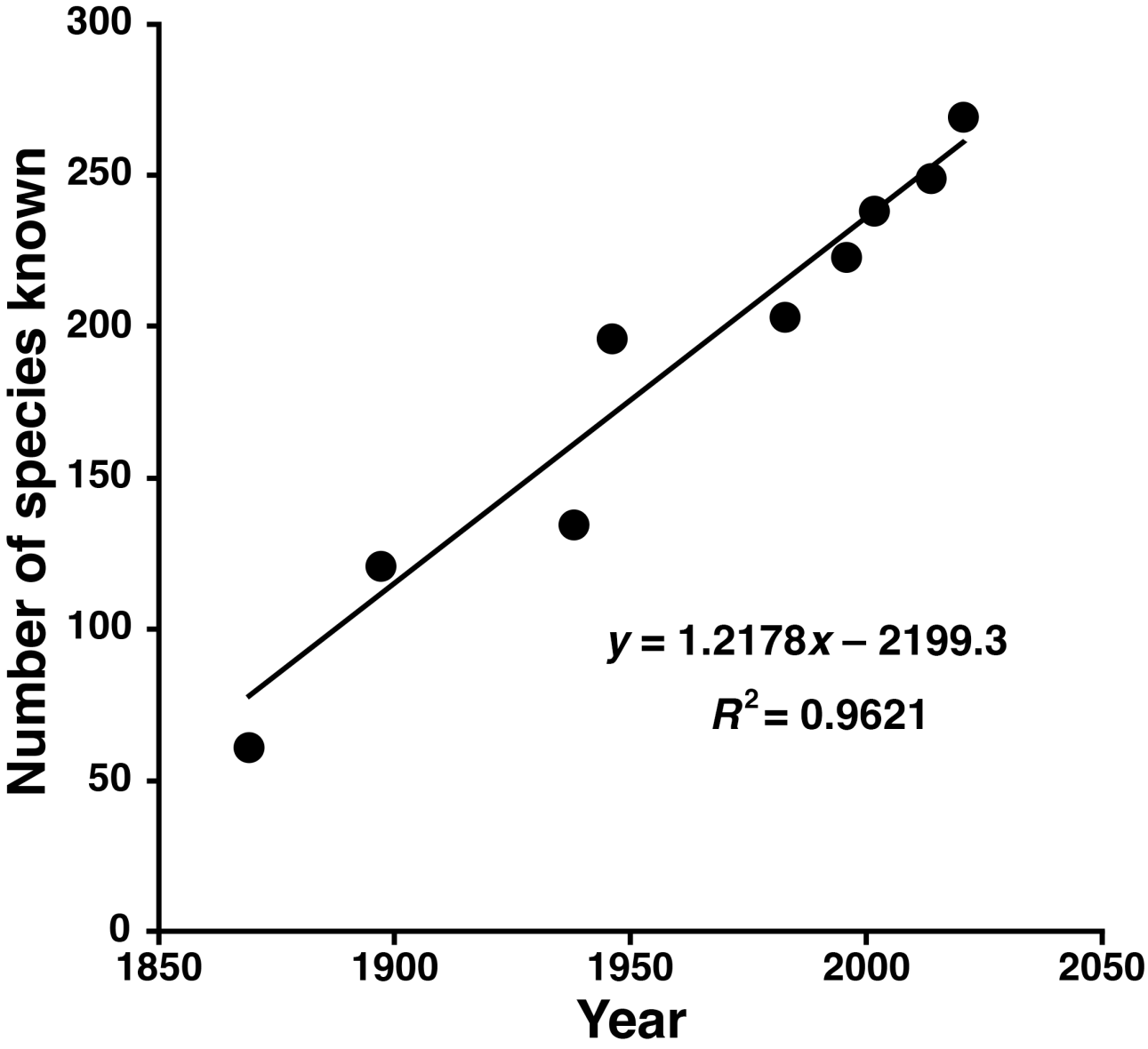

FIGURE 1. Plot of number of species known (vertical axis) by year of publication of taxonomic compendium for mammals of Costa Rica. See text for publication details of the taxonomic compendia. The data suggest that over the past 154 years, the number of species of mammals known for Costa Rica has accumulated at a rate of 1.2 species year^{-1} in two major pulses (1869 to 1946: 1.73 spp. yr^{-1}, $R^2 = 0.99$; and 1983 to 2023: 1.64 spp. yr^{-1}, $R^2 = 0.98$) and is not experiencing any reduction at present.

An analysis of the increase over time in the number of species known for Costa Rica (Fig. 1) is of interest. Based on a simple linear regression, the data suggest that the growth rate of the number of species has not reached an asymptote, hence the number of mammal species known for Costa Rica should continue to grow for some time. For the complete data set, this growth rate is approximately 1.21 species year^{-1} ($R^2 = 0.96$). Visual inspection of the figure suggests that there were two distinct phases in growth rate: the first corresponds to the first two historical periods of collecting identified by Rodríguez–Herrera *et al*. (2005), and encompasses the summaries of von Frantzius (1869), Alfaro (1897), and Goodwin (1946). This phase is characterized by a growth rate in species known for Costa Rica of 1.73 species year^{-1} ($R^2 = 0.99$). An apparent pause in attention to the country's mammal fauna occurred between Goodwin's compendium and that of Wilson (1983). Only seven species were added over that 56-year period (0.125 species year^{-1}). Since 1983, however, a resurgence in interest regarding the mammal fauna of Costa Rica has resulted in a growth rate in species added to the known mammal fauna almost equal to that of the first phase: 1.58 species year^{-1} ($R^2 = 0.98$). This strong burst of interest, and the continuing additions to the known mammal fauna of the country is a hopeful indication that there remains much still to be known and discovered.

Taxonomic changes to orders

Eulipotyphla

Insectivora was a name used extensively for a very diverse group of mammals (e.g., Simpson, 1945), and largely derived from Cuvier (1816 [refer to Roux, 1976 for considering 1816 the publication date, rather than 1817]); elephant shrews at the time were considered members of *Sorex*, and as such included within Cuvier's "Musaraignes" [=Soricidae]; e.g., "*Sorex*" *proboscideus* Shaw 1800). Wagner (1855) expanded Insectivora to include a broad representation of "primitive" insectivorous mammals, a concept followed by Peters (1863), who divided Insectivora into families with a large cecum (Dermoptera ["*Galeopitheci*"], Scandentia ["*Tupayae*"], and Macroscelidea ["*Macroscelides*"], a group of taxa subsequently included in the suborder Menotyphla by Haeckel [1866]), in contrast to Insectivora with a simple gastrointestinal tract and lacking a cecum (Tenrecidae ["*Centetina*", including *Solenodon*]; Erinaceidae ["*Erinacei*"]; Talpidae ["*Talpina*", including Chrysochloridae, the type species of which was described by Linnaeus as *Talpa asiatica*]; and Soricidae ["*Sorices*"]). These latter were grouped by Haeckel (1866) at the subordinal level as Lipotyphla. Names for extant taxa used at the suprafamilial level by Simpson (1945; Tenrecoidea; Chrysochloroidea; Erinaceoidea; Macroscelidoidea; Soricoidea) generally were included in morphologically based assessments or phylogenies as "Lipotyphla" (e.g., Novacek 1992; MacPhee & Novacek 1993; Shoshani & McKenna 1998), but represent groups now considered unnatural as a singular coherent order (Springer *et al*. 1997, 2003; Stanhope *et al*. 1998). Some molecular assessments divided Lipotyphla into the unrelated orders Soricomorpha and Erinaceomorpha (e.g., Arnason *et al*. 2002). However, the diphyly of Soricomorpha and Erinaceomorpha was demonstrated to be a result of a mitochondrial artefact that disappeared when mitochondrial and nuclear data were combined (e.g., Stanhope *et al*. 1998; Springer *et al*. 2003; Arnason *et al*. 2008; dos Reis *et al*. 2012), with Soricidae and Erinaceidae resolving as sister taxa (e.g., Brace *et al*. 2016). As a result, contemporary phylogenies (e.g., Bininda-Emonds *et al*. 2007; Upham *et al*. 2019) and textbooks (Vaughan *et al*. 2015; Feldhamer *et al*. 2020) alike use Eulipotyphla including the extant families Erinaceidae, Solenodontidae, Soricidae, and Talpidae. Asher & Helgen (2010) nevertheless advocated for the name Lipotyphla as having priority for this group. However, as we indicated above, the Lipotyphla of Haeckel (1866) and that of Asher & Helgen (2010) were somewhat disparate in their contents. We therefore maintain Eulipotyphla Waddell, Okada, and Hasegawa, 1999 for this group.

Artiodactyla and Cetacea

Cetacea no longer applies to an ordinal level taxon: all members of Cetacea currently are included within the order Artiodactyla. Montgelard *et al*. (1997) proposed the name "Cetartiodactyla" to reflect the growing body of data showing Cetacea nested within Artiodactyla. However, use of the name Cetartiodactyla has been controversial because Cetacea and Artiodactyla are not sister-taxa: molecular data distinctly show cetaceans embedded *within* Artiodactyla (Prothero *et al*. 2021). Exceptionally rapid and disparate evolution of the cetacean skull has obscured an accurate assessment of their phylogenetic relationships with other groups of mammals (Goswami *et al*. 2022). As a result, the initial—and apparently incongruous—assignment of Cetacea to Artiodactyla generally is ascribed to molecular data from amino acid and nucleotide sequence data (Goodman *et al*. 1985; Irwin *et al*. 1990; Graur & Higgins 1994), pinpointing Hippopotamidae as the sister taxon of Cetacea (Gatesy *et al*. 1996). Paleontological evidence subsequently corroborated this relationship (Gingerich *et al*. 1990, 2001; Thewissen & Hussain 1993; Thewissen 1994; Thewissen & Madar; 1999; Thewissen *et al*. 2001). Molecular data have provided increasing support and definition for these relationships (Upham *et al*. 2019; McGowen *et al*. 2020). However, the name and taxonomic rank of the group remains controversial.

A variety of propositions have been put forward to address this controversy. We noted Cetartiodactyla above, a name that has been recommended for disuse by Asher & Helgen (2010) and Prothero *et al*. (2022) for the ordinal group. An intraordinal alternative was proposed by Waddell *et al*. (1999): Whippomorpha ("**wh**ales" plus "**hippo**s"), as the clade within Artiodactyla that includes Hippopotamidae and Cetacea. The same grouping subsequently was given the name Cetancodonta by Arnason *et al*. (2000, 2002, 2008). As pointed out by Asher & Helgen (2010) based on the principle of priority espoused by Simpson (1945; also see Art. 23 of the International Code of Zoological

Nomenclature), and regardless of the awkward construction of the name, Whippomorpha has temporal priority over Cetancodonta. However, as a "clade", it is a descriptive appellation for a monophyletic subordinate group, and does not resolve the taxonomic level at which subordinate or superordinate groups may lie; in other words: the taxonomic level of "clade" is nebulous in this instance, besides defining a common ancestry, or circumscribing "delimitable monophyletic units" (Huxley 1957); in the present instance: Hippopotamidae and Cetacea. There are any number of such units in any region of the tree of life one may wish to examine, and a proliferation of names for such clades would serve little useful purpose; Prothero *et al*. (2022:96) correctly pointed out that "If one wishes to convey the fact that whales are artiodactyls, one can say informally "whales and other artiodactyls" or "whales and terrestrial artiodactyls"". More recently, Whippomorpha has been adopted as a subordinal level group (Lewison 2011).

Linnaeus described whales, dolphins, and their ilk, as the order Cete (Linnaeus 1758:75; also used by Gray 1843; Bonaparte 1851; *nec* Cete *sensu* Thewissen 1994), but the currently accepted name (for the same group defined by Linnaeus) is Cetacea Brisson 1762:3 [first summary mention], 215 [unnumbered title page], 217 [diagnosis]. This name became accepted and since has come into widespread use (e.g., Gray 1821 [as a "Class": "Cetaceæ", containing the order Herbivoraæ (including Manatidæ and Dugongidæ, and Order Carnivoræ, with families Monodontidæ, Physeteridæ, and Balanadæ]; Lesson 1827 [as "Cétacées"]; Gray 1846 [as Cetacea, but with the same familial arrangement as in Gray 1821]; Brandt 1873; Lydekker 1887; Trouessart 1898; etc.): all used Cetacea as an ordinal level taxon. The Committee on Taxonomy of The Society for Marine Mammalogy maintains a list of marine mammals and subspecies (https://marinemammalscience.org/science-and-publications/list-marine-mammal-species-subspecies/; accessed 20 December 2022) listing Cetacea as an infraorder within Artiodactyla, with Mysticeti and Odontoceti (no rank) and their currently accepted familial level taxa contained therein. Cetacea also has been used at the family level: Doherty (1864:138) used "Cetacidae" [sic] for "whales, etc.". Doherty (1864) even went so far as to link Cetacidae, in the "Pachydermal Order" with "Pachydermidae" (hippopotamus), albeit containing as well Tapiridae and Proboscidae (tapirs and elephants). While Doherty's philosophical taxonomic framework was somewhat heterodox, it was not unique and may have had its origins in similar philosophical propositions of Swainson (1835).

Taxonomic changes to families

Chlamyphoridae

In an extensive analysis that included all xenarthran species, Gibb *et al*. (2016) proposed dividing armadillos (order Cingulata) into two different families, Dasypodidae, including only *Dasypus* species, and Chlamyphoridae, including all other armadillos: Euphractinae, Chlamyphorinae, and Tolypeutinae. Gibb *et al*. (2016) suggested that this arrangement better reflects the hypothesized ancient divergence between the two putative families, estimated at ca. 44.9±3.5 Ma. The nomenclature of Gibb *et al*. (2016) rests on the priority of "Chlamyphorinae Bonaparte, 1850". We note that the name coined by Bonaparte was "Chlamydophorina" [we were unable to secure a copy of Bonaparte 1850; this assertion rests on Bonaparte 1851 and *fide* Simpson 1945], based on an unjustified emendation of *Chlamyphorus*. Because of the latter, *Chlamyphorus* and *Chlamyphodorus* are objective synonyms. As a result, and as noted by Gibb *et al*. (2016), the authority for Chlamyphoridae thus would be Bonaparte, 1850, rather than Yepes 1928:11, pursuant to the latter's use of the name Chlamyphorinae (temporally coincident with the use of the same name by Weber, 1928). "Chlamyphorini" was included within Dasypodidae: Euphractinae by Patterson & Pascual (1968).

Choloepodidae

The two–toed sloths are based on "*Bradypus*" [=*Choloepus*] *didactylus* Linnaeus 1758:35, a taxon the range of which he erroneously ascribed to "Zeylona", i.e., the modern island of Sri Lanka. Simpson (1945) grouped the genera *Bradypus* and *Choloepus* Illiger, 1811 together in the family Bradypodidae, within Pilosa (at the infraordinal level), as did Hoffstetter (1958) and Romer (1966). *Bradypus tridactylus* Linnaeus 1758:34 remained in Bradypodidae when familial rearrangements began to affect the taxonomy of "*Bradypus*" *didactylus* following the suggestion

by Guth (1961), Patterson & Pascual (1968, 1972), Webb (1985), and Patterson *et al*. (1992), that *Choloepus* and *Bradypus* were not each other's sister taxa. In particular, Patterson & Pascual (1968) suggested that *Choloepus* was more closely related to Megalonychidae, whereas *Bradypus* was more closely related to Megatheriidae. Gaudin (1995) provided a robust morphological test of the hypothesis of a monophyletic Bradypodidae using 85 discrete osteological characters of the auditory region in 21 extant and extinct sloth genera, and confirmed that *Bradypus* and *Choloepus* were distantly related (e.g., Gaudin 1995:678; see also Fig. 1 in Raj Pant *et al*. 2014).

Subsequent molecular studies of xenarthrans, including the orders Cingulata and Pilosa by Delsuc *et al*. (2001, 2002, 2003, 2004, 2012) and Möller-Krull *et al*. (2007), refined our contemporary understanding of the relationships among modern genera in the group. More recent mitogenomic data have provided not only resolution but a timeline of evolution for xenarthrans (Gibb *et al*. 2016), but also confirmation of the distant relationship between *Bradypus* and *Choloepus*, and taxonomic localization of *Bradypus* in Bradypodidae and *Choloepus* in Megalonychidae. However, that latter study was based on extant taxa only. Incorporation of mitogenomes from extinct taxa of xenarthrans (Delsuc *et al*. 2019) showed that *Choloepus* were the sister taxon to †Mylodontidae in a suprafamilial clade (Mylodontoidea) sister to another suprafamilial clade (Megatheroidea) that successively included †Megatheriidae, and Bradypodidae as sister to a clade including †Megalonychidae and †Nothrotheriidae (see Fig. 2 of Delsuc *et al*. 2019). As a result, here, we follow Delsuc *et al*. (2019) in adopting Choloepodidae for *Choloepus* species.

Taxonomic changes to genera

Chiroptera: Phyllostomidae: *Gardnerycteris* Hurtado and Pacheco, 2014

Hurtado & Pacheco (2014) established the genus *Gardnerycteris* as a monophyletic group for *G. koepckeae* (Gardner and Patton, 1972) and *G. crenulatum* (É. Geoffroy St.-Hilaire 1803). These two species previously had been included in *Mimon* Gray 1847, but were shown to not be monophyletic with *Mimon*, based on *M. bennetti* (Gray, 1838) being the type species for *Mimon*. A subsequent study by Hurtado & D'Elía (2018) showed that *Gardnerycteris* includes three species: *G. keenani* (Handley, 1960), which originally had been described as a subspecies of *G. crenulatum*, was shown to be basal to a clade with *G. koepckeae* and *G. crenulatum* as sister taxa.

Chiroptera: Vespertilionidae: *Lasiurus* Gray, 1831, *Dasypterus* Peters, 1870 [1871], and *Aeorestes* Fitzinger, 1870

Dasypterus was erected by Peters (1870 [1871]) for *Lasiurus intermedius* H. Allen, 1862 [1863] (the first species he listed, among others), as a subgenus of *Atalapha* Rafinesque, 1814, which Rafinesque used for a Sicilian bat, *A. sicula* [?= *Nyctalus lasiopterus* (Schreber, 1780)] and *A. noveboracensis* Linnaeus 1788 [= *Vespertilio* [= *Lasiurus*] *borealis* Müller, 1776]. As a result, the use by Peters (1870) of *Atalapha* for lasiurine bats is untenable, even notwithstanding Rafinesque's conflation of Old World ?*Nyctalus* and lasiurines, because the first use of *Atalapha* clearly refers to an Old World bat ("j'ai observé cette espèce en Sicile" [I have observed this species in Sicily], Rafinesque 1814:12). This point also was noted by Miller (1897:13) who stated that "The use of the name [*Atalapha*] for a genus confined to America is therefore impossible", as well as in a more in-depth discussion of this issue by Gardner & Handley (2007 [2008]). Application of *Dasyperus* for the clade including the type species of the genus, *D. intermedius*, as advocated by Baird *et al*. (2015, 2017, 2021), and as extensively used in the past (e.g., H. Allen 1894, Thomas 1897, 1901a, Miller 1907, 1924, Tate 1942) therefore follows long established norms and practice.

Aeorostes was established by Fitzinger (1870) for *A. villosissimus* (É. Geoffroy St.-Hilaire, 1806). The latter variously has been classified as subspecies of *Aeorestes cinereus* (Palisot de Beauvois, 1796), or as a distinct species (see synonymies in Gardner & Handley 2007 [2008] and Baird *et al*. 2015) [N.B.: Palisot de Beauvois named this species *Vespertilio linereus*; Gardner & Handley 2007 [2008]:462 indicated that the "spelling [had been] hand-corrected to *cinereus* before [the] copies [were] distributed"; however, the copy of the *Catalogue rainsonné…* at the Bibliotèque Nationale, Paris, France, is not thus marked: thus, this may have been a *lapsus calami*]. The descriptions, both of *Aeorestes* as well as *A. villosissimus*, are as sparse as one might expect of descriptions at that time. However, it is clear that the bat being referred to is a "*cinereus*–type" species, now recognized as *Aeorestes villosissimus* (see below). Use of *Aorestes* as a genus for the species contained therein has not been historically as widespread as *Dasypterus*, but nevertheless also follows established practice. Some of the arguments counter to adoption of the generic structure advocated for Lasiurini by Baird *et al*. (2015), including "lack of familiarity", are being rendered

moot by increasingly widespread use. For example, Teta (2019:210) noted that "a search in GBIF (Global Biodiversity Information Facility; conducted on 28th February 2018) for *Aeorestes cinereus villosissimus* retrieved zero results against 65 for *Lasiurus cinereus villosissimus*." That remains the case still; however, a search undertaken 16 February 2023 for *Aorestes villosissimus* found 99 occurrences against two for *Lasiurus villosissimus*. Rather than reiterate the points brought up by Baird *et al*. (2015, 2021) regarding the use of *Aorestes* versus *Lasiurus* for the hoary bat group of lasiurine species (*A*. *cinereus*, *A*. *egregius*, *A*. *semotus*, and *A*. *villosissimus*), we instead consider this settled precedent, and adopt the use of *Aorestes* for the clade including the type species of the genus, *A*. *villosissimus*.

A hypothesis was proposed by Smith & Teta (2022) that *A*. *villosissimus*, described by Geoffroy-St. Hilaire (1806) based on notes by Félix de Azara (1801, 1802), in fact refers to *Dasypterus ega* (Gervais, 1856). We reject this hypothesis. Much of their reasoning is based on the mensural data provided by Azara. However, those mensural data are extraordinarily unreliable. Prior to 1801, a plethora of measurement systems existed on the Spanish Peninsula, varying extensively from province to province; these were codified into a singular system in 1801 by Charles IV of Spain (Álvarez 1929). A similar situation obtained in France prior to 1795 (Cardarelli 2003). Measurements thus codified are listed in Álvarez (1929) and Cardarelli (2003). Álvarez (1929) documented for the value of the "vara" (the basic unit of linear measurement standardized in 1801 to 0.8359 m) at least 17 distinct values in use among 49 Spanish provinces, with values of $\bar{x}$ = 81.9 cm $\pm$ 4.4 cm (SD), range 76.8 – 91.2 cm. A similar situation obtained in Argentina, where Álvarez (1929) documented 28 different measurements for the vara in 15 Argentine provinces, with values of $\bar{x}$ = 85.6 cm $\pm$ 1.7 cm (SD), range 83.6 – 91.4 cm. These included four different vara measurements in Buenos Aires between 1741 – 1835, and multiple coeval measurements in most of the provinces. We hypothesize that this mensural variation would have extended to Paraguay during the time of Azara's collections. As a result, it is almost impossible to ascertain what particular mensural standard would have been used by Azara writing prior to 1801 (he noted in the prologue to volume 1 of the Spanish edition [Azara 1802] that he wrote the treatise during 1782–1801). For the same reason, we should not take at face value the metric measurements from the French edition (Azara 1801) because these were added by the translator, L. E. Moreau-Saint-Méry, who himself may not have known to what reference standard was being referred. Those additional measurements presumably were not in the original Spanish edition mailed to Félix de Azara's brother, Nicolás, for comments by naturalists prior to publication, and certainly were not in the Spanish edition preferred by Azara (Azara 1802).

Besides the foregoing situation with respect to the frame of reference of the measurement units, there is the issue of how the measurements were taken. For example, Smith & Teta (2022) suggested that the measurements noted by Azara for his "seventh bat" more closely match those of *Dasypterus ega*; those authors provided measurements for some lasiurines and compared the measurements of Azara's bat "translated" to current SI units. To demonstrate the lack of utility of such comparisons, however, it is instructive also to examine the original description of *Nycticejus Ega* [sic] (P. Gervais, 1856) [=*Dasypterus ega*]. Gervais (1856) listed the measurements as follows: body length: 60 mm; length of interfemoral membrane: 45 mm; forearm: 45 mm; leg ("la jambe"; presumably what today we call "tibia measurement"): 18 mm. The metric system had been instituted in France starting in 1795, so Gervais was writing > 60 years after its adoption. Nevertheless, the body length (total length minus interfemoral length) of Gervais' animal is 2 mm smaller than any of the measurements for that character provided by Smith & Teta (2022) for *D*. *ega*; and the forearm and tail measurements provided by Gervais (1856:73) are at the very lowest limit of those measurements provided by Smith & Teta (2022). [N.B.: an alternative "pseudo-metric" system was in use from 1812 – 1840, during which period a foot was 1/3 m, an inch 27. 8 mm, and a line 2.3 mm (Cardarelli 2003); this alternation of systems could have further complicated knowing the units in use by Gervais]. Indeed, confusion reigns for example as to the ear length of the "seventh bat", which was reported by Azara (1802) to be 7 lines long. Using the units adopted by Charles IV as reported by Álvarez (1929) results in an ear 13.5 mm long; using the "Old Spanish" measurements as listed by Cardarelli (2003) results in an ear 10.2 mm long; Smith & Teta reported this character as 15.79 mm long; and Geoffroy St.-Hilaire (1806) reported it as 7.5 mm. What is clear from this example is that although we may think today that we know what was being measured in the past, and what the units were, there nevertheless clearly remain inconsistencies in how those measurements were taken and resulting in discrepancies between contemporary measurements vis-à-vis measurements taken in the late 1700's and mid 1800's: such comparisons simply are not reliable.

The argument likewise was made by Smith & Teta (2022) that the description by Azara (1801) referred to *D*. *ega*, based on coloration and general morphology. Here, we hypothesize similarly that the bat described by Azara most closely fits the general conformation of an *A*. *cinereus*-type bat. For example, Azara (1801) indicated that "la

membrane de la queue […] est velue, excepté dans la bordure" and that "[…] la membrana de la cola, que tiene pelos, menos en la borda" (Azara 1802) [the uropatagium is furred except on the edge; in French and Spanish]. Whilst the uropatagium of *A. villosissimus* is fully furred, that of *D. ega* is furred only throughout its cranial half, the remainder is naked; it is difficult to comprehend under what circumstances a discriminating observer and meticulous recorder such as Azara might have interpreted half a uropatagium as the edge of the same ("bordure" in French or "borda" Spanish). Similarly, we do not accept that "brun-blanchâtre" (Azara 1801) or "pardo blanquizco" (Azara 1802) in any way could be interpreted as the coloration of *D. ega*, which Azara instead well may have noted as "brun clair" or "brun jaunâtre" in French, or "marrón [or "pardo"] claro" or "marrón [or "pardo"] amarillento" in Spanish. The wing color of the bat was noted as "mûre" ("blackberry" in French; Azara 1801) or "morada" ("purple" in Spanish; Azara 1802), and similarly almost definitively points to *A. villosissimus* rather than *D. ega*: while a common color for the wings of *A. cinereus*, we have never observed a *D. ega* with wings of that color. These observations on color certainly are nothing new: Thomas (1902a) had already detailed this *in extenso*.

In his description of *Aorestes*, Fitzinger (1870) noted that he owed a more detailed knowledge of *A. villosissimus* to Rengger (1830) ["Eine genauere Kenntniss derselben haben wir erst Rengger zu verdanken, der uns später gleichfalls eine Beschreibung von ihr mitgetheilt." Fitzinger 1870:428], and went on to repeat much of Rengger's description. Interestingly, the measurements listed by Rengger (1830:83) for "*Vespertilio villosissimus*", evaluated within the framework of the old German (Prussian) measurement system in existence prior to 1872 (Cardarelli 2003), result in an even smaller individual than Azara's chauve-souris septième. However, Rengger noted that the coloration was overall mouse-gray [überall mäusegrau], which along with the small size (with the caveats expressed above regarding measurements) suggests he may have been examining a juvenile. One character that does, however, seem in line with *Aeorestes* rather than *Dasypterus* is the thickness of the fur in the neck area, which led Rengger (1830:83) to note that the neck was inconspicuous due to the thickness of the fur ["Der Hals ist, der langen Haare wegen, kaum bemerkbar."].

As a result of the foregoing, we therefore propose that none of the radical solutions proposed by Smith & Teta (2022) are required, because the problems they exposed largely are nonexistent. It is likely that we will never know with any certainty what was the bat known by Azara (1801) as "chauve-souris septième ou chauve-souris brun-blanchâtre" and by Azara (1802) as the "pardo blanquizco". That animal, subsequently described by Étienne Geoffroy St.-Hilaire (1806) as *Vespertilio villosissimus*, has been associated at least since 1872 with *"Atalapha cinerea* Pal. de Beauv." from Montevideo (Hensel 1872:25; see also Thomas 1901b). Upending long-standing established understanding that *Aeorestes cinereus* and *A. villosissimus* are congeners and instead refers—erroneously, we argue—to a bat in the genus *Dasypterus*, would cause much greater an upheaval in the taxonomy of lasiurine bats than the level at which generic distinctions should be applied within Lasiurini.

While the foregoing nomenclatural changes at the level of genus for *Lasiurus* vis-à-vis {*Lasiurus*, *Dasypterus*, *Aeorestes*} are not universally accepted (Ziegler *et al*. 2016, Novaes *et al*. 2018, Simmons & Cirranello 2022), insofar as the classification of this group is concerned, we nevertheless follow Baird *et al*. (2015, 2017, 2021), thereby further highlighting the temporal depth of the cladogenesis among the three lasiurine genera (ca. 36.7 MYA for cladogenesis between *Myotis* and Lasiurini, ca. 22.8 MYA for *Dasypterus* and {*Lasiurus*, *Aorestes*}, and ca. 18 MYA between *Lasiurus* and *Aorestes*) as well as the genetic distance among them supporting generic distinctions (Bradley & Baker 2001; Baker & Bradley 2006). Regardless of the nomenclature adopted, the use of *Lasiurus* versus three genera for the species involved in no way modifies the number of species present in Costa Rica.

Rodentia: Sciuridae: *Echinosciurus*, *Microsciurus*, *Sciurus*, and *Syntheosciurus*

Costa Rican Sciuridae have undergone taxonomic changes as a result of recent studies on evolution and biogeography of Sciuridae (Abreu-Jr. *et al*. 2020a, b, 2022). While the number of species present in Costa Rica remains as outlined by Rodríguez-Herrera *et al*. (2014), changes have been made to some of the generic assignments of Costa Rican sciurids. *Sciurus* Linnaeus, 1758 no longer encompasses any of the squirrels in the country. *Syntheosciurus* Bangs, 1902, which formerly only included *Syntheosciurus brochus* Bangs, 1902, now also includes *Sy. granatensis* (Humboldt, 1811), which was resolved by Abreu *et al*. (2020a) as the sister taxon of *Sy. brochus*. Abreu *et al*. (2020a) further illuminated two clades within *Sy. granatensis*, one of which was South American, the other containing one group from Ecuador and Colombia and another group composed of specimens from Nicaragua and Panama. Because the type locality of *Sy. granatensis* is Cartagena, Colombia, it remains possible that the species in Costa Rica may undergo further taxonomic changes, although it would remain in *Syntheosciurus*. Importantly,

Abreu *et al*. (2020a) only examined lowland specimens; highland forms such as *Sy*. *g*. *hoffmani* (Peters, 1863 [1864]) eventually may be found to be distinct from lowland forms.

Similarly, *Sciurus varegatoides* Ogilby, 1839 and *Sc*. *deppei* Peters, 1863, were removed by Abreu *et al*. (2022) to *Echinosciurus* Trouessart, 1880. A large number of subspecies level taxa remain included in *E*. *varegatoides*, the type locality of which is El Salvador; it therefore is possible that further taxonomic changes also may come to populations in Costa Rica of this species complex, particularly with respect to montane taxa such as *E*. *v*. *rigidus* (Peters, 1863 [1864]), the type locality of which is San José.

Finally, *Microsciurus alfari* (J. A. Allen, 1895b) remains in its genus. Because the type locality of *M*. *alfari* is "Jiménez, Costa Rica", and *M*. *alfari* is the type species of *Microsciurus*, it is unlikely that there will be any taxonomic changes to *Microsciurus* in Costa Rica, although undescribed species and new generic assignments are rife in species formerly in *Microsciurus* (Abreu *et al*. 2020a, b, 2022).

Rodentia: Geomyidae: *Heterogeomys*

Heterogeomys was established by Merriam (1895) for *Geomys hispidus* (Le Conte, 1852) and *G*. *torridus*, a species that Merriam (1895) described in the same work. Russel (1968) synonymized *Heterogeomys* with *Orthogeomys* Merriam, 1895, which latter he expanded to 12 species with multiple subspecies by incorporating the subgenera *Orthogeomys* (the nominal genus), *Heterogeomys*, and *Macrogeomys*. However, a recent molecular revision of *Orthogeomys* by Spradling *et al*. (2016) showed that *Orthogeomys* was monotypic, including only *O*. *grandis*, and combined the subgenera *Heterogeomys* and *Macrogeomys* into a resurrected *Heterogeomys* including seven species. Here, following Spradling *et al*. (2016), we use *Heterogeomys* for the species of pocket gophers present in Costa Rica.

Rodentia: Erethizontidae: *Coendou* Lacépède, 1799

The species and genus of the porcupine that exists in Costa Rica has a colorful nomenclatural history. Details were provided by Tate (1935), Alberico *et al.* (1999), Voss (2011), and Voss *et al*. (2013). Menezes *et al*. (2021) also assessed the systematics and taxonomy of *Coendou* but did not include a morphological examination of the species present in Costa Rica. Briefly, species of *Coendou* initially were described in *Hystrix* Linnaeus, 1758. Lacépède (1799) established *Coendou* for *C*. *prehensilis*. On multiple occasions, American species instead were included in *Sphiggurus* G. Cuvier, 1822 (e.g., Husson 1978; Woods & Kilpatrick 2005; see Voss *et al*. 2013), as *Sphiggurus mexicanus* (Kerr, 1792), as well as in *Cercolabes* Brandt 1835 [as *Cercolabes novaehispaniae* (Brisson 1756)]; in the latter instance, with *Sphiggurus* as a subgenus. Phylogenetic analyses of morphology and Cytochrome *b* by Voss *et al*. (2013) conclusively demonstrated that *Sphiggurus* as considered by previous authors did not constitute a monophyletic taxon. Voss *et al*. (2013) did note that "*spinosus*", the type species of *Sphiggurus*, was contained in a clade with weak bootstrap support, and the clade was not morphologically diagnosable [N.B.: Menezes *et al*. (2021) listed a set of morphological traits specific to this clade, making it morphologically diagnosable]. Accordingly, they chose to retain *Coendou*. Regardless of whether *Sphiggurus* is a valid genus or not, those authors resolved *mexicanus* as a definitive member of *Coendou*. Menezes *et al*. (2021) obtained similar results from their molecular analyses. Accordingly, we follow Voss *et al*. (2013) and Menezes *et al*. (2021) in considering *pro tempore* that the species of porcupine (Erethizontidae) present in Costa Rica is *Coendou mexicanus*.

Carnivora: Mustelidae: *Neogale frenata vs. Mustela frenata.*

A comprehensive analysis of Neotropical weasels undoubtedly is required, in particular as to the taxon formerly known as *Mustela frenata*. Recent molecular studies showed that *frenata* lies within a clade distinct from *Mustela sensu stricto*, instead located in a clade with South American weasels and the mink, *Neovison vison* (Harding & Smith 2009; Koepfli *et al*. 2017; Law *et al*. 2018; Hassanin *et al*. 2021). The resulting taxonomic morass was resolved by Patterson *et al*. (2021), who determined that nomenclatural priority for the genus containing *frenata* lay with *Neogale* Gray 1865a.

Questions with respect to taxonomy of *Neogale frenata* clades also require resolution: Harding & Dragoo (2012) showed substantial geographic structure within *N*. *frenata* based on the mitochondrial Cytochrome *b* gene, with a basal clade from North–Central Mexico sister to two sister clades: North– and South America, suggesting a Tropical origin for the taxon. The divergence estimates resulting from their analysis (3.82 – 4.03 MYA between North-Central Mexico and remaining clades; 2.20 – 2.21 MYA between North– and South American clades) strongly suggest that *N*. *frenata* as currently understood is a taxon containing multiple species.

Artiodactyla: Tayassuidae: *Dicotyles* vs. *Pecari* vs. *Tayassu.*

The taxonomy of the Collared Peccary was broadly covered by Taber *et al*. (2011). There is little question as to the taxonomy of extant species, with chromosomal studies generally confirming the extant species (Bosma *et al*., 2004). However, the subspecies boundaries of the collared peccary are not congruent with the existing taxonomy for that species, with molecular data showing two clades contained within "*tajacu*", and dividing Colombian individuals classified as *D*. *t*. *patira* Kerr, 1792 into a "North American" and "South American" clade (Gongora *et al*., 2006, 2011). Because "*patira*" previously has been used at the species level (see discussion by Acosta *et al*., 2020:62), molecular studies to illuminate the intraspecific taxonomy and systematics of *D*. *tajacu* would be worth undertaking.

With respect to nomenclature, previous authors had generally used *Tayassu* Fischer, 1814 for all peccaries (e.g., Simpson 1945) or for white-lipped and collared peccaries subsequent to the discovery of the Chacoan peccary (Grubb & Groves 1993; McKenna & Bell 1997). Hall (1981) used *Dicotyles* Cuvier, 1816 for the collared peccary, and *Tayassu* for the White-lipped peccary. Taber *et al*. (2011) in contrast used *Pecari* Reichenbach, 1835 for the collared peccary (i.e., *P*. *tajacu*), also reserving *Tayassu* for the white-lipped peccary (*Tayassu pecari*). More recently, Acosta *et al*. (2020), conclusively demonstrated that *Pecari* is a junior synonym of *Dicotyles* Cuvier, 1816 (we follow Roux [1976] in considering 1816 as the publication date, rather than 1817, as indicated on the title page; also see Acosta *et al*. [2020:62]). Pursuant to Hall (1981) and Acosta *et al*. (2020), we therefore use *Dicotyles tajacu* (Linnaeus, 1758) as the name for the collared peccary.

Taxonomic changes to species

Didelphimorphia: Didelphidae: *Marmosa nicaraguae* Thomas, 1905 and *Marmosa alstoni* (J. A. Allen, 1900)

Marmosa nicaraguae has been considered a widely ranging monotypic species, although some (e.g., Tate 1933) included it as a subspecies within an *M*. *alstoni* with two subspecies: *M*. *alstoni alstoni* and *M*. *a*. *nicaraguae*. As "*M*. *alstoni*", the species was hypothesized to be distributed from Belize to Colombia, with a break in Panama. However, Voss *et al*. (2021), in a revision of the *Alstoni* Group of *Marmosa*, showed using genetics and morphology that *M*. *alstoni* and *M*. *nicaraguae* were distinct at the species level, and restricted *M*. *nicaraguae* to the Caribbean coastal lowlands of Nicaragua and Costa Rica (potentially extending into the foothills; see Voss 2022), and *M*. *alstoni* to the central highlands of Costa Rica (Voss *et al*. 2021; Voss 2022). We follow these authors in treating the two taxa of *Marmosa* as distinct species.

Didelphimorphia: Didelphidae: *Metachirus myosuros* (Temminck, 1824)

Metachirus, the only genus in Metachirini Reig, Kirsch, and Marshall, 1987, ranges from southern Mexico to northern Argentina, and has been considered to be monotypic, containing only *M. nudicaudatus*. However, Voss *et al*. (2019) compiled molecular and morphological evidence to recognize *M. myosuros* as a separate species (Voss & Jansa 2021).

Didelphimorphia: Didelphidae: *Philander melanurus* (Thomas, 1899) and *Philander vossi* Gardner and Ramírez-Pulido, 2020.

Extensive revisions undertaken of Didelphidae have led to the recognition of a number of new species considered to be valid, most particularly species of *Philander* (e.g., Voss *et al*. 2018; Voss & Giarla 2020). The distributional limits of some of these species remain unclear, but two are potentially to be found in Costa Rica: *Philander vossi* (name provided by Gardner & Ramírez-Pulido 2020 for *P*. *pallidus* J. A. Allen, 1901, which was preoccupied) is found in Central America, mainly in dry forest, and *P*. *melanurus* in the rest of the country, particularly in the rainforest (Voss *et al*. 2018). This latter species is confirmed for Panama, very close to the border with Costa Rica, so is the most likely four-eyed opossum to exist in Costa Rica, which previously was listed as *Philander opossum* (e.g., Rodríguez-Herrera *et al*. 2014). As a result, it is possible that *P*. *vossi* would be expected to be found in northwestern Costa Rica (Voss *et al*. 2018; Gardner & Ramírez-Pulido 2020). However, it remains to be determined where these two phenotypes integrate in Central America, as well as whether there exist genetically intermediate haplogroups (Voss *et al*. 2018). Notwithstanding, we see this latter possibility as unlikely, given the sister taxon relationship illuminated by Voss *et al*. (2018) between *P*. *pallidus* and the trans-Andean (relative to Costa Rica) *P*. *melanurus*.

Pilosa: Cyclopedidae: *Cyclopes dorsalis* (Gray, 1865b) vs. *C. didactylus* (Linnaeus, 1758)

Miranda *et al*. (2018) reviewed the taxonomy of *Cyclopes* using an integrative approach combining morphological, morphometric, and molecular data. Based on phylogenetic analyses of mitochondrial and nuclear DNA, and using coalescent species delimitation analyses, diagnostic characters of the skull, color patterns and structures of pelage, Miranda *et al*. (2018) suggested that *Cyclopes* encompasses at least seven species. The authors recognized *Cyclopes dorsalis* (Gray, 1865), with a type locality of 'Costa Rica', as the species inhabiting Central America. Alston (1879–1882) only mentioned specimens from Guatemala in relation to materials collected by Salvin, but von Frantzius (1869) explicitly noted that Gray (1865) had described it on the basis of a specimen at the British Museum (Natural History) procured by Salvin, and that at that time, it was thought to be restricted to Costa Rica, in particular in the valley of Orosí, near Cartago. Specimens exist from Puntarenas, Guanacaste, and Cartago provinces, and it is more broadly distributed in nearby countries. In light of the data from Miranda *et al*. (2018), we recognize the species in Costa Rica as *Cyclopes dorsalis* (Gray, 1865).

Eulipotyphla: Soricidae: *Cryptotis monteverdensis* Woodman and Timm, 2017

Woodman & Timm (2017) described this species from near the community of Monteverde in the highlands of the Cordillera de Tilarán of northwestern Costa Rica. This is the only species of the *C. thomasi* group known from Costa Rica and is distinguished from the other four species of *Cryptotis* Pomel, 1848 in Costa Rica by its larger body size and by having a tail longer than that of those other species, as well as its cranial characters (Woodman & Timm 2017). Incongruously, this and one other localized endemic *Cryptotis* from Panama (*C. endersi* Setzer, 1950) currently are hypothesized to belong to the *thomasi* group of Choate (1970), whose remaining additional "at least" 12 recognized species (Woodman & Timm 2017) have a trans-Andean distribution (relative to Costa Rica). Choate (1970) considered *C. endersi* to be a "relict species" in Central America, one of a group whose relationships could not be discerned at the time because of a preponderance of shared primitive characters.

Chiroptera: Mormoopidae: *Mormoops megalophylla* Peters, 1864

York *et al*. (2019) noted that *Mormoops megalophylla* was captured in the Venado Caves of San Carlos, province of Alajuela, in northwestern Costa Rica. We therefore include this species among those recognized in the list of mammals in Costa Rica.

Chiroptera: Phyllostomidae: *Micronycteris tresamici* Siles and Baker, 2020 vs. *M. minuta* (Gervais, 1856)

Siles & Baker (2020) described *Micronycteris tresamici* for Central America, with a type locality in Honduras, and paratypes from Honduras and Costa Rica (Guanacaste and Alajuela). Those authors referred specimens previously identified as *Micronycteris minuta* from Costa Rica (e.g., Larsen *et al*. 2011) to the new taxon. It nevertheless is possible that both species are present in Costa Rica: Siles & Baker (2020) noted the presence of *M. minuta* in Panama. As a result, we have included both species in the present list. It remains to be definitively determined whether *M. minuta* is present in Costa Rica, because the existence of this species in Central America needs to be evaluated (Siles & Baker 2020). It is possible either that the two species are sympatric in Central America or that they are parapatric, with *M. tresamici* distributed from Guatemala to Costa Rica and *M. minuta* from Panama to southern Brazil (Mora *et al*. 2021b).

Chiroptera: Phyllostomidae: *Glossophaga "soricina"*

The taxonomy of the *Glossophaga soricina* (Pallas, 1766) species complex was examined and assessed by Calahorra-Oliart *et al*. (2021). These authors recommended the recognition of at least four species in what until then was construed as *G. soricina*. Specimens from South America were referred to *G. valens* Miller, 1913. Individuals from Mexico, and northern Central America (including Guatemala and El Salvador) were considered to be *G. mutica*. Populations from the remainder of Central America (the authors explicitly noted Panama and Nicaragua; Costa Rica therefore is implied) "seem to form another independent linage, whose relation to the rest of the species and taxonomic situation should be addressed in future studies" (Calahorra-Oliart *et al*. 2021:63). As a result, although it is clear that *G. soricina* as such is not present in Costa Rica, it currently is not possible to offer an alternative nomenclature. For this reason, we continue at present to use this name for the species of *Glossophaga* found in Costa Rica.

Chiroptera: Phyllostomidae: *Gardnerycteris keenani* (Handley, 1960)

Using molecular data, Hurtado & D'Elía (2018) conclusively demonstrated that *Gardnerycteris* includes three species: *G. crenulatum*, *G. kopckeae*, and *G. keenani*. Only the latter, *G. keenani*, is present west and north of the Andes, with remaining species, including a polytypic *G. crenulatum*, restricted to South America. *Gardnerycteris keenani* therefore becomes the species present in Costa Rica and *Mimon crenulatum* is precluded from the present list by *G. keenani*.

Chiroptera: Phyllostomidae: *Lophostoma nicaraguae* Peters, 1866 [1867].

A recent analysis of *L. brasiliense* by Esquivel *et al*. (2022) concluded that this taxon consisted of two distinct species–level lineages with allopatric distributions. One lineage corresponds to *L. brasiliense sensu stricto* and is distributed in South America, south and east of the Andes. The other lineage corresponds to *Lophostoma nicaraguae* (Goodwin, 1942), and is distributed north and west of the Andes (Ecuador and Colombia) into Central America (Esquivel *et al*. 2022: fig. 5, p. 13). The two lineages were hypothesized to have diverged by vicariant speciation driven by the uprising of the Andes less than six million years ago (Esquivel *et al*., 2022). As a result of that work, we recognize the species *L. nicaraguae* in Costa Rica, rather than *L. brasiliense*.

Chiroptera: Phyllostomidae: *Tonatia bakeri* Williams, Willig, and Reid, 1995

In an analysis of *Tonatia saurophila* Koopman and Williams, 1951, Basantes *et al*. (2020) determined that this taxon in fact was composed by three distinct species level taxa, of which *Tonatia bakeri* is that present in Central America. *Tonatia saurophila* was determined to only be known from its type locality in Jamaica and further, may be extinct (Basantes *et al*. 2020).

Chiroptera: Phyllostomidae: *Artibeus intermedius* J. A. Allen, 1897

In recent years, this species has variously been included and removed from species lists of several countries, including Costa Rica. York *et al*. (2019), based on Davis (1984) and Wilson (1991), indicated that this species can be differentiated from other *Artibeus* species that exist in the region. *Artibeus intermedius* was recognized as valid by Simmons & Cirranello (2022); as a result, we include it in this list as present in Costa Rica. Larsen *et al*. (2013) suggested that a recent ecological expansion of *Artibeus lituratus* in the Neotropics resulted in the presence of *A. intermedius* in Central America.

Chiroptera: Phyllostomidae: *Uroderma convexum* Lyon, 1902

Two species of *Uroderma* Peters, 1865 [1866] traditionally have been recognized in Costa Rica and much of Central America (Davis 1968; Simmons 2005; Mantilla-Meluk 2014); the more widespread of these has been known as *U. bilobatum* Peters, 1866 [1867], a species exhibiting large amounts of variation (Baker & López 1970; Baker & McDaniel 1972; Baker *et al*. 1972; Greenbaum 1981; Barton 1982; Bradley & Baker 2001; Hoffmann *et al*. 2003) and habitually including *U. convexum* Lyon 1902 as a subspecies. Mantilla-Meluk (2014) noted chromosomal and morphological characters, as well as distributional data, supporting the excision of *U. convexum* from *U. bilobatum*, which latter was restricted to a trans-Andean distribution relative to Central America.

Chiroptera: Phyllostomidae: *Uroderma magnirostrum* Davis, 1968

Uroderma magnirostrum is known from the Pacific lowlands of Nicaragua, but has yet to be detected in Costa Rica (York *et al*. 2019). The species has a putative distribution in adjacent countries (Davis 1968, Solari 2015), including numerous specimens from Panama, and more reduced numbers from Nicaragua, including two from Rivas Dept., immediately adjacent to Costa Rica (specimens TTU 17113 and KU 97697). It therefore is highly likely that this species may yet be found in Costa Rica.

Chiroptera: Phyllostomidae: *Chiroderma gorgasi* Handley, 1960

A recent analysis of *Chiroderma trinitatum* Goodwin, 1958 by Lim *et al*. (2020) determined that this species is confined to east of the Andes and that the species present in Central America instead is *C. gorgasi*. These two species are a clear example of cryptic species because they traditionally were considered to be morphologically identical, although detailed analyses did manage to find subtle differences between the two (Lim *et al*. 2020; Garbino *et al*. 2022). *Chiroderma gorgasi* is distinguished from other species of the genus by its somewhat smaller body and skull

size, particularly braincase width, although morphometrically and on the basis of a principal component analysis, it is indistinguishable from *C. trinitatum*: only discrete characters distinguish these two species of *Chiroderma* (Lim *et al*. 2020).

Chiroptera: Phyllostomidae: *Sturnira hondurensis* Goodwin, 1940

Although this species has been reported in the past for Costa Rica, a revision of *Sturnira* Gray, 1842 by Velazco & Patterson (2013) showed that that species' distribution was much more limited; modeling and specimen data analyzed by Hernández-Canchola (2018) and Torres-Morales (2019) suggested a distribution restricted to Mexico, Guatemala, El Salvador, Honduras, and potentially, extreme northern Nicaragua (see also Hernández-Canchola *et al*. 2021). Velazco & Patterson (2014) described *S. burtonlimi* based on material formerly identified as *S. hondurensis*, and identified as "*Sturnira* new species 1" in Velazco & Patterson (2013). As a result of these works, there are four species of *Sturnira* documented in Costa Rica: *S. burtonlimi* Velazco and Patterson, 2014, *S. luisi* (Davis, 1980), *S. mordax* (Goodwin, 1938), and *S. parvidens* Goldman, 1917.

Chiroptera: Phyllostomidae: *Natalus lanatus* Tejedor, 2005

This species was recorded for Costa Rica by Rodríguez-Herrera *et al*. (2011). However, analysis of molecular data by López–Wilchis *et al*. (2012) suggested that this taxon is a junior synonym of *Natalus mexicanus* Miller, 1902. On the basis of the latter revision, we follow Simmons & Cirranello (2022) in treating them as such. Accordingly, the only species of this genus present in Costa Rica is *Natalus mexicanus*. Notwithstanding the data of López-Wilchis *et al*. (2012), York *et al*. (2019) treated these taxa as separate species for Costa Rica.

Chiroptera: Vespertilionidae: *Aeorestes egregius* (Peters, 1870)

This species has not yet been recorded in Costa Rica; however, it has been detected in Panama and Honduras (Mora 2012), thus suggesting that it most likely is present in Costa Rica, particularly in rain forests of the Caribbean, such as Tortuguero National Park or the Barra del Colorado and Gandoca-Manzanillo wildlife refuges. This species is difficult to detect by conventional means (Mora 2012).

Chiroptera: Vespertilionidae: *Dasypterus ega* (Gervais, 1856)

See comments above, under genus *Dasypterus*. This species has undergone a change of genus.

Chiroptera: Vespertilionidae: *Dasypterus intermedius* H. Allen, 1862

See comments above, under genus *Dasypterus*. This species has undergone a change of genus.

Chiroptera: Vespertilionidae: *Lasiurus frantzii* Peters, 1870

Although described by Peters (1870) as a species, *L. frantzii*, whose type locality is Costa Rica, subsequently was variously synonymyzed with *L. borealis* (Müller, 1776) by Dobson (1878) [as a "variety" of *Atalapha noveboracensis* (= *L. borealis*)], then disappeared altogether as a synonym of *L. borealis mexicanus* (Saussure, 1861) by Miller 1897, albeit in the absence of examining any specimens from Costa Rica. Goldman (1932b) removed it from *L. b. mexicanus*, considering it to be a distinct subspecies of *L. borealis*. This taxonomy was maintained by Hall (1981). Molecular data analyzed by Baird *et al*. (2015) nevertheless confirmed the status of this taxon as a species independent of *L. borealis*. We therefore adopt that taxonomic framework and include *L. frantzii* in the list of Costa Rican mammals, rather than *L. borealis*.

Chiroptera: Vespertilionidae: *Myotis pilosatibialis* LaVal, 1973

Myotis pilosatibialis LaVal, 1973 was considered a valid species by Mantilla–Meluk & Muñoz–Garay (2014), who extracted it from synonymy with *Myotis keaysi* J. A. Allen, 1914. Character data also were provided by Mantilla–Meluk & Muñoz–Garay (2014) to discriminate between the two species.

Chiroptera: Vespertilionidae: *Rhogeessa io* Thomas, 1903

In describing *R. permutandis* from Nicaragua, Baird *et al*. (2019) noted that *R. io* as then construed likely constituted a polyphyletic species complex. In particular, although no genetic distance data were presented, *R. io* from Panama was as topologically distinct at the molecular level (based on Cytochrome *b* sequences) from *R. io*

from South America as it was from the cytotypically distinct *R. permutandis*. These data suggest that *R. io sensu stricto*, the type locality of which is "Valencia, Venezuela", eventually may come to be restricted to the east and south of the Andes, whereas *R.* "*io*" north and west of the Andes, including Central America, in fact may represent an undescribed species. We have left *R. io* on our list *pro tempore*, as have others (e.g., Timm & LaVal 2018), until this taxonomic conundrum is resolved, but we caution that this taxonomy is likely to change.

Chiroptera: Vespertilionidae: *Myotis armiensis.*

The genus *Myotis*, with 137 species currently recognized, is the second most speciose genus of mammals, after *Crocidura* (Eulipotyphla: Soricidae), with 217 species currently recognized (Burgin *et al*. 2018). Species in *Myotis* are, however, notoriously difficult to discriminate, both morphologically and molecularly (Ruedi & Mayer 2001; Piaggio *et al*. 2002). Recent molecular analyses have resulted in the recognition of several novel species previously considered junior synonyms or at most subspecies level taxa. One of these recent recognitions is *M. armiensis* as a species formerly contained within *M. keaysi pilositibialis* and inhabiting premontane and montane forests from Costa Rica to Ecuador (Carrion-Bonilla & Cook, 2020).

Chiroptera: Molossidae: *Cynomops greenhalli* Goodwin, 1958

Despite much controversy in the past as to the composition of the genus *Cynomops*, several authors have recognized both *C. greenhalli* and *Cynomops mexicanus* (Jones & Genoways, 1967) as distinct species (Eger 2008; Moras *et al*. 2016; Moras *et al*. 2018). Simmons & Cirranello (2022) likewise recognized the two species, bringing the total number of species in the genus to nine pursuant to the revision by Moras *et al*. (2018). *Cynomops greenhalli* and *C. mexicanus* are morphologically very similar but nevertheless belong to distinct clades within *Cynomops* (Moras *et al*. 2018); it thus is understandable that they were considered a single species by several authors given that they cannot be conclusively separated by size (Peters *et al*. 2002). Salas-Solano *et al*. (2020) reported that both species are present in Costa Rica; accordingly, *C. greenhalli* is added to the list. This species has a wide distribution on both sides of the Andes (Moras *et al*. 2018) and extending well into Central America (Taylor *et al*. 2019).

Chiroptera: Molossidae: *Eumops ferox* Gundlach, 1861 [1862]

Eumops is the most diversified and morphologically diverse genus of Molossidae (summary by Gregorin *et al*. 2016), and includes 17 species (Mora *et al*. 2021b). *Eumops ferox* was recognized by Gregorin *et al*. (2016) as the valid name for the taxon present in Central America, rather than *Eumops glaucinus* (Wagner, 1843), the name that previously has been included in lists of bats and mammals of Costa Rica. However, Bartlett *et al*. (2013) as well as Gregorin *et al*. (2016) found two populations of *E. ferox* to be paraphyletic: the nominotypical population (from Cuba, Fundador coffee plantation, on the banks of the Canímar River, Matanzas) was found to be sister to *E. floridanus* (G. M. Allen, 1932). As a result, four potential hypotheses remain to be tested for these taxa: 1) All three taxa are conspecific. In this instance, the name for the Costa Rican populations will remain *E. ferox*. 2) Central American populations of "*E. ferox*" are distinct from a combined *ferox* + *floridanus* taxon. In this case, *ferox* would be applied to the Cuban population, with *floridanus* becoming a junior synonym; Central American populations of *ferox* do not have a name whereof we are aware. 3) All three taxa are distinct at the species level. Again, the name *ferox* would be retained by Cuban populations, and Central American populations require a redescription and establishment of a neotype. 4). The phylogenies resulting from the analyses of molecular data by Bartlett *et al*. (2013) and Gregorin *et al*. (2016) were based on misidentified specimens (R. Gregorin, Universidade Federal de Lavras, Minas Gerais, Brazil, *in litt*., 20 January 2023). Were this to be the case, it is unclear how nomenclature would be affected. Here, we have left *pro tempore* the name *Eumops ferox* as that applicable to the Central American taxon, including Costa Rica, while we acknowledge that this is likely to change in the future.

Chiroptera: Molossidae: *Molossus alvarezi* González-Ruiz, Ramírez-Pulido, and Arroyo-Cabrales, 2011

González-Ruiz *et al*. (2011) described *M. alvarezi* from the Yucatán Peninsula in Mexico as a species distinct from *Molossus sinaloae* Allen, 1906 which was considered to be distributed from the Pacific versant of Mexico through Central America and northern South America. As a result, *M. alvarezi* comes to be the more prevalent species of *Molossus* recognized as being present in Central America (Loureiro *et al*. 2020a) because *M. sinaloae* now is restricted to Mexico west and north of the Isthmus of Tehuantepec (Loureiro & Lim 2019b).

Chiroptera: Molossidae: *Molossus aztecus* Saussure, 1860b

Another species of *Molossus* that is commonly present throughout Central America is *M. aztecus*. With a type locality in the state of Tlaxcala, Dolan (1989) considered the southern extent of the distribution to be northern Nicaragua. However, Handley (1976) documented the presence of the species in Venezuela, and it also has been documented in Brazil (Gregorin *et al*. 2011; Loureiro *et al*. 2018). Despite this expansive range, neither Loureiro & Lim (2019a) nor York *et al*. (2019) included Costa Rica in the species' distribution. However, specimens exist from Costa Rica identified as *M. aztecus* (not examined by us; University of Kansas Natural History Museum 134583, 158384, and 158385) from Guanacaste and Alajuela Provinces. Even if the specimens are misidentified, given the broad distribution of the species and documented presence in Nicaragua and in South America, the probability of *M. aztecus* being present is high, and it would not be unexpected to find it in Costa Rica. In light of the foregoing, we therefore include this species in the list of mammals present in Costa Rica.

Chiroptera: Molossidae: *Molossus bondae* J. A. Allen, 1904

The genus *Molossus* includes groups of species that are morphologically or genetically very similar, causing taxonomy of the genus to be confusing and unstable (Loureiro *et al*. 2020a). The classification of *M. bondae* has been no less complicated: it was recently returned to species status since previously long having been synonymized with *M. currentium* Thomas, 1901b, which now is restricted to South America (Loureiro *et al*. 2020b). The population of *M. currentium* identified by Loureiro *et al*. (2020b) from Ecuador may require a new name, because specimens from the type locality (Paraguay) were found to be definitively distinct and paraphyletic vis-à-vis Ecuadorian specimens. Loureiro *et al*. (2020b) chose to potentially (if not explicitly) synonymize that population with *M. rufus* É. Geoffroy, 1805.

Chiroptera: Molossidae: *Molossus nigricans* Miller, 1902

Molossus nigricans was synonymyzed first with *M. ater* É. Geoffroy, 1805 (Jones *et al*., 1962, with no comments), and subsequently with *M. rufus* É. Geoffroy, 1805 (e.g., Eger 2008), but recently has been considered distinct from either (Loureiro *et al*. 2020b). These authors cautioned, however, that these taxa "represent cryptic species without any pronounced morphological differentiation." The two taxa also were hypothesized to be distinct by Simmons & Cirranello (2022). Currently, it is considered that *M. nigricans* is the taxon present in Central America from Mexico to Panama, and that *M. rufus* is found in South America and Trinidad and Tobago (Loureiro *et al*. 2019, 2020b; Simmons & Cirranello 2022).

Chiroptera: Molossidae: *Nyctinomops laticaudatus* (É. Geoffroy St.-Hilaire, 1805)

Mora (2000) listed this species as "expected" for Costa Rica, and its presence was confirmed in 2018 by Villalobos-Chaves *et al*. (2018). These authors confirmed the presence both of *N. laticaudatus* and *Eumops nanus* (Miller, 1900) with voucher specimens found by workers at wind power production facilities. Villalobos-Chaves *et al*. (2018) pointed out that their record of *N. laticaudatus* helped close a gap in the distribution of this species in Central America. However, they ignored reports on the presence of the other two species of the genus *Nyctinomops* in the region and perhaps for this reason did not include them as "expected" for Costa Rica.

Chiroptera: Molossidae: *Nyctinomops aurispinosus* (Peale, 1849)

This species has a wide distribution both in South and North America. Reports from Central America are based on specimens from Honduras (Espinal *et al*. 2016). It is very likely that the species will be detected in Costa Rica, although it remains to be seen whether the species inhabits the region or only is found here occasionally, for example during migrations.

Chiroptera: Molossidae: *Nyctinomops macrotis* (Gray, 1839)

This is a case similar to the previous one: this species inhabits both North and South America and was reported for Central America by Mora *et al*. (2016) based on two males captured in southern Honduras. We hypothesize that this taxon also will eventually be found to be present in Costa Rica.

Rodentia: Sciuridae: *Echinosciurus deppei* (Peters, 1863)

This represents a change in assignment to genus: see comments above, under Family Sciuridae.

Rodentia: Sciuridae: *Echinosciurus variegatoides* (Ogilby, 1839)

This represents a change in assignment to genus: see comments above, under Family Sciuridae.

Rodentia: Sciuridae: *Syntheosciurus granantensis* (Humboldt, 1811)

This represents a change in assignment to genus: see comments above, under Family Sciuridae.

Rodentia: Heteromyidae: *Heteromys salvini* Thomas, 1893

This species was returned to the genus *Heteromys* Desmarest, 1817 by Hafner *et al*. (2007; Rogers & Vance 2005; but see Rogers & González 2010). Whilst it was described by Thomas (1903) as a member of *Heteromys,* it had been synonymized with *Liomys* Merriam 1902 by Goldman (1911) and been included in that genus in previous checklists of Costa Rican mammals.

Rodentia: Cricetidae: Sigmodontinae: *Ichthyomys tweedii* Anthony 1921

This species is little known and was described based on few individuals, with specimens documented only from Panama and Ecuador (Voss 1988). Ramírez-Fernández *et al*. (2020) reported the first record of *I. tweedii* in southern Costa Rica, which also constitutes the northernmost point of the distribution of this taxon.

Rodentia: Cricetidae: Sigmodontinae: *Melanomys chrysomelas* (J. A. Allen, 1897)

This species was described by Allen in 1897 as *Oryzomys chrysomelas* and subsequently was synonymized with *O. caliginosus* (Tomes, 1860) by Goldman (1918). *Melanomys* originally was named (without description) by Thomas (1902b) [Thomas referred in that work to a description in Novitates Zoologicae, also in 1902, but we have been unable to find any such description; we follow Allen (1913), Hall (1981), and Weksler & Lóss (2015) in using Thomas' note in Annals and Magazine of Natural History as the nomenclatural citation for the name]. *Melanomys chrysomelas* most recently was excised from *M. caliginosus* by Hanson & Bradley (2008). The type locality for *M. caliginosus* is "Ecuador", while that of *M. chrysomelas* is "Suerre, [Limón Province] Costa Rica"; we note that while Allen (1913) specified that the holotype was caught at an "altitude probably between 3000 and 4000 feet", Suerre in fact is closer to 330 m (1083 feet). While we have caught these on the Caribbean slope at 70 – 500 m (230 – 1640 ft), it is unclear what their actual elevational range is.

Rodentia: Cricetidae: Neotominae: *Oligoryzomys costaricensis* (J. A. Allen, 1893)

Systematics and taxonomy of this group of taxa in general and of species in particular remain problematic. Described by J. A. Allen in 1893, from "El General, altitude 2150 feet" [= San Isidro de el General, San José Prov., ca. 700 m/2300 ft], this taxon was synonymized by Goldman (1918) with *O. fulvescens* (Saussure, 1860a), whose type locality was noted by this author as "Habite le Mexique" [= Inhabits Mexico]. Doubts as to the taxonomic integrity of "*O. fulvescens*" were raised by Rogers *et al*. (2009), who found that Venezuelan and Mexican samples assigned to *O. fulvescens* were paraphyletic. Further studies by Hanson *et al*. (2011) confirmed this distinction and demonstrated that *O. costaricensis* was distinct at the species level from *O. fulvescens*, as well as from *O. vegetus* (Bangs, 1902), with which *O. costaricensis* is sympatric over parts of its range. We therefore adopt *O. costaricensis* as the name for what formerly was known in Costa Rica as *O. fulvescens*.

Rodentia: Cricetidae: Neotominae: *Peromyscus nicaraguae (*J. A. Allen, 1908) and *Peromyscus nudipes* J. A. Allen, 1891

Allen (1891b) described *Peromyscus nudipes* from La Carpintera, Costa Rica "a mountain situated eight miles east of San Jose, at an altitude of about 6000 feet" [ca. 9º53′03″N, 83º58′52″W, ca. 1860 m; amended to 4597 ft (1401 m) by Goodwin (1946)]. Further specimens from additional localities documented by Osgood (1909) supported Allen's description of *P. nudipes* as a distinct species: Osgood placed the taxon in the *Lepturus* group of the subgenus *Peromyscus*, a group that he considered distinct from the *Mexicanus* group; Osgood (1909:195) also extended the range of *P. nudipes* from La Carpintera to "Mountains of Central Costa Rica and thence south to Chiriqui". Two additional subspecies of *P. nudipes* from Costa Rica subsequently were described: first by Goodwin (1938b; *P. n. orientalis*), then by Harris (1940; *P. n. hesperus*). Both these subspecies occupy lower elevation habitats than *P. n. nudipes*, and were documented as being substantially smaller in size than the nominal taxon, leading Goodwin (1946) to suggest a potential relationship with *P. mexicanus saxatilis*. Were that to have been the

case, *P. n. nudipes* would have been left as the sole representative of the species (Bradley *et al.* 2016).

The *P. mexicanus* species group was revised in detail by Huckaby (1980), who concluded based on morphology that *P. nudipes* was a synonym of *P. mexicanus*. Although this arrangement was not followed by Hall (1981), who retained *P. nudipes* and its subspecific divisions, more recent authors followed Huckaby's recommendation of placing *P. nudipes* in synonymy with *P. mexicanus* (Carleton, 1989; Musser & Carleton, 2005; Trujano-Álvarez & Álvarez-Castañeda, 2010). More recent analyses in contrast concluded based on morphology as well as parsimony and Bayesian analyses of Cytochrome *b* sequences that *P. nudipes* is a species distinct from *P. mexicanus* (Ordóñez-Garza *et al.*, 2010). The topology resolved in that study showed *P. nudipes* as the sister species to a clade of *P. grandis* and *P. guatemalensis*, supporting the relationships proposed by Bradley *et al.* (2007; {*nudipes*, *guatemalensis*}: *grandis* was not sampled in that study). The same conclusion, *P. nudipes* is an independent species sister to {*grandis, guatemalensis*}, was reached by Pérez Consuegra and Vázquez-Domínguez (2015), with samples previously identified as *P. m. saxatilis* reclassified as *P. nicaraguae*. Although these authors restricted *P. nicaraguae* to Honduras and Nicaragua, subsequent molecular work by Bradley *et al.* (2016) confirmed the presence of *P. nicaraguae* in Costa Rica. Bradley *et al.* (2016) demonstrated that samples of *P. n. hesperus* and *P. n. orientalis* from several localities were grouped together with individuals of *P. nicaraguae* from Honduras and Nicaragua in a single clade. As a result, these taxa now are considered a part of *P. nicaraguae*. Based on the tree topology and levels of genetic divergence from other members of the *P. mexicanus* species group, samples from south-central Costa Rica and Panama formed a monophyletic clade that has historically been considered to be *P. nudipes nudipes*; these samples therefore should retain that name (Bradley *et al.*, 2016).

The conclusion of the most recent studies thus is that *P. nudipes* indeed is a valid species, and that its distribution should be restricted to the high elevation montane forests of the Cordillera de Talamanca in south-central Costa Rica and northern Panama (Bradley *et al.*, 2016). In particular, *P. nudipes* is found only in the montane oak forests of the Cordillera de Talamanca in southern Costa Rica and northwestern Panama. In contrast, *P. nicaraguae* (formerly known as *P. nudipes hesperus* and *P. nudipes orientalis*) occupies the mid– to low-elevation Tropical forests of the Central, Tilaran, and Guanacaste Mountains in the north-central regions of Costa Rica, extending northward to Nicaragua and Honduras (Bradley *et al.*, 2016). This hypothesis should be tested further by obtaining additional samples to determine whether these taxa indeed are restricted to these specific ecosystems, as suggested by Bradley *et al.* (2016).

Rodentia: Cricetidae: Neotominae: *Reithrodontomys cherrii* (J. A. Allen, 1891b)

Reithrodontomys cherrii was described by Allen on the basis of specimens from San José and nearby La Carpintera collected by G. K. Cherrie, then acting curator of mammals at the Museo Nacional de Costa Rica (see footnote 3 of Gardner & Carleton [2009:165] for use of *cherrii* versus *cherriei* and adoption of the former over the latter). Specimens from La Carpintera subsequently formed the basis for the taxon *Reithrodontomys costaricensis* (Allen, 1895a). Howell (1914) synonymized *R. cherrii* and *R. costaricensis* with *R. mexicanus* (de Saussure, 1860a), a taxonomy followed by Hooper (1952). Osgood (1907) and Hooper (1952) noted that the holotype of *R. cherrii* was a composite consisting of a *Reithrodontomys* skin and a *Peromyscus maniculatus* skull; because the skin from San José was the specimen first mentioned in the original description by Allen (1891b), it was designated by Osgood (1907) as the lectotype. Arellano *et al*. (2005) conclusively demonstrated based on analyses of Cytochrome *b* sequences that certain Costa Rican populations of *R. mexicanus* were paraphyletic with respect to *R. mexicanus sensus stricto* and elevated the former to species under the name *R. cherrii*. Gardner & Carleton (2009) concurred with considering *costaricensis* a junior synonym of *cherrii*, and similarly considered *R. cherrii* as distinct from *R. mexicanus*, a taxonomy also favored by Villalobos–Chaves *et al*. (2016). We follow Arellano *et al*. (2005) and Gardner & Carleton (2009) in considering *R. cherrii* distinct from *R. mexicanus*.

Rodentia: Cricetidae: Neotominae: *Reithrodontomys garichensis* Enders and Pearson, 1940

This species originally was proposed as a subspecies of *R. mexicanus* by Enders & Pearson (1940). While maintaining *cherrii* and *garichensis* as subspecies of *R. mexicanus*, Hooper (1952:157) discriminated between them "principally on the basis of the dorsal profile of the skull and on the shape of the rostrum and upper incisors." In addition, Enders & Pearson (1952) noted that the two taxa likely were altitudinally segregated, with *garichensis* inhabiting lower elevations: the type locality was at 3200 ft [= 975 m] and specimens from 6000 ft [=1829 m] and above (up to 11,000 ft [3353 m] in their sample) were tentatively identified as *R. cherrii*. *Reithrodontomys*

garichensis was definitively removed from synonymy with *R. mexicanus* by Gardner & Carleton (2009) on the basis of an extensive suite of craniodental characters. *Reithrodontomys garichensis* also was included among the rodent species of Costa Rica by Villalobos–Chaves *et al*. (2016).

Rodentia: Cricetidae: Neotominae: *Reithrodontomys mexicanus* (de Saussure, 1860a)

As noted above, while most Costa Rican populations of *R. mexicanus* broadly writ have been removed from *R. mexicanus*, Arellano *et al*. (2005) included one sample from Cartago Province, Costa Rica in their "Clade I" under the name of *R. mexicanus*. Those authors noted that their Clade I corresponded to a portion of the *R. mexicanus* group of Hooper (1952), and as such is likely to include a number of species-level taxa, both described and undescribed. We recognize that it is highly unlikely that *R. mexicanus sensu stricto* will be found to occur in Costa Rica. Nevertheless, the presence of a Costa Rican sample in Clade I of Arellano *et al.* (2005) suggests the existence either of an additional existing but unreported taxon, or of an additional, potentially undescribed member of the *R. mexicanus* group in Costa Rica. Genetic studies of *Reithrodontomys* have shown inconsistencies with respect to morphologically delineated species limits (Gardner & Carleton 2009): this is a genus that surely bears further taxonomic scrutiny. The presence in our checklist of *R. mexicanus* therefore is more precautionary, implying the presence of an as yet undetermined taxon, rather than meant to imply that *R. mexicanus sensu stricto* is present.

Rodentia: Cricetidae: Neotominae: *Reithrodontomys* sp. (listed in Timm & LaVal 2018)

This putatively undescribed new species was listed by Timm & LaVal (2018). However, R. M. Timm indicated that genetic data confirmed the identity of this animal as *R. rodriguezi* (R. M. Timm, Kansas Biodiversity Institute, *in litt*., 3 February 2023). We include this only in the present note, not in the Table listing Costa Rican species, because there is no published correction identifying this putatively undescribed species listed in a previous faunal compendium of the country as the otherwise well-known *R. rodriguezi*.

Rodentia: Echimyidae: *Diplomys labilis* (Bangs, 1901).

This is another southern species previously known as being distributed from Colombia to central Panama (Ramírez-Fernández *et al*. 2015). These authors reported finding *D. labilis* in the Osa region of southwestern Costa Rica, about 490 km from its type locality (Ramírez-Fernández *et al*. 2015). In addition, one animal of this species recently was observed and another collected in southern Nicaragua near the Costa Rica border (Martínez–Fonseca *et al*. 2018). The presence of this species in Costa Rica is therefore strongly supported.

Rodentia: Echimyidae: *Proechimys semispinosus* (Tomes, 1860)

Based on the variability previously uncovered in this species and the confused taxonomic history of the species and indeed, the genus (Gardner 1983), it is unlikely that the species in Costa Rica to which this name is assigned will remain *P. semispinosus*. The names *P. s. centralis* (Thomas, 1896) and *P. s. rubellus* Hollister, 1914 (for a highly localized taxon from Angostura Valley, Cartago) have previously been used for taxa of *Proechimys* in Costa Rica. Regardless of the biologically correct nomenclature, at least one *Proechimys* occurs in Costa Rica. While the name is likely to change, we have opted to leave it in our list *pro tempore* as *Proechimys semispinosus* until such a time as a more thorough evaluation is undertaken of species limits in this group.

Rodentia: Erethizontidae: *Coendou mexicanus* (Kerr, 1792)

As detailed above (refer to "Changes to Genera"), this species was removed from *Sphiggurus* to *Coendou*.

Lagomorpha: Leporidae: *Sylvilagus hondurensis* Goldman, 1932

A recent revision of *Sylvilagus floridanus* (Allen, 1891) demonstrated that *S. floridanus sensu stricto* has the southern end of its distribution at the Isthmus of Tehuantepec, and that the *Sylvilagus* species in the *floridanus* group present in Costa Rica is *S. hondurensis costaricensis* Harris, 1933 (Ruedas *et al*. 2023).

Carnivora: Felidae: *Herpailurus yagouaroundi* (É. Geoffroy Saint-Hilaire, 1803)

This taxon originally was described in the genus *Felis* Linnaeus 1758. Jardine (1834) included the species within his new genus *Puma* Jardine, 1834, with *P. concolor* (Linnaeus, 1771). *Herpailurus* Severtzow (1858) was erected as an apparently monotypic subgenus for "Eyra" [= Jaguarundi], albeit absent a diagnosis or description.

The species was returned to *Felis* by Simpson (1945), a taxonomy followed by McKenna & Bell (1997). Salles (1992) maintained *Herpailurus* as the genus for this taxon, as did Johnson and O'Brien (1997), who found an ancient sister taxon relationship between *Puma* and *Herpailurus*, a relationship supported by Bininda-Emonds *et al*. (1999). The species was transferred back to *Puma* by Wozencraft (2005) and conserved in *Puma* based on genetic data by Johnson *et al*. (2006). A three-dimensional analysis of cranial morphometrics in the *Puma* group by Segura *et al*. (2013) nevertheless argued for distinction at the generic level for the species in the *Puma* group. We follow Segura *et al*. (2013) in recognizing *Herpailurus* as the genus for *H. yaguaroundi* while acknowledging that this taxonomic framework does not appear to be a settled issue.

Carnivora: Canidae: *Speothos venaticus* Lund, 1842

The bush dog was considered to be distributed from Argentina to Panama and to be one of the least known and most rare carnivores (González-Maya *et al*. 2017). As a result of intensive sampling using camera traps, this species was detected in the Las Tablas Protected Zone, in the Cordillera de Talamanca in southern Costa Rica at 1,500 m elevation, an elevation record for the species (González-Maya *et al*. 2017). The authors pointed out that the low frequency of bush dog in their camera trap sampling (2 of ~16,000 images) and the absence of previous records despite intensive work in the area for over 10 years, serve to reinforce the rarity of the species throughout its range (González-Maya *et al*. 2017).

Final considerations

In the case of the genus *Vampyrodes* Thomas, 1900 (originally named as a subgenus of *Vampyrops* Peters, 1866), the species found in Central America is *Vampyrodes major* G. M. Allen, 1908, pursuant to the revision of *Vampyrodes* by Velazco & Simmons (2011). These authors split *V. caraccioli* Thomas, 1889, into its constituent taxa at the species level, restricting *V. caraccioli* to south and east of the Andes, and *V. major* to north and west of the Andes, including Central America. Although York *et al*. (2019) made this clarification, they nevertheless erroneously included *V. caraccioli* in their key to the bats of Costa Rica and Nicaragua. We have omitted this latter taxon here.

Based on the foregoing comments and the list presented below, we hypothesize that 271 species of mammals live within the political confines of Costa Rica. This number includes three introduced murids that live in the wild in some locations of Costa Rica. Thirty-five species are aquatic, of which 31 correspond to cetaceans, and three are marine carnivores; the remaining aquatic species is the manatee. Some of the species included have freshwater aquatic habits within their terrestrial range, for example the water opossum, the otter, and some rodents, but overall, the remaining 236 species are terrestrial, including 124 bats. These 271 species belong to 40 families of 12 orders (Table 1).

Other species expected to potentially be present in Costa Rica

The Panamanian night monkey, *Aotus zonalis* Goldman, 1914, has been found in the Bocas del Toro province of Panama (Ortega *et al*. 2022), which borders southeastern Costa Rica. This species eventually may be found also to be present in Costa Rica.

Marmosa (*Exulomarmosa*) *robinsoni* was noted by Voss (2022) to occur primarily in dry forest habitats ranging from western Panama to Colombia and northern Venezuela. Its presence was documented in Panama adjacent to the Costa Rican border: locality 109 of Rossi *et al*. (2010; Finca Santa Clara, Chiriquí, Panama) is georeferenced in the USNM database as 8º51´N, 82º45´W, which would place it under 5 km from the Costa Rica border. Note that the map for *M. robinsoni* of O'Connell (1983) largely refers for Panama to *M. isthmica* Goldman, 1912, which was excised from *M. robinsoni* by Rossi *et al*. (2010). In light of the foregoing research results, we therefore list *M. robinsoni* herein as likely to be documented in Costa Rica.

Marmosa (*Micoureus*) *adleri* Voss, Giarla, and Jansa, 2021 currently is known only from Panama. One of the localities documented for this species by Voss *et al*. (2021), locality 12, is ca. 30 km airline distance from the Costa Rica border. We therefore consider this species also to possibly be potentially present in Costa Rica.

Vampyressa elisabethae Tavares, Gardner, Ramírez-Chaves, and Velazco, 2014 was described in 2014 based

on an adult male captured in an evergreen forest of Rancho Mojica, upper part of the Changena river, about 32 km southwest of Changuinola in Bocas del Toro, Panama (Tavares *et al*., 2014). This location is approximately 60 km from the border with Costa Rica at Sixaola, so it is possible that it is also found in Costa Rica. It should be taken into account that the holotype was collected in 1961 and that the most recent paratype dates from 1976. The original habitat of this region of Panama, as well as that of the Sixaola area of Costa Rica, has substantially deteriorated in recent decades.

The type and so far only known locality for specimens of *Rhogeessa permutandis* Baird, Light, and Bickham, 2019 is in the environs of Rama, in the Costa Caribe Sur Autonomous Region of Nicaragua (Baird *et al*. 2019). Rama is ca. 130 km from the border of Costa Rica but the autonomous region is adjacent to and ecologically continuous with northern portions of Alajuela Province. We therefore likewise include *R*. *permutandis* as an expected species potentially to be found in Costa Rica.

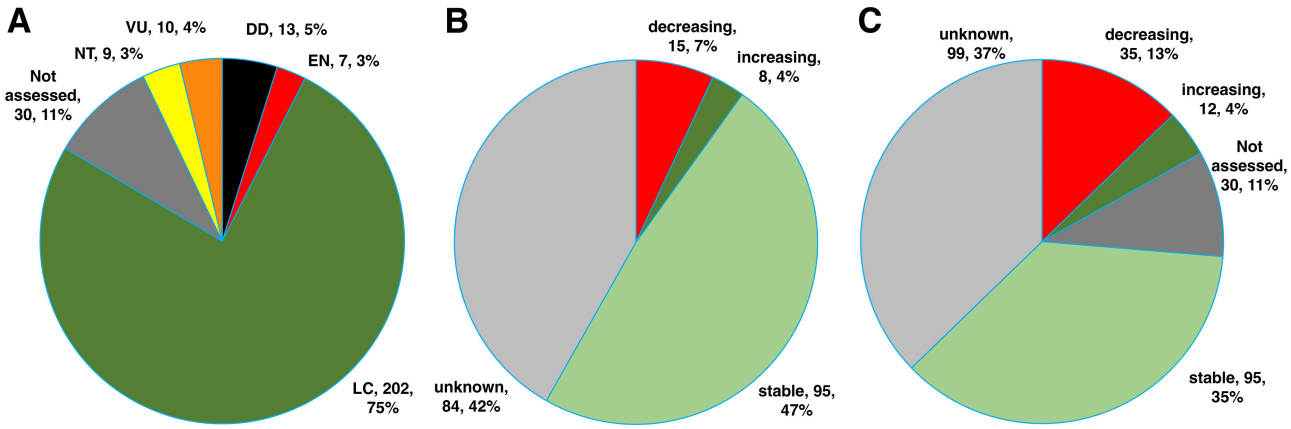

FIGURE 2. Distribution of species of Costa Rican mammals by categories of threat as assessed by the International Union for the Conservation of Nature (IUCN). A: overall assessment of all mammal species known for Costa Rica into IUCN categories of threat. Key to abbreviations: EN, endangered; DD, data deficient; LC, least concern; NT, not threatened; VU, vulnerable. B: Trends in population growth rates for the 202 species of Costa Rican mammals listed in the IUCN category of "least concern." C: Trends in population growth rates for all Costa Rican mammal species. Numbers represent total number of species in each category followed by proportional representation relative to the total, expressed as a percentage.

Conservation concerns for mammals of Costa Rica

The list below includes, when available, the risk categories assigned to the species in the IUCN Red List. These risk assessments are summarized in Fig. 2. Broadly speaking, about three-quarters (202 of 271, or 76%) of Costa Rica's mammal species are in the "Least Concern" category (Fig. 2A). However, a more in-depth examination of that category shows that not all is well from a conservation perspective. Indeed, while 51% of the species in the Least Concern category (103 species of 202) are either stable (n = 95) or increasing (n = 8) with respect to their population trends, an alarming proportion are decreasing (n = 15, 7%) or unknown (n = 84, 42%; Fig. 2B). One might argue that unknown means just that: unknown, and that the category therefore could include species whose populations are stable or increasing. However, a recent analysis of species in IUCN's Data Deficient category, which we would argue is the equivalent of "unknown" population trend, predicted that over half of all species sampled in the category, and in particular 61% of the mammals, were threatened by extinction (Borgelt *et al.* 2022). A population trend of "Unknown" therefore is a conservation concern when it comes to species of mammals in Costa Rica. For all species of Costa Rican mammals (Fig. 2C), the picture is even more concerning: species whose population trends are stable (n = 95) and increasing (n = 12) constitute only 39.5% of Costa Rica's mammal species; the remaining 60.5% species (n = 164) are decreasing (n = 35), unknown (n = 99), or not assessed (n = 30). A further factor of concern is the finding that undescribed species have a higher extinction risk than known species (Liu *et al*. 2022), underscoring the necessity of fully documenting not just the mammals, but all of Cota Rica's biota. This is being rendered increasingly difficult in light of the fact that 60% of recently described species are considered to be morphologically cryptic (Ceballos & Ehrlich 2009), which as a result require much greater efforts at documentation than already existing species (Bickford *et al*. 2007; Parsons *et al*. 2022), as does finding and describing rare and

range restricted species (Pimm *et al*. 2014; Teta & D'Elía 2019; Moura & Jetz 2021). Thus, although 28% of Costa Rican territory is under some sort of protection regime, it is evident from our analysis that much more remains to be done to document and safeguard Costa Rica's exceptional biodiversity heritage.

TABLE 2.—List of mammal species of Costa Rica

Species (within their corresponding higher taxonomic rank)	**Nombre en español**	**Name in English**	**IUCN status**
ORDER DIDELPHIMORPHIA			
FAMILY DIDELPHIDAE			
SUBFAMILY CALUROMYINAE			
Caluromys derbianus (Waterhouse, 1841)	zorro de balsa	Derby's Woolly Opossum	LC (decreasing)
SUBFAMILY DIDELPHINAE			
TRIBE DIDELPHINI			
Chironectes minimus (Zimmermann, 1780)	zorro de agua	Water Opossum	LC (decreasing)
Didelphis marsupialis Linnaeus, 1758	zorro pelón	Common opossum	LC (stable)
Didelphis virginiana Kerr, 1792	zorro pelón	Virginia opossum	LC (increasing)
Philander melanurus (Thomas, 1899)	zorro cuatrojos	Gray Four-eyed Opossum	Not assessed
Philander vossi Gardner and Ramírez–Pulido, 2020	zorro cuatrojos	Voss' Four-eyed Opossum	Not assessed
TRIBE MARMOSINI			
Marmosa alstoni (J. A. Allen, 1900)	zorra, zorricí gris	Alston's mouse opossum	LC (stable)
Marmosa mexicana Merriam, 1897	zorricí	Mexican Mouse Opossum	LC (stable)
Marmosa nicaraguae Thomas, 1905	zorricí	Nicaraguan Mouse Opossum	Not assessed
Marmosa zeledoni Goldman, 1911	zorricí	Zeledon's Mouse Opossum	Not assessed
TRIBE METACHIRINI			
Metachirus myosuros (Temminck, 1824)	zorro pardo, zorricí pardo	Mouse-tailed Four-eyed Opossum	LC (stable)
ORDER PILOSA			
SUBORDER VERMILINGUA			
FAMILY MYRMECOPHAGIDAE			
Myrmecophaga tridactyla Linnaeus, 1758	oso caballo	Giant Anteater	VU (decreasing)
Tamandua mexicana (Saussure, 1860)	oso mielero, oso chaleco, tamandúa	Northern Tamandua	LC (unknown)
FAMILY CYCLOPEDIDAE			
Cyclopes dorsalis (Gray, 1865)	ceibita, serafín de platanar	Pygmy Anteater	Not assessed
SUBORDER FOLIVORA			
FAMILY CHOLOEPODIDAE			
Choloepus hoffmanni Peters, 1858	perezoso, perica	Hoffmann's Two-toed Sloth	LC (decreasing)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
FAMILY BRADYPODIDAE			
Bradypus variegatus Schinz, 1825	perezoso, cúcula	Brown-throated Three-toed Sloth	LC (decreasing)
ORDER CINGULATA			
FAMILY DASYPODIDAE			
SUBFAMILY DASYPODINAE			
Dasypus novemcinctus Linnaeus, 1758	armadillo, cusuco	Nine-banded Armadillo	LC (stable)
FAMILY CHLAMYPHORIDAE			
SUBFAMILY TOLYPEUTINAE			
Cabassous centralis (Miller, 1899)	armadillo, armado de zopilote	Naked-tailed Armadillo	DD (unknown)
ORDER EULIPOTYPHLA			
FAMILY SORICIDAE			
Cryptotis gracilis Miller, 1911	musaraña delicada	Talamancan Small-eared Shrew	LC (unknown)
Cryptotis merriami Choate, 1970	musaraña de Merriam	Merriam's Small-eared Shrew	LC (stable)
Cryptotis monteverdensis Woodman and Timm, 2017	musaraña de Monteverde	Monteverde Small-eared Shrew	Not assessed
Cryptotis nigrescens (J. A. Allen, 1895)	musaraña negra	Blackish Small-eared Shrew	LC (stable)
Cryptotis orophilus (J. A. Allen, 1895)	musaraña montañera	Central American Least Shrew	Not assessed
ORDER CHIROPTERA			
FAMILY EMBALLONURIDAE			
Balantiopteryx plicata Peters, 1867	murciélago de pliegues	gray sac-winged bat	LC (unknown)
Centronycteris centralis Thomas, 1912	murciélago central	Thomas's Shaggy Bat	LC (unknown)
Cormura brevirostris (Wagner, 1843)	murciélago chato	Chestnut Sac Winged Bat	LC (unknown)
Cyttarops alecto Thomas, 1913	murciélago gris	Short-eared bat	LC (unknown)
Diclidurus albus Wied – Neuwied, 1820	murciélago fantasma	White Ghost Bat	LC (unknown)
Peropteryx kappleri Peters, 1867	murciélago de Kappler	Greater Dog-like Bat	LC (unknown)
Peropteryx macrotis (Wagner, 1843)	murciélago orejón	Lesser sac-winged bat	LC (stable)
Rhynchonycteris naso (Wied – Neuwied, 1820)	murciélago narigón	Brazilian Long-nosed Bat	LC (unknown)
Saccopteryx bilineata (Temminck, 1838)	murciélago listado	Greater Sac-winged Bat	LC (unknown)
Saccopteryx leptura (Schreber, 1774)	murciélago de ala delgada	Lesser Sac-winged Bat	LC (unknown)
FAMILY NOCTILIONIDAE			
Noctilio albiventris Desmarest, 1818	murciélago pescador	Lesser Bulldog Bat	LC (stable)
Noctilio leporinus (Linnaeus, 1758)	murciélago ñajo	Greater Bulldog Bat	LC (unknown)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
FAMILY MORMOOPIDAE			
Mormoops megalophylla Peters, 1864	murciélago duende	Ghost-faced Bat	LC (unknown)
Pteronotus davyi Gray, 1838	murciélago de Davy	Davy's Naked-backed Bat	LC (stable)
Pteronotus gymnonotus (Wagner, 1843)	murciélago de oído	Big Naked-backed Bat	LC (stable)
Pteronotus mesoamericanus Smith, 1972	murciélago mesoamericano	Central American Common Mustached Bat	LC (unknown)
Pteronotus personatus (Wagner, 1843)	murciélago enmascarado	Wagner's Mustached Bat	LC (stable)
FAMILY PHYLLOSTOMIDAE			
SUBFAMILY MICRONYCTERINAE			
Lampronycteris brachyotis (Dobson, 1879)	murciélago de orejas cortas	Yellow-throated Big-eared Bat	LC (stable)
Micronycteris hirsuta (Peters, 1869)	murciélago peludo	Hairy Big Eared Bat	LC (unknown)
Micronycteris microtis Miller, 1898	murciélago orejitas	Common Big Eared Bat	LC (stable)
Micronycteris minuta (Gervais, 1856)	murciélago enano	White Bellied Big Eared Bat	LC (stable)
Micronycteris schmidtorum Sanborn, 1935	murciélago de los Schmidt	Schmidts' Big-eared Bat	LC (unknown)
Micronycteris tresamici Siles and Baker, 2020	murciélago de los tres amigos		Not assessed
SUBFAMILY DESMODONTINAE			
TRIBE DESMODONTINI			
Desmodus rotundus (É. Geoffroy St.-Hilaire, 1810)	vampiro, desmodo redondo	Common Vampire Bat	LC (stable)
Diaemus youngii (Jentink, 1893)	vampiro de Young	White-winged Vampire Bat	LC (unknown)
TRIBE DIPHYLLINI			
Diphylla ecaudata Spix, 1823	vampiro chingo	Hairy-legged Vampire Bat	LC (stable)
SUBFAMILY LONCHORHININAE			
Lonchorhina aurita Tomes, 1863	murciélago nariz de lanza	Tomes's Sword-nosed Bat	LC (stable)
SUBFAMILY PHYLLOSTOMINAE			
TRIBE PHYLLOSTOMINI			
Gardnerycteris keenani (Handley, 1960)	murciélago de Keenan	Keenan's Hairy-nosed Bat	Not assessed
Lophostoma nicaraguae (Goodwin, 1942)	lofostoma de Nicaragua	Mesoamerican Round-eared Bat	Not assessed
Lophostoma silvicola d'Orbigny, 1836	lofostoma de bosque	White-throated Round-eared Bat	LC (unknown)
Phylloderma stenops Peters, 1865	murciélago de ojos angostos	Pale-faced Bat	LC (stable)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Phyllostomus discolor (Wagner, 1843)	murciélago careto	Pale Spear-nosed Bat	LC (stable)
Phyllostomus hastatus (Pallas, 1767)	murciélago punta de lanza	Greater Spear-nosed Bat	LC (stable)
Tonatia bakeri Williams, Willig and Reid, 1995	tonatia de Baker		Not assessed
TRIBE MACROPHYLLINI			
Macrophyllum macrophyllum (Schinz, 1838)	murciélago de hoja	Long-legged Bat	LC (unknown)
Trachops cirrhosus (Spix, 1823)	murciélago ranero	Fringe-lipped Bat	LC (stable)
TRIBE VAMPYRINI			
Chrotopterus auritus (Peters, 1856)	murciélago dorado	Woolly False Vampire Bat	LC (stable)
Mimon cozumelae Goldman, 1914	murciélago de Cozumel	Cozumel Golden Bat	LC (stable)
Vampyrum spectrum (Linnaeus, 1758)	murciélago espectral	Great False Vampire Bat	NT (decreasing)
SUBFAMILY GLOSSOPHAGINAE			
TRIBE CHOERONYCTERINI			
Anoura cultrata Handley, 1960	murciélago de cuchilla	Handley's Tailless Bat	LC (decreasing)
Anoura geoffroyi Gray, 1838	murciélago de Geoffroy	Geoffroy's Tailless Bat	LC (stable)
Choeroniscus godmani (Thomas, 1903)	murciélago de Godman	Godman's Long-tailed Bat	LC (unknown)
Hylonycteris underwoodi Thomas, 1903	murciélago de Underwood	Underwood's Long Tongued Bat	LC (stable)
Lichonycteris obscura Thomas, 1895	murciélago oscuro	Dark Long-tongued Bat	LC (unknown)
TRIBE GLOSSOPHAGINI			
Glossophaga commissarisi Gardner, 1962	murciélago de Commissaris	Commissaris's Long Tongued Bat	LC (stable)
Glossophaga leachii Gray, 1844	murciélago de Leach	Gray Long-tongued Bat	LC (stable)
Glossophaga cf. soricina (Pallas, 1766)	murciélago musaraña	Common Long-tongued Bat	Not assessed
SUBFAMILY LONCHOPHYLLINAE			
TRIBE LONCHOPHYLLINI			
Lonchophylla concava Goldman, 1914	murciélago cóncavo	Central American Nectar Bat	LC (unknown)
Lonchophylla robusta Miller, 1912	murciélago grueso	Orange Nectar Bat	LC (unknown)
SUBFAMILY GLYPHONYCTERINAE			
Glyphonycteris daviesi (Hill, 1965)	murciélago de Davies	Davies’s Big-eared Bat	LC (unknown)
Glyphonycteris sylvestris Thomas, 1896	murciélago silvestre	Tri-colored Big-eared Bat	LC (unknown)
Trinycteris nicefori (Sanborn, 1949)	murciélago de Niceforo	Niceforo's Bat.	LC (unknown)
SUBFAMILY CAROLLIINAE			

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Carollia castanea H. Allen, 1890	carolia castaña	Chestnut Short Tailed Bat	LC (stable)
Carollia perspicillata (Linnaeus, 1758)	carolia transparente	Seba's Short-tailed Bat	LC (stable)
Carollia sowelli Baker, Solari, and Hoffmann, 2002	carolia de Sowell	Sowell's Short-tailed Bat	LC (stable)
Carollia subrufa (Hahn, 1905)	carolia parda	Gray Short-tailed Bat	LC (stable)
SUBFAMILY STENODERMATINAE			
TRIBE STURNIRINI			
Sturnira burtonlimi Velazco and Patterson, 2014	esturnira de Burton Lim	Burton Lim's Yellow-shouldered Bat	DD (unknown)
Sturnira luisi Davis, 1980	esturnira de Luis	Luis's Yellow-shouldered Bat	LC (unknown)
Sturnira mordax (Goodwin, 1938a)	esturnira mordedora	Talamancan Yellow Shouldered Bat	LC (stable)
Sturnira parvidens Goldman, 1917	esturnira de dientes chicos	little yellow-shouldered Mesoamerican Bat	LC (stable)
TRIBE STENODERMATINI			
Artibeus intermedius J.A. Allen, 1897	artibeo intermedio	Intermediate Fruit-eating Bat	LC (stable)
Artibeus jamaicensis Leach, 1821	artibeo jamaiquino	Jamaican Fruit-eating Bat	LC (stable)
Artibeus lituratus (Olfers, 1818)	artibeo correcto	Great Fruit-eating Bat	LC (stable)
Centurio senex Gray, 1842	murciélago de charreteras	Wrinkle-faced Bat	LC (stable)
Chiroderma salvini Dobson, 1878	murciélago de Salvin	Salvin's Big-eyed Bat	LC (stable)
Chiroderma gorgasi Handley, 1960	murciélago de Gorgas	Gorgas' Big-eyed Bat	Not assessed
Chiroderma villosum Peters, 1860	quiroderma velludo	Hairy Big-eyed Bat	LC (Stable)
Dermanura azteca Andersen, 1906	murcielaguito azteca	Aztec Fruit-eating Bat	LC (unknown)
Dermanura phaeotis (Miller, 1902)	murcielaguito pardo	Pygmy Fruit Eating Bat	LC (stable)
Dermanura tolteca (Saussure, 1860)	murcielaguito tolteca	Toltec Fruit-eating Bat	LC (unknown)
Dermanura watsoni (Thomas, 1901)	murcielaguito de Watson	Thomas' Fruit-eating Bat	LC (stable)
Ectophylla alba H. Allen, 1892	murciélago blanco, ectofila blanca	Honduran White Bat	NT (decreasing)
Enchisthenes hartii (Thomas, 1892)	murciélago de Hart	Velvety Fruit-eating Bat	LC (unknown)
Mesophylla macconnelli Thomas, 1901	murciélago de MacConnell	MacConnell's Bat	LC (unknown)
Platyrrhinus helleri (Peters, 1866)	murciélago de Heller	Heller's Broad-nosed Bat	LC (stable)
Platyrrhinus vittatus (Peters, 1859)	murciélago rayado	Greater Broad-nosed Bat	LC (unknown)
Uroderma convexum Lyon, 1902	murciélago convexo	Pacific Tent-making Bat	Not assessed
Uroderma magnirostrum Davis, 1968	murciélago de cara ancha	Brown Tent-making Bat	LC (stable)
Vampyriscus nymphaea (Thomas, 1909)	vampirillo ninfa	Striped Yellow-eared Bat	LC (unknown)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Vampyressa thyone Thomas, 1909	vampiresa pequeña	Northern Little Yellow-eared Bat	LC (unknown)
Vampyrodes major G. M. Allen, 1908	murciélago cara rayada	Greater Stripe-faced Bat	LC (unknown)
FAMILY NATALIDAE			
Natalus mexicanus Miller, 1902	murciélago bebé mexicano	Mexican Funnel-eared Bat	LC (stable)
FAMILY FURIPTERIDAE			
Furipterus horrens (F. Cuvier, 1828)	furiptero horrendo	Thumbless Bat	LC (unknown)
FAMILY THYROPTERIDAE			
Thyroptera discifera (Lichtenstein and Peters, 1855)	murciélago de ventosas	Peter's Disk-winged Bat	LC (unknown)
Thyroptera tricolor Spix, 1823	murciélago platanillero	Spix's Disk-winged Bat	LC (unknown)
FAMILY VESPERTILIONIDAE			
SUBFAMILY VESPERTILIONINAE			
TRIBE ANTROZOINI			
Bauerus dubiaquercus (Van Gelder, 1959)	murciélago de cedral	Van Gelder's Bat	NT (unknown)
Rhogeessa bickhami Baird, Marchán-Rivadeneira, Pérez, and Baker, 2012	murciélago de Bickham	Bickham's Little Yellow Bat	LC (stable)
Rhogeessa io Thomas, 1903	murciélago de io	Thomas's Yellow Bat	LC (unknown)
TRIBE LASIURINI			
Aeorestes egregius (Peters, 1870)	lasiuro ilustre	Giant Red Bat	DD (unknown)
Dasypterus ega (Gervais, 1856)	lasiuro amarillo	Southern Yellow Bat	LC (unknown)
Dasypterus intermedius H. Allen, 1862	lasiuro intermedio	Northern Yellow Bat	LC (unknown)
Lasiurus frantzii Peters, 1870	lasiuro de Frantzius	Peters' Red Bat	Not assessed
Lasiurus castaneus Handley, 1960	lasiuro castaño	Tacarcuna bat	DD (unknown)
TRIBE VESPERTILIONINAE			
Eptesicus brasiliensis (Desmarest, 1819)	eptésico de Brasil	Brazilian Brown Bat	LC (unknown)
Eptesicus furinalis (d'Orbigny and Gervais, 1847)	eptésico furioso	Argentine Brown Bat	LC (unknown)
Eptesicus fuscus (Palisot de Beauvois, 1796)	eptésico pardo	Big Brown Bat	LC (increasing)
Eptesicus chiriquinus Thomas, 1920	eptésico de Chiriquí	Chiriquí Brown Bat	LC (unknown)
SUBFAMILY MYOTINAE			
Myotis albescens (É. Geoffroy St.-Hilaire, 1806)	mioto blanquecino	Silver-tipped Myotis	LC (stable)
Myotis armiensis Carrión-Bonilla and Cook 2020	mioto de Armién	Armien's Myotis	Not assessed
Myotis elegans Hall, 1962	mioto elegante	Elegant Myotis	LC (unknown)
Myotis pilosatibialis LaVal, 1973	mioto peludo	Northern Hairy-legged Myotis	Not assessed
Myotis nigricans (Szhinz, 1821)	mioto negruzco	Common Black Myotis	LC (stable)
Myotis oxyotus (Peters, 1866)	mioto oreja roja	Montane Myotis	LC (unknown)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Myotis riparius Handley, 1960	mioto ribereño	Riparian Myotis	LC (stable)
FAMILY MOLOSSIDAE			
SUBFAMILY MOLOSSINAE			
Cynomops greenhalli Goodwin, 1958	moloso de Greenhall	Greenhall's Dog-faced Bat	LC (unknown)
Cynomops mexicanus (Jones and Genoways, 1967)	moloso mexicano	Mexican Dog-faced Bat	LC (unknown)
Eumops auripendulus (G. Shaw, 1800)	mops negro	Shaw's Mastiff Bat	LC (unknown)
Eumops ferox Gundlach, 1861	mops feroz	Fierce Bonneted Bat	LC (stable)
Eumops glaucinus (Wagner, 1843)	mops grisaceo	Wagner's Bonneted Bat	LC (unknown)
Eumops hansae Sanborn, 1932	mops mercader	Sanborn's Bonneted Bat	LC (unknown)
Eumops nanus (Miller, 1900)	mops enano	Dwarf Bonneted Bat	LC (stable)
Eumops underwoodi Goodwin, 1940	mops de Underwood	Underwood's Bonneted Bat	LC (unknown)
Molossus alvarezi González-Ruiz, Ramírez-Pulido y Arroyo-Cabrales,2011	moloso de Álvarez	Alvarez's Mastiff Bat	DD (unknown)
Molossus aztecus Saussure, 1860	moloso azteca	Aztec Mastiff Bat	LC (decreasing)
Molossus bondae J. A. Allen, 1904	moloso de Bonda	Bonda Mastiff Bat	LC (stable)
Molossus coibensis J. A. Allen, 1904	moloso de Coiba	Coiban Free-tailed Bat	LC (unknown)
Molossus molossus (Pallas, 1766)	moloso moloso	Pallas' Free-tailed Bat	LC (unknown)
Molossus nigricans Miller, 1902	moloso negro	Northern Black Mastiff Bat	Not assessed
Molossus pretiosus Miller, 1902	moloso valioso	Miller's Mastiff Bat	LC (unknown)
Nyctinomops laticaudatus (É. Geoffroy St.-Hilaire, 1805)	murciélago de cola ancha	Broad-eared Free-tailed Bat	LC (unknown)
Nyctinomops aurispinosus (Peale, 1849)	murciélago de espinas doradas	Peale's Free-tailed Bat	LC (unknown)
Nyctinomops macrotis (Gray, 1839)	murciélago orejudo	Big Free-tailed Bat	LC (unknown)
Promops centralis Thomas, 1915	mastín central	Big-crested Mastiff Bat	LC (unknown)
Tadarida brasiliensis (I. Geoffroy St.-Hilaire, 1824)	tadárida de Brasil	Brazilian Free-tailed Bat	LC (stable)
ORDER PRIMATES			
FAMILY CEBIDAE			
SUBFAMILY CEBINAE			
TRIBE CEBINI			
Cebus imitator Thomas, 1903	mono carablanca, carilla	Panamanian White-throated Capuchin	VU (decreasing)
SUBFAMILY SAIMIRIINAE			
TRIBE SAIMIRIINI			
Saimiri oerstedii (Voigt, 1831)	tití, mono ardilla	Black-crowned Central American Squirrel Monkey	EN (decreasing)
FAMILY ATELIDAE			

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
SUBFAMILY ALOUATTINAE			
Alouatta palliata (Gray, 1849)	mono congo, mono aullador	Mantled Howler	EN (decreasing)[1]
SUBFAMILY ATELINAE			
Ateles geoffroyi Kuhl, 1820	mono colorado, mono araña	Ornate Spider Monkey	VU (decreasing)[2]
ORDER RODENTIA			
SUBORDER SCIUROMORPHA			
FAMILY SCIURIDAE			
SUBFAMILY SCIURINAE			
Echinosciurus deppei Peters, 1863	chiza, ardilla	Deppe's Squirrel	LC (stable)
Echinosciurus variegatoides Ogilby, 1839	chiza, ardilla, tuche	Variegated Squirrel	LC (stable)
Microsciurus alfari (J. A. Allen, 1895)	chiza, ardilla,	Central American Dwarf Squirrel	LC (stable)
Syntheosciurus brochus Bangs, 1902	chiza de montaña	Bangs' Mountain Squirrel	DD (decreasing)
Syntheosciurus granatensis Humboldt, 1811	chiza, ardilla roja	Red Tailed Squirrel	LC (stable)
SUBORDER CASTORIMORPHA			
FAMILY GEOMYIDAE			
Heterogeomys cavator (Bangs, 1902)	taltuza gigante	Chiriquí Pocket Gopher	Not assessed
Heterogeomys cherriei (J. A. Allen, 1893)	taltuza de Cherrie	Cherrie's Pocket Gopher	LC (stable)
Heterogeomys heterodus (Peters, 1865)	taltuza	Variable Pocket Gopher	Not assessed
Heterogeomys underwoodi Osgood, 1931	taltuza de Underwood	Underwood's Pocket Gopher	Not assessed
FAMILY HETEROMYIDAE			
SUBFAMILY HETEROMYINAE			
Heteromys desmarestianus Gray, 1868	guardafiesta de mochila	Desmarest's spiny pocket mouse	LC (stable)
Heteromys nubicolens Anderson and Timm, 2006	guardafiesta nuboso		Not assessed
Heteromys oresterus Harris, 1932	guardafiesta de montaña	Mountain Spiny Pocket mouse	LC (stable)
Heteromys salvini Thomas, 1893	guardafiesta	Salvin's Spiny Pocket Mouse	LC (decreasing)
SUBORDER MYOMORPHA			
FAMILY CRICETIDAE			
SUBFAMILY SIGMODONTINAE			
TRIBE ICHTHYOMYINI			
Ichthyomys tweedii Anthony (1921)	rata cangrejera	Tweedy's Crab-eating Rat	DD (unknown)
Rheomys raptor Goldman, 1912	rata de agua	Goldman's Water Mouse	LC (stable)
Rheomys underwoodi Thomas, 1906	rata acuática de Underwood	Underwood's Water Mouse	LC (stable)
TRIBE ORYZOMYINI			

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Handleyomys alfaroi (J. A. Allen, 1891)	arrocero de Alfaro	Alfaro's Rice Rat	LC (stable)
Melanomys chrysomelas (J. A. Allen, 1897)	rata negridorada		Not assessed
Nephelomys devius (Bangs, 1902)	ratón arrocero	Boquete Rice Rat	LC (stable)
Oligoryzomys costaricensis (Saussure, 1860)	ratón enano	Fulvous Pygmy Rice Rat	Not assessed
Oligoryzomys vegetus (Bangs, 1902)	ratón pigmeo	Sprightly Pygmy Rice Rat	LC (stable)
Oryzomys couesi (Alston, 1877)	arrocero de Coues	Coues's Rice Rat	LC (unknown)
Oecomys trinitatis (Allen and Chapman, 1893)	rata de árbol	Long-furred Rice Rat	LC (stable)
Sigmodontomys alfari J. A. Allen, 1897	rata ocrosa	Alfaro's Rice Water Rat	LC (stable)
Tanyuromys aphrastus (Harris, 1932)	rata colilarga	Harris' Rice Water Rat	DD (unknown)
Transandinomys bolivaris (J. A. Allen, 1901)	arrocero bigotudo	Long-whiskered Rice Rat	LC (stable)
Transandinomys talamancae (J. A. Allen, 1891)	arrocero de Talamanca	Talamanca Rice Rat	LC (stable)
Zygodontomys brevicauda (Allen and Chapman, 1893)	cañera cola corta	Short-tailed Cane Mouse	LC (stable)
TRIBE SIGMODONTINI			
Sigmodon hirsutus (Burmeister, 1854)	rata cañera	Southern Cotton Rat	LC (increasing)
SUBFAMILY TYLOMYINAE			
Nyctomys sumichrasti (de Saussure, 1860)	rata vespertina	Sumichrast's Vesper Rat	LC (stable)
Ototylomys phyllotis Merriam, 1901	rata orejuda	Big-eared Climbing Rat	LC (stable)
Tylomys watsoni Thomas, 1899	rata trepadora	Watson's Climbing Rat	LC (stable)
SUBFAMILY NEOTOMINAE			
TRIBE BAIOMYINI			
Scotinomys teguina (Alston, 1877)	cantor pardo	Short-tailed Singing Mouse	LC (stable)
Scotinomys xerampelinus (Bangs, 1902)	cantor hediondo	Long-tailed Singing mouse	LC (stable)
TRIBE REITHRODONTOMYINI			
Peromyscus nicaraguae (J. A. Allen, 1908)	ratón patas blancas	Nicaraguan Deermouse	Not assessed
Peromyscus nudipes J. A. Allen, 1891	ratón patas blancas de altura	Naked-footed Deermouse	Not assessed
Reithrodontomys brevirostris Goodwin, 1943	cosechero ñato	Short-nosed Harvest Mouse	LC (stable)
Reithrodontomys cherrii J. A. Allen, 1891	cosechero de Cherrie	Cherrie's Harvest mouse	Not assessed
Reithrodontomys creper Bangs, 1902	cosechero pardo	Chiriquí Harvest Mouse	LC (stable)
Reithrodontomys garichensis Enders and Pearson, 1940	cosechero de Gariché	Gariché Harvest Mouse	Not assessed
Reithrodontomys gracilis Allen and Chapman, 1897	cosechero largo		LC (stable)
Reithrodontomys cf. mexicanus (de Saussure, 1860)	cosechero mexicano	Mexican Harvest Mouse	LC (stable)[3]

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Reithrodontomys musseri Gardner and Carleton, 2009	cosechero de Musser	Small Harvest Mouse	DD (unknown)
Reithrodontomys paradoxus Jones and Genoways, 1970	cosechero	Nicaraguan Harvest Mouse	DD (unknown)
Reithrodontomys rodriguezi Goodwin, 1943	cosechero de Rodríguez	Rodriguez's Harvest Mouse	LC (stable)
Reithrodontomys sumichrasti (Saussure, 1861)	cosechero leonado	Sumichrast's Harvest Mouse	LC (stable)
FAMILY MURIDAE [all invasive]			
Mus musculus Linnaeus 1758	ratón casero	House Mice	LC (stable)
Rattus norvegicus Berkenhout 1769	rata casera	Brown Rat	LC (stable)
Rattus rattus Linnaeus 1758	rata de caño	Black Rat	LC (stable)
SUBORDER HYSTRICOMORPHA			
FAMILY CUNICULIDAE			
Cuniculus paca (Linnaeus, 1766)	tepezcuinte	Agouti	LC (stable)
FAMILY DASYPROCTIDAE			
Dasyprocta punctata Gray, 1842	guatusa, cherenga	Central American Agouti	LC (stable)
FAMILY ECHIMYDAE			
Diplomys labilis (Bangs, 1901).	rata espinosa arborícola	Rufous Tree Rat	LC (stable)
Hoplomys gymnurus (Thomas, 1897)	rata espinosa	Armored Rat	LC (stable)
Proechimys semispinosus (Tomes, 1860)	yiso	Tome's Spiny Rat	LC (stable)
FAMILY ERETHIZONTIDAE			
Coendou mexicanus (Kerr, 1792)	puercoespín, cuerpoespín	Mexican Hairy Dwarf Porcupine	LC (unknown)
ORDER LAGOMORPHA			
FAMILY LEPORIDAE			
SUBFAMILY LEPORINAE			
Sylvilagus dicei Harris, 1932	conejo de monte	Dice's Cottontail	VU (decreasing)
Sylvilagus gabbi (J. A. Allen, 1877)	conejo de monte	Costa Rica Forest Rabbit	LC (unknown)
Sylvilagus hondurensis Goldman, 1932	conejo de monte	Honduran Cottontail	Not assessed
ORDER CARNIVORA			
SUBORDER FELIFORMIA			
FAMILY FELIDAE			
SUBFAMILY FELINAE			
Herpailurus yagouaroundi Schreber 1777	león breñero, yaguarundí o yaguarundi	Jaguarundi	LC (decreasing)
Leopardus pardalis (Linnaeus, 1758)	manigordo, ocelote	Ocelot	LC (decreasing)
Leopardus tigrinus (Schreber, 1775)	tigrillo	Northern Tiger Cat	VU (decreasing)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Leopardus wiedii (Schinz, 1821)	caucel	Margay	NT (decreasing)
Puma concolor (Linnaeus, 1771)	puma, león, león de montaña	Puma	LC (decreasing)
SUBFAMILY PANTHERINAE			
Panthera onca (Linnaeus, 1758)	jaguar, tigre	Jaguar	NT (decreasing)
SUBORDER CANIFORMIA			
FAMILY CANIDAE			
Canis latrans Say, 1823	coyote	Coyote	LC (increasing)
Speothos venaticus Lund, 1842	perro vinagrero, perro de monte	Bush Dog	NT (decreasing)
Urocyon cinereoargenteus (Schreber, 1775)	zorra gris, tigrillo	Gray Fox	LC (stable)
FAMILY PROCYONIDAE			
Bassaricyon gabbii J. A. Allen, 1876	martilla, olingo, cacomixtle	Northern Olingo	LC (decreasing)
Bassariscus sumichrasti (Saussure, 1860)	ostoche	Cacomistle	LC (unknown)
Nasua narica (Linnaeus, 1766)	pizote, pizote solo	White-Nosed Coati	LC (decreasing)
Potos flavus (Schreber, 1774)	martilla	Kinkajou	LC (decreasing)
Procyon cancrivorus (G. Cuvier, 1798)	mapache cangrejero	Crab-eating Raccoon	LC (decreasing)
Procyon lotor (Linnaeus, 1758)	mapache, mapachín, osito lavador	Raccoon	LC (increasing)
FAMILY MEPHITIDAE			
SUBFAMILY MEPHITINAE			
Conepatus semistriatus (Boddaert, 1785)	zorrillo hediondo	Striped Hog-nosed Skunk	LC (unknown)
Mephitis macroura Lichtenstein, 1832	mofeta, zorrillo	Hooded Skunk	LC (increasing)
Spilogale angustifrons Howell, 1902	zorrillo manchado	Southern Spotted Skunk	LC (stable)
FAMILY MUSTELIDAE			
SUBFAMILY GULONINAE			
Eira barbara (Linnaeus, 1758)	tolomuco, cholomuco	Tayra	LC (decreasing)
SUBFAMILY ICTONYCHINAE			
Galictis vittata (Schreber, 1776)	grisón	Greater Grison	LC (stable)
SUBFAMILY LUTRINAE			
Lontra longicaudis (Olfers, 1818)	nutria, perro de agua	Neotropical Otter	NT (decreasing)
SUBFAMILY MUSTELINAE			
Neogale frenata (Lichtenstein, 1831)	comadreja	Long-tailed Weasel	LC (stable)
FAMILY OTARIIDAE			
Arctocephalus galapagoensis Heller, 1904	león marino de Galápagos	Galapagos Fur Seal	EN (decreasing)
Zalophus californianus (Lesson, 1828)	león marino de California	California Sea Lion	LC (increasing)
Zalophus wollebaeki Sivertsen, 1953	león marino de Wollebaek	Galápagos Sea Lion	EN (decreasing)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
ORDER SIRENIA			
FAMILY TRICHECHIDAE			
Trichechus manatus Linnaeus, 1758	manatí, vaca marina	West Indian Manatee	VU (decreasing)
ORDER PERISSODACTYLA			
FAMILY TAPIRIDAE			
Tapirus bairdii (Gill, 1865)	danta, danto, macho de monte, tapir	Central American Tapir	EN (decreasing)
ORDER ARTIODACTYLA			
SUBORDER RUMINANTIA			
FAMILY CERVIDAE			
SUBFAMILY CAPREOLINAE			
TRIBE ODOCOILEINI			
Mazama temama (Kerr, 1792)	cabro de monte	Central American Red Brocket Deer	DD (decreasing)
Odocoileus virginianus (Zimmermann, 1780)	venado, venado cola blanca	White-tailed Deer	LC (stable)
SUBORDER SUINA			
FAMILY TAYASSUIDAE			
Dicotyles tajacu (Linnaeus, 1758)	saíno, zaino	Collared Peccary	LC (stable)
Tayassu pecari (Link, 1795)	cariblanco, chancho de monte	White-lipped Peccary	VU (decreasing)
SUBORDER WHIPPOMORPHA			
FAMILY DELPHINIDAE			
Delphinus delphis Linnaeus, 1758	delfín, bufeo	Common Dolphin	LC (unknown)
Feresa attenuata Gray, 1875	orca enana	Pygmy Killer Whale	LC (unknown)
Globicephala macrorhynchus Gray, 1846	ballena piloto	Short-finned Pilot Whale	LC (unknown)
Grampus griseus Cuvier, 1812	delfín gris	Risso's Dolphin	LC (unknown)
Lagenodelphis hosei Fraser, 1956	delfín de Hose	Sarawak Dolphin	LC (unknown)
Orcinus orca Linnaeus, 1758	orca, ballena asesina	Orca	DD (unknown)
Peponocephala electra Gray, 1846	calderón pequeño	Melon-headed Whale	LC (unknown)
Pseudorca crassidens Owen, 1846	falsa orca	False Killer Whale	NT (unknown)
Sotalia guianensis (van Bénéden, 1864)	delfín costero	Guiana Dolphin	NT (unknown)
Stenella attenuata Gray, 1846	delfín manchado	Pantropical Spotted Dolphin	LC (unknown)
[5]*Stenella clymene* Gray, 1850	delfín clímene	Clymene Dolphin	LC (unknown)
Stenella coeruleoalba Meyen, 1833	delfín azul	Striped Dolphin	LC (unknown)
Stenella frontalis Cuvier, 1829	delfín manchado del Atlántico	Atlantic Spotted Dolphin	LC (unknown)
Stenella longirostris Gray, 1828	delfín girador	Spinner Dolphin	VU (increasing)[4]
Steno bredanensis Lesson, 1828	delfín de dientes ásperos	Rough-toothed Dolphin	LC (unknown)

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TABLE 2. (Continued)

Species (within their corresponding higher taxonomic rank)	Nombre en español	Name in English	IUCN status
Tursiops truncatus Montagu, 1821	Tursión, delfín hocico de botella	Common Bottlenose Dolphin	LC (unknown)
FAMILY PHYSETERIDAE			
Physeter macrocephalus Linnaeus, 1758	cachalote	Sperm Whale	VU (unknown)
FAMILY KOGIIDAE			
[5]*Kogia breviceps* de Blainville, 1838	cachalote pigmeo	Pygmy Sperm Whale	LC (unknown)
Kogia sima Owen, 1866	cachalote enano	Dwarf Sperm Whale	LC (unknown)
FAMILY ZIPHIIDAE			
Indopacetus pacificus (Longman, 1926)	zifio de Longman	Longman's Beaked Whale.	LC (unknown)
Mesoplodon densirostris de Blainville, 1817	zifio de Blainville	Dense-beaked Whale	LC (unknown)
[5]*Mesoplodon europaeus* Gervais, 1855	zifio de Gervais	Gervais' Beaked Whale	LC (unknown)
[5]*Mesoplodon ginkgodens* (Nishiwaki and Kamiya, 1958)	ballena picuda de Ginkgo	Sowerby's Beaked Whale	DD (unknown)
Mesoplodon peruvianus Reyes, Mead, and Van Waerebeek, 1991	zifio peruano, zifio menor	Peruvian Beaked Whale	LC (unknown)
Ziphius cavirostris Cuvier, 1823	zifio careto	Cuvier's Beaked Whale	LC (unknown)
FAMILY BALAENOPTIDAE			
Balaenoptera acutorostrata Lacépède, 1804	rorcual aliblanco, ballena minke	Common Minke Whale	LC (unknown)
Balaenoptera borealis Lesson, 1828	rorcual norteño	Sei Whale	EN (increasing)
Balaenoptera brydei Olsen, 1913	rorcual de Bryde	Large Bryde's whale	Not assessed
Balaenoptera musculus Linnaeus, 1758	ballena azul	Bue Whale	EN (increasing)
Balaenoptera physalus Linnaeus, 1758	rorcual careto	Fin Whale	VU (increasing)
Megaptera novaeangliae Borowski, 1781	ballena jorobada, yubarta	Humpback Whale	LC (increasing)

Footnotes:

1. Refers to *Alouatta palliata palliata*, the subspecies predominantly distributed throughout Costa Rica. The species as a whole is listed as "Vulnerable" with decreasing populations.
2. Refers to *Ateles geoffroyi ornatus*, the subspecies predominantly distributed throughout Costa Rica. The species as a whole is listed as "Endangered", with decreasing population numbers.
3. This status is unlikely to apply to populations that eventually will be described and named from the *Reithrodontomys mexicanus* species complex in Costa Rica, given how range restricted these appear to be. Rather, it applies to the nominate species in the group.
4. This conservation assessment refers to *Stenella longirostris orientalis*, the putative taxon hypothesized to occupy the eastern tropical Pacific, including the Pacific coast of Costa Rica. The detailed basis for the assessment is presented in Hammond *et al.* (2012). Atlantic populations are considered in the category of "Least Concern", with an unknown population trend.
5. Although these species have no official records from Costa Rica, their distribution encompasses territorial waters of Costa Rica.

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