

Ecography

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Supplementary material

1 **APPENDIX 1.**—Gazetteer and specimens examined. Below we list the localities and specimens of
2 *Marmosa robinsoni* and *M. xerophila* employed in this study. We report data verbatim from specimen
3 tags for cases in which specimens were examined ourselves and follow Rossi et al. (2010) otherwise.
4 Elevation, geographic coordinates, and sources for coordinates are indicated in brackets. Elevational
5 data (if any) are reproduced verbatim from either specimen tags or Rossi et al. (2010) in meters (m).
6 For each entry, boldface type indicates the place name to which geographic coordinates correspond.
7 Literature, maps, and other sources used to georeference localities are indicated within brackets,
8 and the corresponding citations appear in Appendix 2. Estimated georeferencing error is indicated
9 for each entry in kilometers (km). Note that most historical collectors typically collected specimens
10 1–2 km from their camp, despite providing a single locality description for that site. Hence, in
11 addition to the estimated georeferencing error noted here, specimens likely came from somewhere
12 within a slightly larger radius (in contrast to estimated errors including such “roaming distance,” e.g.
13 Anderson 2003; Anderson and Gutiérrez 2009). Museum catalog numbers for specimens examined
14 (either by us or by Rossi et al. 2010) follow each locality, using the following institutional
15 abbreviations: AMNH, American Museum of Natural History (New York); BMNH, Natural History
16 Museum (London); CVULA, Colección de Vertebrados de la Universidad de los Andes (Mérida);
17 EBRG, Museo de la Estación Biológica de Rancho Grande (Maracay); FMNH, Field Museum of
18 Natural History (Chicago); MHNLS, Museo de Historia Natural La Salle (Caracas); MBUCV, Museo
19 de Biología de la Universidad Central de Venezuela (Caracas); MCZ, Museum of Comparative
20 Zoology, Harvard University (Cambridge); MVZ, Museum of Vertebrate Zoology, University of
21 California (Berkeley); USNM, United States National Museum of Natural History (Washington,
22 DC). Early specimens in the AMNH for which the osteological portion was cataloged in a separate
23 numbering sequence from the skin are indicated as skin number/osteological number. Localities that
24 were not used in analyses because they fell outside the environmental grids (numbers: 29, 37, 99,

25 150, 151, 186) or because of their large georeferencing error (numbers: 48, 79, 94, 105, 146, 162) are
26 listed here as well.

27

28 *Marmosa robinsoni*

29 COLOMBIA

30 ATLÁNTICO

31 1. **Barranquilla** [ca. 100 m, 10°59'N, 74°48'W; Paynter 1997], MVZ 135234–135243;

32 "**Barranquilla**" [place of shipment]: MVZ 183339; Vicinity **Barranquilla**: MVZ 183334–
33 183338. Georeference error: ca. 2 km.

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35 BOLÍVAR

36 2. **San Juan Nepomuceno** [167 m, 09°57'N, 75°05'W; Paynter 1997], FMNH 69315.

37 Georeference error: ca. 2 km.

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39 CESAR

40 3. Río Cesar [=**El Orinoco**; 158 m, 10°13'N, 73°23'W; Hershkovitz 1960], USNM 280820,

41 280886–280888; Río Guaimaral [=El Guaimaral, 5 km from **El Orinoco**; coordinates

42 correspond to **El Orinoco**, which is located 5 km from El Guaimaral; see Hershkovitz 1960;

43 Anderson 2003], USNM 280817, 280819. Georeference error: ca. 1 km.

44 4. **Colonia Agrícola de Caracolicito** [400 m, 10°18'N, 74°00'W; Hershkovitz 1947], USNM

45 280806. Georeference error: ca. 1 km.

46 5. **El Salado** [430 m, 10°22'N, 73°29'W; Hershkovitz 1947], USNM 280814–280816. Georeference

47 error: ca. 1 km.

48 6. **Pueblo Bello** [1067 m, 10°24'N, 73°39'W; Hershkovitz 1947], USNM 280807–280813.

49 Georeference error: ca. 1 km.

50 7. **San Sebastián** [1900–2000 m, 10°37'N, 73°34'W; Hershkovitz 1947], FMNH 69320, 69321.

51 Georeference error: ca. 1 km.

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53

CUNDINAMARCA

54 8. **Bogotá** [2590 m, 05°26'N, 74°34'W; Hernández-Camacho, 1956 (but see Anderson, 1999;

55 Anderson 2003) clarified that this locality corresponded to "*Volcanes, cerca a la cabecera del*
56 *corregimiento de Córdoba, Municipio de Caparrapí, Departamento de Cundinamarca; vertiente occidental de*
57 *la Cordillera Oriental. Colombia. Alt. 250 metros*"; not Rossi et al. 2010, who provided
58 coordinates for Bogotá (at an elevation of 2590 m) missing the mention of "*Volcanes*" on the
59 oldest museum tag tied to the specimen], AMNH 143521. Georeference error: ca. 2 km.

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HUILA

62 9. Valle de Suaza, **Naranjal** [02°01'N, 75°51'W; NGA 2010], USNM 541857–541861, 543120.

63 Georeference error: ca. 2 km.

64 10. **7.5 km E Villavieja** [488 m, 03°14'N, 75°10'W; GE 2010], specimens from this locality were

65 reported by Rossi et al. 2010 under locality "*16 km NE Villavieja*" (see below). Georeference
66 error: ca. 1 km.

67 11. **5 km N Villavieja** [488 m, 03°16'N, 75°12'W; IGAC 1985a], specimens from this locality were

68 reported by Rossi et al. 2010 under locality "*16 km NE Villavieja*" (see below). Georeference
69 error: ca. 1 km.

70 12. **16 km NE Villavieja** [488 m, 03°21'N, 75°10'W; IGAC 1985a], MVZ 113366, 113367,

71 113833–113840. Georeference error: ca. 1 km.

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LA GUAJIRA

74 13. Sierra Negra, **Villanueva**, Valledupar District [274 m, 10°37'N, 72°58'W; Hershkovitz 1960],

75 USNM 280821–280852; **Villanueva**, Valledupar District, USNM 280853–280875.

76 Georeference error: ca. 1 km.

77 14. **Las Marimondas**, Fonseca District [1000 m, 10°52'N, 72°43'W; Hershkovitz 1947],

78 USNM280876–280880, 280882, 280883, 280885. Georeference error: ca. 1 km.

79 15. **San Miguel** [1700 m, 10°58'N, 73°29'W; Paynter 1997], FMNH 18506. Georeference error: ca.

80 1 km.

81 16. Santa Marta, **Pueblo Viejo** [610 m, 10°59'N, 73°10'W; IGAC 1988; see Anderson 2003],

82 FMNH 18508. Georeference error: ≤ 5 km.

83 17. **Pueblo Viejo [=El Pueblito]**; 610 m, 10°59'N, 73°27'W; IGAC 1988; see Anderson 2003],

84 FMNH 18509; BMNH 9.4.15.18–9.4.15.20; MCZ B8117–B8122, B8123, B8125–B8127,

85 B8132, B8143; USNM 85531, 85532. Georeference error: ≤ 5 km.

86 18. **La Concepción** [ca. 800 m, 11°03'N, 73°27'W; Paynter 1997; not Rossi et al. 2010], FMNH

87 18507. Georeference error: ca. 1 km.

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89

MAGDALENA

90 19. **Palomino** [ca. 600 m, 11°02'N, 73°39'W; Paynter 1997], USNM 85533. Georeference error: ca.

91 1 km.

92 20. **Minca** [670 m, 11°09'N, 74°07'W; Paynter 1997], AMNH 23293. Georeference error: ca. 1 km.

93 21. **Bonda** [46 m, 11°14'N, 74°08'W; Paynter 1997], AMNH 14610, 14611, 15357–15361, 23273–

94 23276, 23280, 23281, 23292, 23627. Georeference error: ca. 1 km.

95 22. **Mamatoco** [ca. 25 m, 11°14'N, 74°10'W; Paynter 1997], AMNH 15362. Georeference error: ca.
96 1 km.

97 23. **Taganga** [0 m, 11°16'N, 74°12'W; Paynter 1997], AMNH 15363. Georeference error: ca. 1 km.

98

99

NORTE DE SANTANDER

100 24. Cucuta, 10 mi N [=10 miles N **Cúcuta**; 215 m, 08°02'N, 72°08'W; IGAC 1985b], FMNH
101 18692. Georeference error: ca. 1 km.

102

103

TOLIMA

104 25. Madalegna River, **Honda** [183 m, 05°12'N, 74°45'W; Paynter 1997], AMNH 34602–34604.
105 Georeference error: ca. 1 km.

106 26. **Mariquita** [535 m, 05°12'N, 74°54'W; Paynter 1997], AMNH 207766. Georeference error: ca. 1
107 km.

108

109

GRENADA

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SAINT GEORGE

111 27. Annandale [=Annandale **waterfalls**; 12°05'N, 61°43'W; NGA 2010], BMNH 87.6.30.5.
112 Georeference error: ca. 1 km.

113

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PANAMA

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CANAL ZONE

116 28. **Fort Kobbe** [08°54'N, 79°36'W; Fairchild and Handley 1966], USNM 298697, 298698, 300329,
117 300330, 301141, 303049. Georeference error: ca. 1 km.

118 29. **Quarry Heights** [08°57'N, 79°34'W; Fairchild and Handley 1966], USNM 303281–303283.

119 Georeference error: ca. 1 km.

120 30. 8 km W Balboa, **Rodman Naval Ammo** [=Ammunition] **Depot** [=Rodman Naval Station;

121 08°57'N, 79°37'W; Fleming 1970], USNM 456818, 456822. Georeference error: ca. 1 km.

122 31. **Miraflores** [08°59'N, 79°36'W; Fairchild and Handley 1966], USNM 396415. Georeference

123 error: ca. 1 km.

124

125 CHIRIQUÍ

126 32. **2 mi NE Tolé** [08°15'N, 81°39'W; GE 2010], USNM 331071. Georeference error: ca. 2 km.

127 33. **Colorado Camp.** [=Campamento Cerro Colorado; 08°29'N, 81°48'W; GE 2010], USNM

128 541324. Georeference error: ca. 2 km.

129 34. **23–25 km NNE San Felix** [=Near Escopeta Camp; 08°30'N, 81°47'W; Rossi et al. 2010],

130 USNM 541000, 541002. Georeference error: ca. 4 km.

131 35. **Finca Santa Clara, 14.5 km NW El Volcán** [08°51'N, 82°45'W; GE 2010], USNM 520772.

132 Georeference error: ca. 2 km.

133

134 COCLÉ

135 36. **2 mi E Río Hato** [08°23'N, 80°08'W; GE 2010; also see Fairchild and Handley 1966], USNM

136 331069. Georeference error: ca. 2 km.

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138 PANAMÁ

139 37. **Saboga Island** [08°37'N, 79°04'W; GE 2010], MCZ 10809. Georeference error: ca. 2 km.

140 38. **4 mi E, 1 mi S Pacora** [09°04'N, 79°14'W; GE 2010], USNM 305146. Georeference error: ca.

141 4 km.

142

143

VERAGUAS

144 39. **Río Santa María, Santa Fé** [08°31'N, 81°04'W; Fairchild and Handley 1966], USNM 304696–

145 304709. Georeference error: ca. 1 km.

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TRINIDAD & TOBAGO

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TOBAGO

149 40. **Speyside** [11°18'N, 60°32'W; Anderson and Gutiérrez 2009], AMNH 184845, 184846, 184848,

150 184849. Georeference error: ca. 3 km.

151 41. **1 km E Charlotteville** [11°19'N, 60°32'W; GE 2010; Rossi et al. 2010 combined this locality

152 with "Near Charlotteville"], AMNH 259973, 259983; USNM 537898, 537899, 538075–

153 538078. Georeference error: ca. 1 km.

154

155

TRINIDAD

156 42. **Brazil village** [10°33'N, 61°17'W; GE 2010], AMNH 208997, 208998. Georeference error: ca.

157 3 km.

158 43. **Bush Bush Forest** [10°24'N, 61°03'W; Downs et al. 1968; Rossi et al. 2010 combined this

159 locality with "Nariva Swamp, **Bush Bush Forest**"; Nariva Swamp, **Bush Bush Forest**]

160 AMNH 188357, 189314–189316, 204855–204857, 206595–206597, 206761, 206762,

161 206764–206768. Georeference error: ca. 2 km.

162 44. **Caparo** [10°27'N, 61°19'W; Anderson and Gutiérrez 2009], AMNH 7426, 7429, 7660/6046–

163 7664/6050. Georeference error: ca. 3 km.

- 164 45. **Caura** [10°43'N, 61°21'W; Anderson and Gutiérrez 2009], AMNH 7665/6051, 7666/6052,
165 7667/6053–7670/6056, 7672/6058, 7674/6060–7676/6062; USNM 85556; **Caura** Mts.,
166 AMNH 7430. Georeference error: ca. 3 km.
- 167 46. Cedros [10°05'N, 61°51'W; O.S. 1930; coordinates correspond to **Bonasse**, near Cedros Bay],
168 AMNH 234960, 234961; Cedros Ward, Cedros, St. Patrick Co, AMNH 214424.
169 Georeference error: ca. 5 km.
- 170 47. **Cumaca** [10°42'N, 61°10'W; Anderson and Gutiérrez 2009; Rossi et al. 2010 lumped this
171 locality with "Valencia Ward, **Cumaca**, St. Andrew"], AMNH 188354, 208996, 208999–
172 209003, 212128–212130, 214425–214438, 214444, 234963–234970. Georeference error: ca.
173 4 km.
- 174 48. El Cerro del Oropuche [10°46'N, 61°09'W; NGA 2010], AMNH 31229–31231. Georeference
175 error: ca. 12 km.
- 176 49. **Fishing Pond** [10°35'N, 61°03'W; Anderson and Gutiérrez 2009], AMNH 173997.
177 Georeference error: ca. 4 km.
- 178 50. **Prinestown [=Princes Town; 10°16'N, 61°23'W; Anderson and Gutiérrez 2009], AMNH**
179 4799–4802, 6046, 6049, 6121, 6123, 6045/4767, 6047/4768, 6048/47669, 6050/4770–
180 6053/4773, 6055/4775, 6056/4776, 6058/4778. Georeference error: ca. 4 km.
- 181 51. **Sangre Grande** [10°35'N, 61°07'W; Anderson and Gutiérrez 2009], AMNH 173984, 173996,
182 174000, 174007, 174008, 174012, 174162, 188356; El Reposo Rd., **Sangre Grande**, AMNH
183 173990; Maingot Estate, 5 miles from **Sangre Grande**, AMNH 173998. Georeference error:
184 ca. 10 km.
- 185 52. Tamana Ward, **Cumuto**, St. Andrew [10°35'N, 61°12'W; Anderson and Gutiérrez 2009],
186 AMNH 212303–212305. Georeference error: ca. 3 km.
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VENEZUELA

ANZOÁTEGUI

53. **Mamo** [08°28'N, 63°06'W; Gardner 2008], MHNLS 6463. Georeference error: ca. 2 km.

54. Paso "**Los Cocos**" Río Caris S de El Trigre [08°36'N, 64°04'W; Anderson and Gutiérrez 2009],

MBUCV 3131–3134; Sabana "**Los Cocos**", Río Caris, S El Tigre, MBUCV 3135.

Georeference error: ca. 2 km.

55. **Morichal Largo** [=Río Morichal Largo], límite de los Estados Anzoátegui y Monagas

[08°46'N, 63°13'W; SAGCN 1996], MHNLS 5611, 5612. Georeference error: ca. 5 km.

56. **Hato Real Campo Matas** [09°22'N, 64°02'W; collector's label], EBRG 24174. Georeference

error: < 5 km.

57. **Complejo De Joces, 15 km E Puerto Piritu** [10°05'N, 64°53'W; collector's label], EBRG

22811, 22812; **Quebrada Hoces 15 km E Puerto Piritu**, EBRG 22231, 22232.

Georeference error: < 5 km.

APURE

58. **Caño la Guardia, afluente del Río Capanaparo** [90 m, 06°40'N, 67°35'W; collector's label],

MHNLS 7600, 7601, 7984, 7985. Georeference error: < 5 km.

59. "Mata Salado", **Hato Acapulco**, entre Capanaparo y Arauca [07°00'N, 67°07'W; Gardner

2008], MBUCV 1423, 1424. Georeference error: ca. 5 km.

60. La Trinidad (**Hato La Trinidad de Arauca**) [07°11'N, 69°04'W; Voss 1991], MBUCV 1414,

1415. Georeference error: ca. 5 km.

61. **El Mantecal** [07°33'N, 69°09'W; Paynter 1982], CVULA I-952. Georeference error: ca. 5 km.

62. **Hato El Frío, 30 km W del Saman de Apure** [60 m, 07°43'N, 68°58'W; collector's label],

MHNLS 8234. Georeference error: < 5 km.

212 63. **Hato El Frío** [60 m, 07°49′N, 68°54′W; collector's label], MHNLS 7942; USNM 448524.

213 Georeference error: < 5 km.

214

215 ARAGUA

216 64. **Fundo Paso del Medio, 10 km ENE San Juan de los Morros** [400–458 m, 09°56′N,

217 67°16′W; collector's label], EBRG 24083–24086. Georeference error: < 5 km.

218 65. **Hacienda Macapo, Lago de Valencia** [10°08′N, 67°39′W; collector's label], EBRG 22154,

219 22158, 22159, 22390. Georeference error: < 5 km.

220 66. **Camp Rangel** [10°09′N, 67°09′W; Anderson and Gutiérrez 2009], USNM 314171.

221 Georeference error: ca. 5 km.

222 67. **Rancho Grande** [1050–1100 m, 10°21′N, 67°40′W; Anderson and Gutiérrez 2009], USNM

223 517262–517270; Parque Nacional Henri Pittier, **Rancho Grande**, Guamitas, EBRG 16903.

224 Georeference error: ca. 2 km.

225 68. **2 km NE Ocumare de La Costa** [183 m, 10°28′N, 67°45′W; DCN 1971], USNM 517271–

226 517280. Georeference error: ca. 1 km.

227

228 BARINAS

229 69. **Reserva Forestal Caparo, 30 km E del Cantón** [200 m, 07°28′N, 71°00′W; GE 2010],

230 CVULA I-6539. Georeference error: ca. 3 km.

231 70. **Reserva Forestal Ticoporo Unidad II**, Compartimiento 23 [200 m, 08°07′N, 70°50′W; Ochoa

232 *et al.* 1988; GE 2010], EBRG 15757, 15758, 15761; **Reserva Forestal Ticoporo Unidad II**,

233 Compartimiento 16, EBRG 10151, 10274; **Reserva Forestal Ticoporo Unidad II**, área

234 intervenida, EBRG 6386; **Reserva Forestal Ticoporo Unidad II**, 8 km ESE Miri, EBRG

235 15789; **Reserva Forestal Ticoporo Unidad II**, Compartimiento 23 Río Quiu, EBRG

- 236 10133–10135, 10251, 10252; **Reserva Forestal Ticoporo Unidad II**, Compartimiento 9,
237 EBRG 10284, 15762; **Reserva Forestal Ticoporo Unidad II**, Parcela 15, EBRG 6387.
238 Georeference error: ca. 5 km.
- 239 71. La Erika [=La Erica], 20 km SW Barinas [08°29'N, 70°22'W; DCN 1970], CVULA I-073.
240 Georeference error: ca. 3 km.
- 241 72. **El Irel** [90 m, 08°46'N, 70°06'W; GPS coordinates taken by T. Paparoni in 2010], CVULA I-
242 3375. Georeference error: ca. 1 km.
- 243 73. **Río Barragán [=Quebrada Barragán]**, Barinitas [440 m, 08°48'N, 70°27'W; coordinates
244 correspond to a place along the river with the indicated elevation; DCN 1975a], CVULA I-
245 0347. Georeference error: ca. 1 km.
- 246 74. La Quinta, **5 km SW Altamira** [697 m, 08°48'N, 70°32'W; DCN 1976a], USNM 418540.
247 Georeference error: ca. 1 km.
- 248 75. **Altamira de Caceres** [830 m, 08°50'N, 70°30'W; DCN 1976a], CVULA I-0847. Georeference
249 error: ca. 1 km.
- 250
- 251 BOLÍVAR
- 252 76. **Ciudad Bolívar** [ca. 100 m, 08°08'N, 63°33'W; Paynter 1982], AMNH 16132. Georeference
253 error: ca. 1 km.
- 254
- 255 CARABOBO
- 256 77. **Pira-Pira [=Pirapira]**; 09°57'N, 68°04'W; Paynter 1982], EBRG 47. Georeference error: ca. 2
257 km.
- 258 78. **El Trompillo** [ca. 500 m, 10°04'N, 67°46'W; Paynter 1982], BMNH 14.9.1.86–14.9.1.97.
259 Georeference error: ca. 1 km.

- 260 79. **Valencia** [10°11'N, 68°00'W; Paynter 1982], EBRG 125. Georeference error: > 10 km.
- 261 80. **6 km SSE Montalban, Sabana Aguirre** [562 m, 10°11'N, 68°18'W; DCN 1976b; A. L. Tuttle's
262 field notes (1967); Tuttle's corrected elevation is 562 m, not 1055 m as indicated on
263 specimen label], EBRG 3972. Georeference error: ca. 1 km.
- 264 81. **Punta Cabito**; Lago de Valencia [420 m, 10°12'N, 67°50'W; Mavárez et al. 2002], MHNLS
265 2979, 2980, 3188–3194, 3295. Georeference error: ca. 1 km.
- 266 82. **1 km E Montalban, Sanjon** [579–598 m, 10°12'N, 68°20'W; DCN 1976b; A. L. Tuttle's field
267 notes (1967); Tuttle's corrected elevation is 598 m, not 1091 m as previously indicated on
268 specimen label], EBRG 3975; 2.5 km SE Montalban, El Castaño, EBRG 3977; Montalban,
269 Potrerito, EBRG 3973, 3974, 3976, 3978. Georeference error: ca. 1 km.
- 270 83. Embalse Río Moron, **Campamento Palmichal** [10°18'N, 68°14'W; Anderson and Gutiérrez
271 2009], EBRG 17081. Georeference error: ca. 2 km.
- 272 84. Bahía de **Patanemo** [10°26'N, 67°55'W; Anderson and Gutiérrez 2009], MHNLS 3732.
273 Georeference error: ca. 3 km.
- 274 85. **San Esteban** [ca. 200 m, 10°26'N, 68°01'W; Paynter 1982], AMNH 31532; BMNH
275 11.5.25.178–11.5.25.183, 11.5.25.184, 11.5.25.185, 11.5.25.187; **San Esteban** Valley: BMNH
276 11.5.25.186. Georeference error: ca. 1 km.
- 277 86. **Caño Alpargatón**, Petroquímica de Moron [10°28'N, 68°15'W; DCN 1976a], MBUCV 4078;
278 La Batea, 5 km SO [SW] de Moron, MBUCV 4097, 4101–4104. Georeference error: ca. 3
279 km.
- 280 87. **10 km NO [NW] Urama, Río Yaracuy** [125 m, 10°32'N, 68°23'W; DCN 1983; not Rossi et
281 al. 2010], EBRG 3959. Georeference error: ca. 2 km.

282 88. **El Central**, 10 km NW Urama, Río Yaracuy [25 m, 10°33'N, 68°25'W; Gardner 2008; see also
283 Handley 1976], USNM372938–372940, 372942–372944, 372947. Georeference error: ca. 1
284 km.

285

286 COJEDES

287 89. **Finca El Piñero, 25 km E El Baul** [08°59'N, 68°09'W; GE 2010; see also Polisar et al. 2003],
288 EBRG 8174. Georeference error: ca. 5 km.

289 90. **Hato El Piñero a 20 km N de El Baul** [09°00'N, 68°10'W; GE 2010], MBUCV 5157.
290 Georeference error: ca. 5 km.

291 91. Hato El **Tirado** [100 m, 09°05'N, 68°25'W; Anderson and Gutiérrez 2009], MHNLS 3812,
292 3889, 3890. Georeference error: ca. 2 km.

293 92. **Hato Nuevo** [09°13'N, 68°05'W; Gardner 2008], EBRG 364, 458–461, 464, 465. Georeference
294 error: ca. 2 km.

295 93. **Hato de Itabana** [80 m, 09°28'N, 68°27'W; Paynter 1982], MHNLS 4405. Georeference error:
296 ca. 5 km.

297

298 DISTRITO CAPITAL

299 94. **Caracas** [950 m, 10°30'N, 66°55'W; Paynter 1982], AMNH 130586–130589. Georeference
300 error: ca. 15 km.

301

302 FALCÓN

303 95. 20 km S and 98 km E Maracaibo (**Hacienda Socopito**) [470–480 m, 10°30'N, 70°44'W;
304 Handley 1976; see also Anderson 2003], USNM 443801; 24 km S and 94 km E Maracaibo
305 (**Hacienda Socopito**), USNM 418531, 418532. Georeference error: ≤ 5 km.

- 306 96. **Near Mirimire** [250 m, 11°10'N, 68°44'W; Handley 1976; coordinates correspond to the
307 nearest site to Mirimire visited by collector at indicated elevation], USNM 406953.
308 Georeference error: ca. 8 km.
- 309 97. 5 km N and 13 km E Mirimire (cerca **La Pastora**) [122 m, 11°11'N, 68°35'W; Anderson 2003],
310 EBRG 3979. Georeference error: ≤ 5 km.
- 311 98. **Parque Nacional Juan Cristófono Falcón, sector Acurigua** [650 m, 11°17'N, 69°28'W;
312 collector's label], EBRG 23773, 23887, 23888. Georeference error: ca. 2 km.
- 313 99. **Campechano cerca Boca Río Hueque, Municipio Píritu** [0 m, 11°27'N, 68°57'W;
314 collector's label], EBRG 22549, 22556, 22558, 22560. Georeference error: < 5 km.
- 315 100. **Cerro Santa Ana**, Península de Paraguaná [300–615 m, 11°49'N, 69°57'W; Anderson 2003;
316 SAGCN 1990], EBRG 3698, 3707, 15977, 15982, 15986; 49 km N and 32 km W Coro,
317 **Cerro Santa Ana**, EBRG 3993–3997; Península de Paraguaná, **Cerro Santa Ana**, 4 km N
318 Santa Ana, AMNH 276478, 276479, 276487, 276489, 276496, 276502, 276530, 276531,
319 276537, 276541, 276543, 276562; EBRG 25346–25351, 25357, 25359, 25367, 25371, 25465,
320 25496, 25498, 25512, 25514; 15 km SSW Pueblo Nuevo [=49 km and 32 km of Coro],
321 **Cerro Santa Ana**, Península de Paraguaná, USNM 442907; 49 km N and 32 km W Coro
322 (**Cerro Santa Ana**), USNM 443870–443874, 443877, 443880–443888, 443890–443896.
323 Georeference error: ca. 1 km.
- 324 101. **Reserva Biológica Monte Cano**, 5 km de Pueblo Nuevo Península de Paraguaná [200 m,
325 11°58'N, 69°59'W; GPS coordinates taken by M. Soley-Guardia in 2009], EBRG 23557–
326 23566; Estación Biológica Monte Cano, San José de Cocodite, EBRG 24097–24099;
327 Montecano Pueblo Nuevo Península Paraguaná, EBRG 20677–20679; San José de Cocodite
328 Estación Biológica de Monte Cano Municipio Falcón Península de Paraguaná, EBRG
329 23585–23591. Georeference error: ca. 1 km.

330 102. Reserva de Fauna Silvestre Tucurere, **Hacienda Somosagua** [near Boca de Tocuyo],
331 Municipio Acosta [40 m, 11°03'N, 68°26'W; GE 2010], EBRG 24923. Georeference error:
332 ca. 3 km.

333 103. Península de Paraguaná, **Cerro Santa Ana, 3 km N Santa Ana** [120–200m, 11°48'N,
334 69°57'W; collectors' label], AMNH 276533 (previously EBRG 25354); EBRG 25366; Cerro
335 Santa Ana, Península Paraguaná, EBRG 12342. Georeference error: ca. 1 km.

336

337 GUÁRICO

338 104. **Santa Rita, cerca Río Manapiare** [08°08'N, 66°15'W; Gardner 2008], MBUCV 2435.
339 Georeference error: ca. 2 km.

340 105. Paso Mereyal, **Hato La Muerta**, Espino [08°17'N, 65°46'W; www.fallingrain.com .
341 Specifically: http://www.fallingrain.com/world/VE/12/Hato_La_Muerta.html], MBUCV
342 1469. Georeference error: ca. 12 km.

343 106. **Hato La Fé**, Caserio Corozopando [90 m, 08°30'N, 67°35'W; Voss 1991], MHNLS 6723.
344 Georeference error: ca. 5 km.

345 107. **Carretera Calabozo-San Fernando, nivel Hato Flores Moradas** [08°34'N, 67°33'W;
346 Anderson and Gutiérrez 2009; not Paynter 1982], EBRG 8078. Georeference error: ca. 4
347 km.

348 108. **Estación Biológica de los Llanos** [110–115 m, 08°52'N, 67°23'W; Handley 1976], USNM
349 385052; Estación Biológica de Calabozo, MBUCV 1416–1422; **Estación Biológica de Los**
350 **Llanos**, Calabozo, MBUCV 1429–1433, 1934–1937, 1952, 2032; 7 km S and 5 km E
351 Calabozo [=Estación Biológica de los Llanos], USNM 443897, 443901–443905, 443911;
352 9 km SE Calabozo, **Estación Biológica de los Llanos**, USNM 442908, 443906, 443908,
353 443910. Georeference error: ca. 2 km.

354 109. **Dos Caminos** (50 km S, San Juan de Los Morros) [09°35'N, 67°18'W; Gardner 2008],
355 CVULA I-0261, I-0117. Georeference error: ca. 2 km.
356 110. **Hato Las Palmitas** [181 m, 09°36'N, 67°27'W; Handley 1976], EBRG 3980; 34 km S and 12
357 km O [W] San Juan de Los Morros, **Hato Las Palmitas**, EBRG 3971, 3981–3992; Hato
358 La Palmita [=Hato Las Palmitas], San Francisco de Tiznados, MBUCV 1557; 34 km S
359 and 12 km W San Juan de los Morros, **Hto. Las Palmitas**, USNM 385053–385056,
360 418518, 418519, 443794, 443797, 443798, 443800. Georeference error: ca. 5 km.

361 111. **Río Portuguesa 18 km NO [NW] Camaguan, Municipio Camaguan** [69 m, 08°11'N,
362 67°42'W; collector's label], EBRG 24980. Georeference error: ca. 2 km.

363

364 LARA

365 112. 14 km NE El Tocuyo, **Puerta Vieja** [616 m, 09°51'N, 69°41'W; DCN 1975b; see also Handley
366 1976], USNM 443914. Georeference error: ca. 1 km.

367 113. 10 km N El Tocuyo, **caserio Boro** [528 m, 09°53'N, 69°47'W; Handley 1976; DCN 1975b],
368 USNM 443913. Georeference error: ca. 2 km.

369 114. 8 km SW Barquisimeto, **La Concordia** [592 m, 10°01'N, 69°29'W; NGA 2010; see also
370 Handley 1976], USNM 443912. Georeference error: ca. 1 km.

371 115. **Río Tocuyo** [500 m, 10°16'N, 69°56'W; Voss 1991], AMNH 130577–130585, 130600.
372 Georeference error: ca. 1 km.

373

374 MÉRIDA

375 116. **Laguna de Caparú, 3 km SE San Juan de Lagunillas** [900 m, 08°29'N, 71°20'W; Sosa and
376 Soriano 1996], CVULA I-2964, I-3863, I-3867, I-3868. Georeference error: ca. 2 km.

377 117. **Las Gonzalez** [800–900 m, 08°30′N, 71°19′W; DCN 1977], CVULA I-1218, I-1223, I-1318, I-
378 1319, I-1515. Georeference error: ca. 1 km.

379 118. **Lagunillas** [08°30′N, 71°22′W; Handley 1976], CVULA I-1760. Georeference error: ca. 3 km.

380 119. Cafetos de **Milla** [ca. 1100 m, 08°36′N, 71°08′W; DCN 1977; elevation likely wrong in Rossi et
381 al. 2010; see Gardner 2008], BMNH 98.7.1.21; USNM 149005. Georeference error: ca. 1 km.

382 120. **Pedregosa** [=Quebrada La Pedregosa; 1630 m, 08°36′N, 71°12′W; Paynter 1982], BMNH
383 98.7.1.19. Georeference error: ca. 1 km.

384

385 MIRANDA

386 121. **Turgua** [10°22′N, 66°45′W; DCN 1964], MBUCV 1411, 1412. Georeference error: ca. 1 km.

387 122. **8 km S Caracas, cerca Turagua** [=Turgua; 1144 m, 10°22′N, 66°50′W; Anderson and
388 Gutiérrez 2009], EBRG 3960, 3961. Georeference error: ca. 2 km.

389 123. **8 km SSE Caracas** [1144 m, 10°25′N, 66°51′W; DCN 1964; see also Handley 1976], USNM
390 385047–385049. Georeference error: ca. 1 km.

391 124. **19 km E Caracas (Curapao)** [1160–1630 m, 10°31′N, 66°38′W; Anderson and Gutiérrez
392 2009], EBRG 3962–3965; Estanque de Curupao, N. de Guarenas, MBUCV 2033; **19 km E**
393 **Caracas, Curupao**, USNM 385057–385060. Georeference error: ca. 2 km.

394

395 MONAGAS

396 125. **Los Pozos** [08°28′N, 62°43′W; SAGCN 1996], MHNLS 4727, 4728; Carretera **Los Pozos**,
397 MHNLS 4732. Georeference error: ca. 3 km.

398 126. **Carretera Los Barrancos-Chaguaramas**, km 20 [08°32′N, 62°45′W; SAGCN 1996;
399 coordinates correspond to 20 km N Los Barrancos on the indicated road], MHNLS 4723,
400 4724, 4726, 4729–4731. Georeference error: ca. 5 km.

- 401 127. **Uverito**, 35 km S Temblador Distrito Sotillo [40 m, 08°40'N, 62°37'W; SAGCN 1996], EBRG
402 16226, 16228, 16229, 16232. Georeference error: ca. 6 km.
- 403 128. **Campamento El Merey**, cerca Chaguaramas, 45 km SSO [SSW] Temblador, Distrito Sotillo
404 [30 m, 08°40'N, 62°48'W, GE 2010], EBRG 16863. Georeference error: ca. 2 km.
- 405 129. **Río Ñato, 4 km N Las Gaviotas, Municipio Aguasay** [09°10'N, 63°22'W; collector's label],
406 EBRG 22378. Georeference error: < 5 km.
- 407 130. 55 km SSE Maturín, **Hato Mata de Bejuco** [18 m, 09°19'N, 62°56'W; Handley 1976; Rossi et
408 al. 2010 lumped this locality with “*Hato Mata de Bajuco*”], USNM 443915–443917, 442720.
409 Georeference error: ca. < 5 km.
- 410 131. **47 km SE Maturín**, Hato Santa Barbara [18 m, 09°22'N, 63°01'W; GE 2010; see also Handley
411 1976], USNM 385068–385072. Georeference error: ca. 1 km.
- 412 132. **Campamento MARNR**, Río Guarapiche [09°55'N, 62°55'W; DCN 1978], EBRG 17569.
413 Georeference error: ca. 2 km.
- 414 133. **Entre Arbolito y Buena Vista, Suroeste de San Antonio de Capayacual** [850 m, 10°04'N,
415 63°46'W; collector's label], MHNLS 9912, 9914. Georeference error: < 5 km.
- 416 134. San Antonio [=**San Antonio de Maturín**; 549 m, 10°07'N, 63°43'W; Paynter 1982], AMNH
417 69939, 69940. Georeference error: ca. 1 km.
- 418 135. **Caripe** [860 m, 10°11'N, 63°30'W; DCN 1969], MBUCV 397–400. Georeference error: ca. 2
419 km.
- 420 136. 5 km NW Caripe, **San Agustín** [1150 m, 10°12'N, 63°32'W; Handley 1976], USNM 406951.
421 Georeference error: ca. 2 km.
- 422 137. **Ipuré**, Cumaná [10°22'N, 64°08'W; Anderson and Gutiérrez 2009], BMNH 0.5.1.59.
423 Georeference error: ca. 7 km.
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NUEVA ESPARTA

138. **Península de Macanao, Quebrada La Chica** [50 m, 10°02′N, 64°16′W; collector's label], EBRG 24297. Georeference error: < 5 km.
139. Península de Macanao, **Punta Arenas** [10°59′N, 64°24′W; DCN 1979a], EBRG 3133, 3134. Georeference error: ca. 1 km.
140. **La Sierra**, Isla de Margarita [100 m, 11°01′N, 63°52′W; DCN 1979b], MHNLS 198. Georeference error: ca. 1 km.
141. **3 km S La Asunción**, Isla Margarita [38 m, 11°01′N, 63°53′W; DCN 1979b; see also Handley 1976], USNM 388398. Georeference error: ca. 1 km.
142. 2 km N and 1 km E La Assunción (**Salamanca**) [38 m, 11°03′N, 63°52′W; DCN 1979b; see also Handley 1976], USNM 388381, 388388–388397, 388399, 388400. Georeference error: ca. 1 km.

PORTUGUESA

143. Palmarito Curbeleno [=Palmerita Curbelero], near Guanarito [08°24′N, 69°04′W, NGA 2010], AMNH 266951–266954. Georeference error: ca. 1 km.
144. **Refugio de Fauna Silvestre Estero de Chiriguare, Río Guanare** [ca. 60 m, 08°33′N, 68°44′W; collector's label], EBRG 20681–20683. Georeference error: < 5 km.
145. Near **Guanarito** [08°42′N, 69°13′W; Anderson 2003; Rossi et al. 2010 lumped this locality with “Palmarito Curbeleno, near *Guanarito*”; “La Arenosa, near *Guanarito*”; and “La Hoyada, near *Guanarito*”]. Catalogue numbers of specimens examined were taken from Rossi et al. 2010, who reported them together for “Palmarito Curbeleno, near *Guanarito*” (see locality 144, above). Georeference error: ≤ 5 km.

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SUCRE

146. **Embalse Turimiquire**, campamento Inos [ca. 300 m, 10°10'N, 64°19'W; GE 2010], EBRG 16814. Georeference error: ca. 11 km.
147. **Cuchivano** [213 m, 10°14'N, 63°56'W; Anderson and Gutiérrez 2009], AMNH 69938. Georeference error: ca. 3 km.
148. **Río Clavellinos abajo, Embalse Clavellinos, Municipio Ribero** [300 m, 10°22'N, 63°36'W; collector's label], EBRG 23204. Georeference error: < 5 km.
149. **Campo Alegre**, Cumaná [411 m, 10°22'N, 64°12'W; Anderson and Gutiérrez 2009], BMNH 0.5.1.58. Georeference error: ca. 4 km.
150. **21 km E Cumaná**, cerca Sotillo [25 m, 10°27'N, 63°58'W; Gardner 2008; see also Handley 1976], EBRG 3967. Georeference error: ca. 2 km.
151. **16 km E Cumaná**, Hacienda Quetepe [0 m, 10°27'N, 64°02'W; Gardner 2008; see also Handley 1976], EBRG 3966, 3968–3970; **16 km E Cumaná** (Quetepe), USNM 388377–388379, 388385, 388386. Georeference error: ca. 2 km.
152. **Finca Vuelta Larga**, 9.7 km (by road) SE Guaraúnos [10–20 m, 10°30'N, 63°07'W; Anderson and Gutiérrez 2009], AMNH 257208–257210; **Finca Vuelta Larga**; 9.7 km SE. de Guaraunos, MHNLS 8805–8813, 8162, 8164, 8181; **Finca Vuelta Larga**, Guaraunos, MHNLS 8802. Georeference error: ca. 2 km.
153. **Carretera Cariaco-Chacopata** [10°39'N, 63°43'W; Anderson and Gutiérrez 2009], MHNLS 6669. Georeference error: ca. 10 km.
154. Península de Araya, **Laguna Chacopata** [10°41'N, 63°48'W; DCN 1990], EBRG 20680. Georeference error: ca. 2 km.

TÁCHIRA

473 155. **Buena Vista** [07°27'N, 72°26'W; Handley 1976], MBUCV 2772. Georeference error: ca. 3 km.

474 TRUJILLO

475 156. **Valera** [645 m, 09°19'N, 70°37'W; Paynter 1982], FMNH 22175. Georeference error: < 5 km.

476 157. 10 km WNW Valera, Nr. **Isnotú** [930 m, 09°22'N, 70°42'W; Anderson 2003], USNM 370050.

477 Georeference error: ≤ 5km.

478 158. **18 km N Valera, Nr. Agua Viva** [164 m, 09°28'N, 70°34'W; GE 2010], USNM 371304.

479 Georeference error: ca. 2 km.

480 159. 30 km NW Valera, Nr. **El Dividive** [90 m, 09°29'N, 70°44'W; Anderson 2003], USNM

481 371305, 371315, 371316. Georeference error: ≤ 5 km.

482 160. **Hacienda Valle Verde** [29 m, 09°29'N, 70°59'W; GE 2010; coordinates in Handley 1976

483 correspond to La Ceiba, which is located ca. 8 km W of Hacienda], USNM 371317; **Hda.**

484 **Valle Verde** [=46 km WNW Valera; see Handley 1976] vía Puerto La Ceiba, CVULA I-

485 3231. Georeference error: ca. 5 km.

486 161. 23 km NW Valera, Nr. **Agua Santa** [90 m, 09°32'N, 70°39'W; Anderson 2003], USNM

487 370048, 370049. Georeference error: ≤ 5 km.

488

489 VARGAS

490 162. **Canales de Naiguatá**, Parque Nacional El Avila, DF [720–750 m, 10°35'N, 66°44'W;

491 Anderson and Gutiérrez 2009], MHNLS 8577; **Canales de Naiguatá**, DF, MHNLS 7166;

492 Los **Canales de Naiguatá**, Naiguata, DF, MBUCV 2971, 2972. Georeference error: > 10

493 km.

494

495 YARACUY

496 163. **Agua Negra** [80 m, 10°04'N, 69°09'W; SAGCN 1994], MHNLS 3294. Georeference error: ca.
497 2 km.

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YARACUY-CARABOBO

500 164. **19 km NO [NW] Urama**, km 40 [5–25 m, 10°33'N, 68°27'W; Anderson 2003], EBRG 3946–
501 3958. Georeference error: ≤ 5 km.

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503

ZULIA

504 165. **El Tukuko; Perijá** [300 m, 09°45'N, 72°45'W; collector's label], MHNLS 7775. Georeference
505 error: < 5 km.

506 166. **Mene Grande** [70 m, 09°49'N, 70°56'W; Paynter 1982], CVULA I-1320. Georeference error:
507 ca. 2 km.

508 167. 3 km S and 19 km W Machiques [=Novito; 1132 m, 10°02'N, 72°43'W; Handley 1976],
509 USNM 418529, 418530. Georeference error: ca. 1 km.

510 168. **Hato El Mango, 8 km S La Villa** [200 m, 10°15'N, 72°25'W; collector's label], MHNLS
511 7061. Georeference error: < 5 km.

512 169. **La Soledad, Hacienda Grano de Oro, Campo Boscán, Cuenca Baja del Río Palmar**
513 [10°16'N, 72°04'W; collector's label], MHNLS 11929. Georeference error: < 5 km.

514 170. **Planta Ule**, 20 km de Cabimas, carretera Cabimas-Ciudad Ojeda [5 m, 10°17'N, 71°23'W; GE
515 2010], EBRG 24078, 24080, 24081. Georeference error: ca. 2 km.

516 171. **Río Palmar** [110 m, 10°37'N, 72°24'W; DCN 1974a], EBRG 17066. Georeference error: ca. 2
517 km.

518 172. **Refugio de Fauna Silvestre y Reserva de Pesca Los Olivitos, Municipio Miranda** [0 m,
519 10°48'N, 71°26'W; collector's label], EBRG 22568. Georeference error: < 5 km.

520 173. **17 km N and 55 km W Maracaibo (Hacienda El Tigre)** [80 m, 10°48'N, 72°18'W; NGA
521 2010; not Musser *et al.* 1998 who provided coordinates for Maracaibo], USNM 443807; 18
522 km N and 56 km W Maracaibo [=Hda. El Tigre], USNM 443802–443804. Georeference
523 error: ca. 2 km.

524 174. 39 km NW La Paz, Nr. **Cerro Azul** [80 m, 10°51'N, 72°16'W; Anderson 2003], USNM
525 443805, 443806. Georeference error: ≤ 5 km.

526 175. **Refugio de Fauna Silvestre y Reserva de Pesca Los Olivitos, Municipio Miranda** [0 m,
527 10°57'N, 71°23'W; collector's label; note that same collector reported different coordinates
528 for another locality (number 173, above) within the protected area, but described that
529 locality in the same way as this one], EBRG 22545. Georeference error: < 5 km.

530

531 *Marmosa xerophila*

532 COLOMBIA

533 LA GUAJIRA

534 176. 114 km N and 32 km O [W] Maracaibo (**Cojoro**) [15 m, 11°39'N, 71°51'W; GE 2010; not
535 Handley 1976], EBRG 4003, 4005; 114 km N and 32 km W Maracaibo (La Isla) [=37 km
536 NNE Paraguaipoa; =**Cojoro**], USNM 443810, 443811, 443832; 37 km NNE Paraguaipoa,
537 near **Cojoro**, USNM 443812–443818, 443819, 443820–443831. Georeference error: ca. 2
538 km.

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540 VENEZUELA

541 FALCÓN

542 177. **18 km WSW Capatárida**, Capatárida [75 m, 11°02'N, 70°40'W; DCN 1963], USNM 442728.

543 Georeference error: ca. 3 km.

- 544 178. **Capatárida** [40–75m, 11°10′N, 70°37′W; DCN 1963; A. L. Tuttle's field notes (1968); see also
545 Handley (1976), who reported the same coordinates], EBRG 4004, 4006–4031; USNM
546 442721–442727, 442729–442731, 442733–442735, 442744, 443918–443925, 443927–443929,
547 443931, 443936–443938, 443940–443942, 443946, 443947, 443951, 443952, 443955–443957,
548 443959, 443960, 443963–443972, 443974–443978. Georeference error: ca. 2 km.
- 549 179. Serranía de San Luis, **La Chapa**, 15 km N Cabure [350–380 m, 11°17′N, 69°36′W; collectors'
550 label], AMNH 276582 (previously EBRG 25427), 276586 (previously EBRG 25433); EBRG
551 25432, 25437, 25439. Georeference error: ca. 1 km.
- 552 180. **Tacuato**, N Península Paraguaná [11°43′N, 69°50′W; DCN 1974b], EBRG 20670.
553 Georeference error: ca. 3 km.
- 554 181. 48 km N and 46 km W Coro, **Yabuquiva** [13 m, 11°48′N, 70°04′W; N. E. Peterson field
555 notes, 1968; SAGCN 1990; DCN 1962; =25 km SW Pueblo Nuevo in Handley 1976],
556 EBRG 4035–4045; 25 km SW Pueblo Nuevo, **Yabuquiva**, Península de Paraguaná, USNM
557 442906; 48 km N and 46 km W Coro (**Yabuquiva**), USNM 443852, 443854–443856,
558 443862, 443863, 443868–443869. Georeference error: < 5 km.
- 559 182. 49 km N and 33 km W Coro (**Moruy**) [80–90m, 11°49′N, 69°58′W; N. E. Peterson field notes,
560 1968; M. Soley-G. in litt.; not Anderson 2003], EBRG 4032, 4033; USNM 443834–443848,
561 443851. Georeference error: ca. 2 km.
- 562 183. 49 km N and 34 km W Coro (**Moruy**) [55 m, 11°50′N, 69°59′W; Anderson 2003], EBRG
563 4034. Georeference error: ≤ 5 km.
- 564 184. San Pedro, **Jadacaquiva**, Península de Paraguaná [11°54′N, 70°05′W; DCN 1962], EBRG
565 22111. Georeference error: ca. 3 km.
- 566 185. **Guaidabacoa**, 22 km NW Pueblo Nuevo, Paraguaná [60 m, 12°06′N, 70°00′W; Díaz and
567 Granadillo, 2005], CVULA I-3498, I-3499; **Guaidabacoa**, Península de Paraguaná, EBRG

568 22112, 22115–22117, 22119; Hato **Guaidabacoa**, Península Paraguaná, EBRG 20671,
569 22113, 22114, 22118. Georeference error: ca. 2 km.
570 186. La Voz de Venezuela, Puerto Tumatey [=**Punta Tumatey**], Península de Paraguaná [12°10'N,
571 69°56'W; DCN 1974c], EBRG 20668, 20669. Georeference error: ca. 2 km.

572

573 ZULIA

574 187. **Las Mentiras, Municipio Paez** [20–30 m, 11°12'N, 72°02'W; collector's label], EBRG 21810,
575 21817, 21819, 21820. Georeference error: < 5 km

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577 **Literature cited in Appendix 1 and not cited in the Reference section of the article**

578

579 Anderson, R. P. 1999 (2000). Preliminary review of the systematics and biogeography of the spiny
580 pocket mice (*Heteromys*) of Colombia. *Revista Acad. Colomb. Ci. Exact.* 23: 613–630.

581 Anderson, R. P. 2003. Taxonomy, distribution, and natural history of the genus *Heteromys* (Rodentia:
582 Heteromyidae) in western Venezuela, with the description of a dwarf species from the
583 Península de Paraguaná. – *Amer. Mus. Novitates* 3396: 1–12.

584 Anderson, R. P. and Gutiérrez, E. E. 2009. Taxonomy, distribution, and natural history of the genus
585 *Heteromys* (Rodentia: Heteromyidae) in central and eastern Venezuela, with the description of
586 a new species from the Cordillera de la Costa. – In: Voss R. S. and Carleton M. D. (eds),
587 Systematic mammalogy: contributions in honor of Guy G. Musser. – *Bull. Amer. Mus. Nat.*
588 *Hist.* 331: 33–93.

589 DCN. 1962. Hoja 6151 (Punto Fijo), escala 1:100.000. Caracas: Dirección de Cartografía Nacional
590 (DCN), Ministerio de Obras Públicas.

591 DCN. 1963. Hoja 6049 (Dabajuro), escala 1:100.000. Caracas: Dirección de Cartografía Nacional
592 (DCN), Ministerio de Obras Públicas.

593 DCN. 1964. Hoja 6847 (Caracas), escala 1:100.000, preliminary ed. Caracas: Dirección de Cartografía
594 Nacional (DCN), Ministerio de Obras Públicas.

595 DCN. 1969. Hoja 7546 (Caripito), escala 1:100.000. Caracas: Dirección de Cartografía Nacional
596 (DCN), Ministerio de Obras Públicas.

597 DCN. 1970. Hoja 6141 (Barinas), escala 1:100.000, 2nd ed. Caracas: Dirección de Cartografía
598 Nacional (DCN), Ministerio de Obras Públicas.

599 DCN. 1971. Hoja 6647 (Ocumare de la Costa), escala 1:100.000, 2nd ed. Caracas: Dirección de
600 Cartografía Nacional (DCN), Ministerio de Obras Públicas.

601 DCN. 1974a. Hoja 5747 (El Laberinto), escala 1:100.000, preliminary ed. Caracas: Dirección de
602 Cartografía Nacional (DCN), Ministerio de Obras Públicas.

603 DCN. 1974b. Hoja 6251 (Pueblo Nuevo), escala 1:100.000, 2nd ed. Caracas: Dirección de
604 Cartografía Nacional (DCN), Ministerio de Obras Públicas.

605 DCN. 1974c. Hoja 6252 (El Vínculo), escala 1:100.000, 2nd ed. Caracas: Dirección de Cartografía
606 Nacional (DCN), Ministerio de Obras Públicas.

607 DCN. 1975a. Hoja 6142 (Barinitas), escala 1:100.000, 2nd ed. Caracas: Dirección de Cartografía
608 Nacional (DCN), Ministerio de Obras Públicas.

609 DCN. 1975b. Hoja 6245 (El Tocuyo), escala 1:100.000. Caracas: Dirección de Cartografía Nacional
610 (DCN), Ministerio de Obras Públicas.

611 DCN. 1976a. Hoja 6042 (Timotes), escala 1:100.000, 2nd ed. Caracas: Dirección de Cartografía
612 Nacional (DCN), Ministerio de Obras Públicas.

613 DCN. 1976b. Hoja 6546 (Campo de Carabobo), escala 1:100.000, 2nd ed. Caracas: Dirección de
614 Cartografía Nacional (DCN), Ministerio de Obras Públicas.

- 615 DCN. 1977. Hoja 5941 (Mérida), escala 1:100.000. Dirección de Cartografía Nacional (DCN),
616 Ministerio de Obras Públicas, Caracas.
- 617 DCN. 1978. Hoja 7645 (Caño Frances), escala 1:100.000. Caracas: Dirección de Cartografía
618 Nacional (DCN), Ministerio de Obras Públicas.
- 619 DCN. 1979a. Hoja 7348 (Macanao sur), escala 1:100.000, 2nd ed. Caracas: Dirección de Cartografía
620 Nacional (DCN), Ministerio de Obras Públicas.
- 621 DCN. 1979b. Hoja 7449 (La Asunción), escala 1:100.000, 2nd ed. Caracas: Dirección de Cartografía
622 Nacional (DCN), Ministerio de Obras Públicas.
- 623 DCN. 1983. Hoja 6547 (Puerto Cabello), escala 1:100.000, 2nd ed. Caracas: Dirección de Cartografía
624 Nacional (DCN), Ministerio de Obras Públicas.
- 625 DCN. 1990. Hoja 7448 (Porlamar), escala 1:100.000, 2rd ed. Caracas: Dirección de Cartografía
626 Nacional (DCN), Ministerio de Obras Públicas.
- 627 Díaz, M. and Granadillo, E. 2005. The significance of episodic rains for reproductive phenology and
628 productivity of trees in semiarid regions of northwestern Venezuela. – *Trees* 19: 336–348.
- 629 Downs, W. G. et al. 1968. Arbovirus studies in Bush Bush Forest, Trinidad, W.I., September 1959–
630 December 1964. I. Description of the study area. – *Am. J. Trop. Med. Hyg.* 17: 224–236.
- 631 Fairchild, G. B. and Handley, C. O. Jr. 1966. Gazetteer of collecting localities in Panama. – In:
632 Wenzel, R. L. and Tipton, V. J. (eds), *Ectoparasites of Panama*. Field Museum of Natural
633 History. Chicago. pp. 9–22.
- 634 Fleming, T. H. 1970. Notes on the rodent faunas of two Panamanian forests. – *J. Mamm.* 51: 473–
635 490.
- 636 Gardner, A. L. ed. 2008. *Mammals of South America*. Vol. 1. Marsupials, xenarthrans, shrews, and
637 bats. Chicago University Press. Chicago.

638 GE (Google Earth). 2010. Google Earth 5.2. Available at [http://earth.google.com/download-](http://earth.google.com/download-earth.html)
639 [earth.html](http://earth.google.com/download-earth.html). Accessed July 20, 2010.

640 Hernández-Camacho, J. 1956. Una subespecie nueva de *Heteromys anomalus* (Mammalia: Rodentia). –
641 *Lozania* 10: 1–15.

642 Hershkovitz, P. 1947. Mammals of northern Colombia, preliminary report no. 1: squirrels
643 (Sciuridae). – *Proc. U. S. Natl. Mus.* 3208: 1–46.

644 Hershkovitz, P. 1960. Mammals of northern Colombia, preliminary report no. 8: arboreal rice rats, a
645 systematic revision of the subgenus *Oecomys*, genus *Oryzomys*. – *Proc. U. S. Natl. Mus.* 110:
646 513–568.

647 IGAC (Instituto Geográfico “Agustín Codazzi”). 1985a. Departamento de Huila, escala 1:400.000.
648 Ministerio de Hacienda y Crédito Público, subdirección cartográfica. Bogotá.

649 IGAC (Instituto Geográfico “Agustín Codazzi”). 1985b. Departamento de Norte de Santander,
650 escala 1:250.000. Ministerio de Hacienda y Crédito Público, subdirección cartográfica.
651 Bogotá.

652 IGAC (Instituto Geográfico “Agustín Codazzi”). 1988. Departamento de La Guajira, escala
653 1:400.000.: Ministerio de Hacienda y Crédito Público, subdirección cartográfica. Bogotá.

654 Mavárez, J. et al. 2002. Genetic differentiation, dispersal and mating system in the schistosome-
655 transmitting freshwater snail *Biomphalaria glabrata*. – *Heredity* 89: 258–265.

656 Musser, G. G. et al. 1998. Systematic studies of oryzomyine rodents (Muridae, Sigmodontinae):
657 diagnoses and distributions of species formerly assigned to *Oryzomys* “*capito*”. – *Bull. Amer.*
658 *Mus. Nat. Hist.* 236: 1–376.

659 NGA (National Geospatial-Intelligence Agency of the United States). (2010) NGA GEOnet Names
660 Server (GNS). Available at <http://earth-info.nga.mil/gns/html/> Accessed 18 August 18,
661 2010.

- 662 Ochoa-G. J. et al. 1988. Inventario de los mamíferos de la Reserva Forestal de Ticoporo y la Serranía
663 de Los Pijiguaos, Venezuela. – Acta Cient. Venez. 39: 269–280.
- 664 O.S. (Ordnance Survey). 1930. Map of Trinidad, scale 1:150,000. Unknown place of publication.
- 665 Paynter, R. A. Jr. 1982. Ornithological gazetteer of Venezuela. Museum of Comparative Zoology,
666 Harvard University. Cambridge, Massachusetts.
- 667 Paynter, R. A. Jr. 1997. Ornithological gazetteer of Colombia, 2nd edn. Museum of Comparative
668 Zoology, Harvard University. Cambridge, Massachusetts.
- 669 Polisar, J. et al. 2003. Jaguars, pumas, their prey base, and cattle ranching: ecological interpretations
670 of a management problem. – Biol. Cons. 109: 297–310.
- 671 SAGCN (Servicio Autónomo de Geografía y Cartografía Nacional). 1990. Hoja 6151-II-NE
672 (Yabuquiva), escala 1:25.000, 2nd edn. Ministerio del Ambiente y de los Recursos Naturales
673 Renovables. Caracas.
- 674 SAGCN (Servicio Autónomo de Geografía y Cartografía Nacional). 1994. Mapa del Estado Yaracuy,
675 3rd edn. Ministerio del Ambiente y de los Recursos Naturales Renovables. Caracas.
- 676 SAGCN (Servicio Autónomo de Geografía y Cartografía Nacional). 1996. Mapa del Estado
677 Monagas, 4th edn. Ministerio del Ambiente y de los Recursos Naturales Renovables.
678 Caracas.
- 679 Sosa, M. and Soriano, P. J. 1996. Resource availability, diet and reproduction in *Glossophaga longirostris*
680 in an arid zone of the Venezuelan Andes. – J. Trop. Ecol. 12: 805–818.
- 681 Voss R. S. 1991. An introduction to the Neotropical muroid rodent genus *Zygodontomys*. – Bull.
682 Amer. Mus. Nat. Hist. 210: 1–113.
- 683

684 **APPENDIX 2.**—Supplemental material with regards to preliminary models.

685

686 **Methods employed to calibrate preliminary models**

687

688 To approximate optimal model complexity, which implies the best approximation to reality with the
689 least degree of overfitting—we tuned model settings. We did so via preliminary models of each
690 species and then making final models using all localities (and the settings selected as optimal during
691 the tuning process). Specifically, we varied both feature classes and regularization multiplier (see
692 below). Because only a few localities for *Marmosa xerophila* were available (likely requiring very
693 simple models; Anderson and Gonzalez 2011), we used the simple combination of feature classes
694 suggested by MAXENT default settings and created preliminary models by varying only the
695 regularization multiplier. In contrast, for *M. robinsoni*, represented by numerous localities, we created
696 preliminary models varying both feature classes and the regularization multiplier (via k -fold cross-
697 partitioning, with $k = 5$, leading to $\sim 80\%$ for calibration and $\sim 20\%$ for evaluation in each iteration).

698 Together, regularization multiplier and feature class affect model complexity. The
699 regularization multiplier controls the strength of the penalties for complex models (the stronger the
700 multiplier, the stronger the penalty for a complex model; Phillips et al. 2006; Warren and Seifert
701 2011). Complex models, unfortunately, are more prone to overfitting (i.e. situations in which a
702 model is more complex than the real relationships between the species' niche and the examined
703 environmental variables; Anderson and Gonzalez 2011, Warren and Seifert, 2011). Feature classes
704 represent the kinds of mathematical responses that the algorithm is allowed to consider. For
705 *Marmosa robinsoni*, we considered combinations of feature classes likely to be reasonable given the
706 number of localities available (see Phillips et al. 2006, Phillips and Dudík 2008, Anderson and
707 Gonzalez 2011): linear, quadratic, and hinge (LQH); linear, quadratic, and product (LQP); linear,

708 quadratic, product, and hinge (LQPH); linear, quadratic, product, and threshold (LQPT); and linear,
709 quadratic, product, hinge, and threshold (LQPHT; the default combination of feature classes for this
710 number of localities). For *M. xerophila*, we used linear and quadratic features (LQ; the default
711 combination of feature classes for this number of localities; see above). For each of these feature-
712 class combinations, we constructed models using regularization multiplier values of 0.5, 1.0, 1.5, 2.0,
713 2.5, 3.0, 3.5, and 4.0, and implemented replicates to identify the settings that led to the highest
714 average performance on held-out data (see below).

715

716 **Methods employed to evaluate preliminary models**

717

718 We employed threshold-independent and threshold-dependent measures to evaluate preliminary-
719 model performance according to two criteria: 1) the degree to which they avoided overfitting and 2)
720 their discriminatory power (Radosavljevic and Anderson 2013, Shcheglovitova and Anderson 2013).
721 Our primary criterion for these evaluations was the least degree of overfitting. Overfit models
722 underestimate species' abiotically suitable areas, with various detrimental effects (Phillips and Dudík
723 2008, Anderson and Raza 2010, Anderson and Gonzalez 2011). We assessed overfitting with both
724 threshold-independent and threshold-dependent measures. For the former, we used AUC_{Diff} of
725 Warren and Seifert (2011), which is based on the area under the curve (AUC) of the receiver
726 operating characteristic (ROC) plot. For any given model, AUC_{Diff} (difference) equals the calibration
727 AUC minus the evaluation AUC ($AUC_{Diff} = AUC_{Train} - AUC_{Test}$ of Warren and Seifert 2011).
728 Because overfitting typically results in high calibration AUCs and low evaluation AUCs, the first
729 optimality criterion implemented here preferred MAXENT settings that yielded the lowest possible
730 AUC_{Diff} . As a second measure to assess this first optimality criterion (low overfitting), we used the
731 threshold-dependent omission rate. An omission rate indicates the proportion of the localities of the

732 species that fall outside of (are omitted from) areas predicted to be suitable by the model (Anderson
733 et al. 2003, Phillips et al. 2006). Overfit models tend to yield high omission rates (Anderson and
734 Gonzalez 2011, Peterson et al. 2011). Because of this, the first optimality criterion preferred those
735 MAXENT settings that yielded the lowest possible omission rates (and those that best approximated
736 the theoretical expectation of the thresholding rule applied). To convert model output to binary
737 predictions and calculate the omission rates, we applied the 10th percentile threshold (i.e. 10
738 percentile training omission threshold of MAXENT; “T10” of Pearson et al. 2007), the value at which
739 the model omits 10% of the calibration localities. Using this rule, we expect approximately 10%
740 omission of evaluation localities.

741 Our secondary optimality criterion for evaluating preliminary models, high discriminatory
742 power, refers to a model’s capacity to distinguish correctly between unsuitable and suitable
743 conditions for the focal species across the full gradient of suitability. This desirable property was
744 gauged with a rank-based threshold-independent measure, the AUC of the ROC plot obtained based
745 on evaluation data. Thus, this criterion preferred MAXENT settings that yielded the highest
746 evaluation AUC.

747 To implement these measures of model performance, we cross-validated preliminary models
748 for each species. For *Marmosa xerophila*, we assessed model performance and significance using ten
749 partitions via an extension of the $n - 1$ jackknife approach proposed by Pearson et al. (2007) for
750 cases in which only a small number of localities are available (here, $n = 10$; Shcheglovitova and
751 Anderson 2013). For *M. robinsoni*, we implemented k -fold cross validation, with $k = 5$ bins (each
752 iteration withheld one group for evaluation; Peterson et al. 2011). These numbers of partitions per
753 species allowed us to produce final models with similar numbers of localities as the respective
754 preliminary models; thus, we expect that settings selected to approximate optimal model complexity

755 based of preliminary-model performance will likely remain reasonable in calibration of the final
756 models.

757 We assessed the statistical significance of a subset of the preliminary models. Specifically, we
758 did so for replicates that corresponded to the settings that yielded optimal performance in the tuning
759 experiments. For each of those models, we converted the continuous output into binary predictions
760 by applying the 10th percentile threshold (as before). For *Marmosa robinsoni*, we then used one-tailed
761 binomial probabilities to determine whether evaluation localities fell into regions of predicted
762 presence more often than expected by chance (Anderson et al. 2002, Phillips *et al.* 2006). For *M.*
763 *xerophila*, we implemented a more-complicated test with the same intent, appropriate for the $n - 1$
764 jackknife applied to a dataset of few localities (Pearson et al. 2007).

765

766 **Results from evaluations of preliminary models**

767 Among the preliminary models of *Marmosa robinsoni*, those that showed the least overfitting and the
768 highest discriminatory power were calibrated with linear, quadratic, and hinge (LQH) feature classes
769 and a regularization multiplier value of 2.5. At this regularization multiplier value, the LQH feature
770 classes yielded both the lowest average AUC_{DIFF} (0.0548) and the lowest omission rate (13%), which
771 was also the omission rate closest to the theoretical expectation (i.e. 10% for the applied 10th
772 percentile threshold rule). With regard to discriminatory power, the LQH feature classes yielded
773 higher evaluation AUC values than other feature classes across all regularization multipliers;
774 however, there was little variation among the evaluation AUC values across regularization
775 multipliers. Each of the five preliminary models calibrated with LQH feature classes and
776 regularization multiplier 2.5 predicted evaluation localities significantly better than random ($P <$
777 0.012). Based on these results, we calibrated the final model of *M. robinsoni* using the LQH feature
778 classes and a regularization multiplier value of 2.5.

779 Tuning experiments for *Marmosa xerophila* led to selection of the regularization multiplier 1.5
780 as optimal (as mentioned earlier, we used default feature classes for this species; i.e. linear and
781 quadratic; LQ). The value 1.5 yielded both the lowest AUCDIFF (0.085) and the lowest average
782 evaluation omission rate (20%). This omission rate is somewhat higher than that theoretically
783 expected (10%) for the threshold rule employed. Taken as a whole, the suite of jackknifed models
784 for this species did not lead to statistical significance ($P = 0.755$), likely due to a very large
785 proportional predicted area (average = 75% of the study region, which afforded very low statistical
786 power). Based on these results, we calibrated the final model of *M. xerophila* using the LQ feature
787 classes and a regularization multiplier value of 1.5.

788

789 **Literature cited in Appendix 2 and not cited in the Reference section of the article**

790

791 Anderson, R. P. et al. 2002. Geographical distributions of spiny pocket mice in South America:
792 insights from predictive models. – *Global Ecol. Biogeogr.* 11: 131–141.

793 Anderson, R. P. et al. 2003. Evaluating predictive models of species' distributions: criteria for
794 selecting optimal models. – *Ecol. Modell.* 162: 211–232.

795

Appendix 3

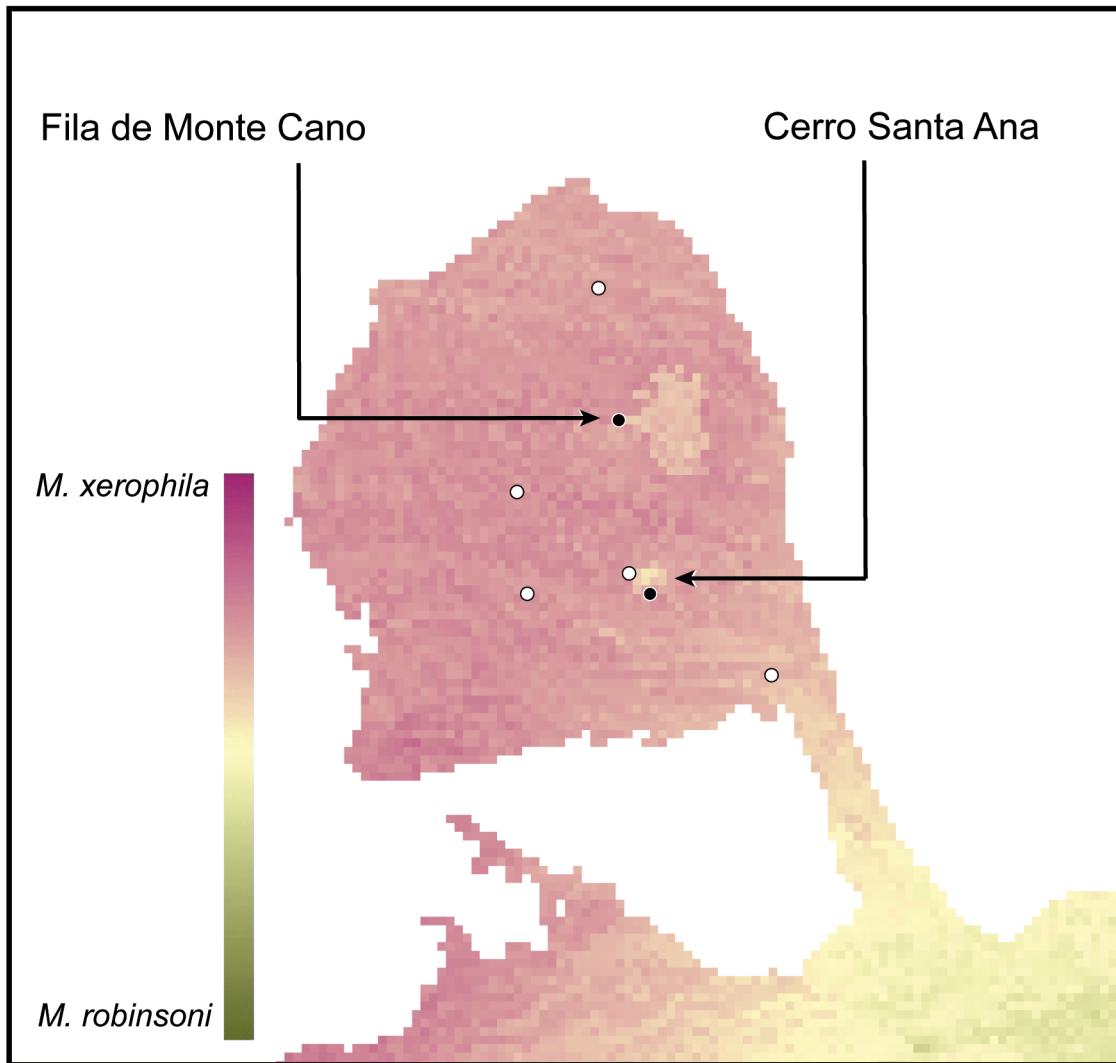


Figure A7. Comparison of predicted environmental suitability for *Marmosa xerophila* and *M. robinsoni* based on the continuous values (logistic output) resulting from final models. Pixels in red represent sites with environmental conditions predicted as more suitable for *Marmosa xerophila* than for *M. robinsoni*, whereas pixels in green represent sites predicted as more suitable for *M. robinsoni* than for *M. xerophila*.