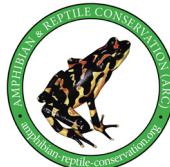




**Introductory page.** *Smilisca cyanosticta* (Smith, 1953). The Blue-spotted Treefrog occurs on the Atlantic slopes of southern Mexico and northern Central America from Oaxaca and southern Veracruz through northern Chiapas, Mexico, into Guatemala (<https://amphibiansoftheworld.amnh.org>). These individuals were located at Ejido Villa Guadalupe, in the municipality of Huimanguillo, Tabasco. Wilson et al. (2013b) determined its EVS as 12, placing it in the upper portion of the medium vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, but this species is not listed by SEMARNAT. *Photo by Liliana Ríos-Rodas.*



# The herpetofauna of Tabasco, Mexico: composition, distribution, and conservation status

<sup>1</sup>Ma. del Rosario Barragán-Vázquez, <sup>2</sup>Liliana Ríos-Rodas, <sup>3</sup>Lydia Allison Fucsko, <sup>4</sup>Louis W. Porras, <sup>5</sup>Vicente Mata-Silva, <sup>6</sup>Arturo Rocha, <sup>6</sup>Dominic L. DeSantis, <sup>7</sup>Elí García-Padilla, <sup>5</sup>Jerry D. Johnson, and <sup>8</sup>Larry David Wilson

<sup>1</sup>Centro de Investigación para la Conservación y Aprovechamiento de los Recursos Tropicales, División Académica de Ciencias Biológicas, Universidad Juárez Autónoma de Tabasco, Villahermosa, MEXICO <sup>2</sup>Facultad Maya de Estudios Agropecuarios, Universidad Autónoma de Chiapas, Carretera Catazajá-Palenque, Km 4, C.P. 29980, Catazajá, Chiapas, MEXICO <sup>3</sup>Department of Humanities and Social Sciences, Swinburne University of Technology, Melbourne, Victoria, AUSTRALIA <sup>4</sup>7705 Wyatt Earp Avenue, Eagle Mountain, Utah, 84005, USA <sup>5</sup>Department of Biological Sciences, The University of Texas at El Paso, El Paso, Texas 79968-0500, USA <sup>6</sup>Department of Biological and Environmental Sciences, Georgia College and State University, Milledgeville, Georgia 31061, USA <sup>7</sup>Oaxaca de Juárez, Oaxaca 68023, MEXICO <sup>8</sup>Centro Zamorano de Biodiversidad, Escuela Agrícola Panamericana Zamorano, Departamento de Francisco Morazán, HONDURAS and 1350 Pelican Court, Homestead, Florida 33035-1031, USA

**Abstract.**—The herpetofauna of Tabasco, Mexico, consists of 170 species, including 39 anurans, five caudates, one caecilian, two crocodylians, 111 squamates, and 12 turtles. We catalogued the distribution of these species among the three physiographic regions we recognize in the state: the Gulf Coastal Plain (88 species), the Sierras Bajas de Petén (93 species), and the Sierra Norte de Chiapas (145 species). The individual species are found in either one, two, or all three regions (mean = 1.9). Approximately 68% of the herpetofauna in Tabasco occupies only one or two of the three regions, which is of important conservation significance. The largest number of single-region species is found in the Sierra Norte de Chiapas (50), followed by the Gulf Coastal Plain (12) and the Sierras Bajas de Petén (nine). Coefficient of Biogeographic Resemblance (CBR) calculations indicate that the Sierra Norte de Chiapas and the Sierras Bajas de Petén share the greatest number of species (79), followed by 71 species between the Sierra Norte de Chiapas and the Gulf Coastal Plain, and 61 between the Gulf Coastal Plain and the Sierras Bajas de Petén. Fifty-five species occupy all three regions. A similarity dendrogram based on the Unweighted Pair Group Method with Arithmetic Averages (UPGMA) illustrates that the Sierras Bajas de Petén clusters with the Gulf Coastal Plain at the 0.67 level and the Sierra Norte de Chiapas clusters with the previous pair at the 0.64 level, and overall indicates an intermediate level of similarity. With reference to distributional categories, the greatest number of species is represented by the non-endemic species (146 of 170), followed by the country endemics (20), and the non-natives (five). Of the 146 non-endemic species, the majority (95) are MXCA species (i.e., those found only in Mexico and Central America). The principal environmental threats to the Tabasco herpetofauna are deforestation, agricultural activities, roads, soil contamination and oil extraction, myths and cultural factors (gastronomy), illegal commerce, and forest fires. We evaluated the conservation status of each of the native species by using the SEMARNAT, IUCN, and EVS systems, of which the EVS system provided the most inclusive assessment of the state's herpetofauna. We also employed the Relative Herpetofaunal Priority (RHP) method to determine the rank order of the three physiographic regions and found the highest values in the Sierra Norte de Chiapas. Most of the protected areas in the state are located in the Gulf Coastal Plain, which is only the second or third most important region from a conservation perspective. Nonetheless, about 95% of the native herpetofauna has been documented within the system of protected areas. Finally, we provide a set of conclusions and recommendations for the future protection of the Tabasco herpetofauna.

**Keywords.** Anurans, caecilians, caudates, conservation status, crocodylians, physiographic regions, protected areas, protection recommendations, squamates, turtles

**Resumen.**—La herpetofauna de Tabasco, México, consta de 170 especies, incluidos 39 anuros, cinco caudados, un cecílico, dos crocodilianos, 111 escamosos y 12 tortugas. Catalogamos la distribución de estas especies entre las tres regiones fisiográficas que reconocemos, incluyendo la Llanura Costera del Golfo (88 especies), las Sierras Bajas del Petén (93 especies) y la Sierra Norte de Chiapas (145 especies). Las especies individuales se

**Correspondence.** rosariobarragan@gmail.com (MRB); ari1707@hotmail.com (LR); lydiasfucsko@gmail.com (LAF); empub@msn.com (LWP); vmata@utep.edu (VM); arocha3@miners.utep.edu (AR); dominic.desantis@gcsu.edu (DLD); eligarcia\_18@hotmail.com (EG); jjohnson@utep.edu (JDJ); bufodoc@aol.com (LDW)

encuentran de una a tres regiones (media = 1,9). Aproximadamente el 68% de la herpetofauna de Tabasco ocupa solo una o dos de las tres regiones, lo que es de gran importancia para la conservación. El mayor número de especies de una sola región se encuentra en la Sierra Norte de Chiapas (49) seguida por la Llanura Costera del Golfo (12) y las Sierras Bajas del Petén (nueve). Los cálculos del Coeficiente de semejanza biogeográfica (CBR) demuestran que la Sierra Norte de Chiapas y las Sierras Bajas de Petén comparten el mayor número de especies (79), seguidas de 71 entre la Sierra Norte de Chiapas y la Llanura Costera del Golfo y 61 entre la Llanura Costera del Golfo y Sierras Bajas del Petén. Cincuenta y cinco especies ocupan las tres regiones. Un dendrograma de similitud basado en el método de grupos de pares no ponderados con promedios aritméticos (UPGMA) ilustra que las Sierras Bajas del Petén se agrupan junto con Llanura Costera del Golfo en el nivel .67 y la Sierra Norte de Chiapas se agrupa con el par anterior en el nivel .64, lo que indica un nivel generalmente intermedio de similitud en general. Con referencia a las categorías de distribución, el mayor número de especies es el de las especies no endémicas (146 de 170), seguido de las endémicas del país (20) y no nativos (cinco). De las 146 especies no endémicas, la mayor parte (95) son especies MXCA. Las principales amenazas ambientales para la herpetofauna de Tabasco son deforestación, actividades agropecuarias, carreteras, contaminación del suelo y actividades petroleras, mitos y factores culturales (gastronomía), comercio ilegal, e incendios forestales. El estado de conservación de cada especie nativa se evaluó mediante el uso de los sistemas SEMARNAT, UICN y EVS, de los cuales el sistema EVS fue de mayor utilidad. También se utilizó el método de Prioridad Relativa de la Herpetofauna (RHP) para determinar el orden de importancia de las tres regiones fisiográficas y los valores más altos se encontraron en la Sierra Norte de Chiapas. La mayoría de las áreas protegidas en el estado están ubicadas en la Llanura Costera del Golfo, que es solo la segunda o tercera región más importante desde una perspectiva de conservación. No obstante, alrededor del 95% de la herpetofauna nativa se ha documentado en el sistema de áreas protegidas. Finalmente, se entregan un conjunto de conclusiones y recomendaciones para la futura protección de la herpetofauna de Tabasco.

**Palabras Claves.** Anuros, áreas protegidas, caudados, cecilidos, crocodilidos, escamosos, estatus de conservación, recomendaciones de protección, regiones fisiográficas, tortugas

**Citation:** Barragán-Vázquez MR, Ríos-Rodas L, Fucsko LA, Porras LW, Mata-Silva V, Rocha A, DeSantis DL, García-Padilla E, Johnson JD, Wilson LD. 2022. The herpetofauna of Tabasco, Mexico: composition, distribution, and conservation status. *Amphibian & Reptile Conservation* 16(2): 1–61 (e315).

**Copyright:** © 2022 Barragán-Vázquez et al. This is an open access article distributed under the terms of the Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0): <https://creativecommons.org/licenses/by/4.0/>], which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. The official and authorized publication credit sources, which will be duly enforced, are as follows: official journal title *Amphibian & Reptile Conservation*; official journal website: [amphibian-reptile-conservation.org](http://amphibian-reptile-conservation.org).

**Received:** 9 May 2022; **Accepted:** 21 June 2022; **Published:** 8 August 2022

*“The more we get done ourselves, the easier it will be for our children and their children to move the world back to sustainability.”*

Peter H. Raven (2021)

## Introduction

Tabasco is an oddly shaped state in Mexico, in which a western segment and an eastern segment are connected to each other by a slender isthmus. With a total area of 24,731 km<sup>2</sup>, this state is relatively small (the 24<sup>th</sup> smallest of the 32 federal entities in Mexico, <http://inegi.org>; accessed 5 May 2022). The state's area constitutes only about 1.3% of the country's area. The coastal region of Tabasco lies adjacent to the southwesternmost corner of the Gulf of Mexico. To the southwest, Tabasco is bordered by the state of Veracruz, to the northeast by the state of Campeche, to the south by the state of Chiapas, and to the southeast by a small portion of the northwestern border of Guatemala. To the west, much of the state lies in the Gulf Coastal Plain, where it merges with part of this

physiographic region in Veracruz, and to the east, this plain merges with the lowlands of the Yucatan Peninsula. The two principal portions of the state are connected by a slender segment of land at least 6 km in width between Campeche and Chiapas, through which passes a portion of the Usumacinta River (Google Earth, <https://earth.google.com>, accessed: 9 May 2022).

The hydrography of Tabasco is dominated by the presence of portions of the first and second largest watersheds in Mexico, those of the Grijalva and the Usumacinta rivers, which arise from divergent points in the central highlands of Chiapas (the Grijalva) and the central highlands of Guatemala (Usumacinta) and join together in a common delta before entering the Gulf of Mexico near the town of Frontera.

Tabasco is partitioned into 17 municipalities and its capital is Villahermosa. As of 2020, its population was 2,402,598, which ranks 20<sup>th</sup> in the country. More recently its density was noted as 97 people/km<sup>2</sup>, ranking 12<sup>th</sup> in the country (<http://inegi.org>; accessed 5 May 2022). This figure is 1.6 times the average density for Mexico.

The southeasternmost portion of the state contains the highest elevation (<http://inegi.org>; accessed 5 May 2022), between 1,140 and 1,150 m on an unnamed peak located at 17°24'38"N, 92°50'22"W near the border with Chiapas, more or less south of Villahermosa (<http://peakbagger.com>; accessed 7 June 2021). As expected, the lowest elevation in the state is sea level, all along the 198.8 km of shoreline (<http://inegi.org>; accessed 5 May 2022).

## Materials and Methods

### Our Taxonomic Position

In this paper we follow the same taxonomic position as detailed in previous works on other portions of Mesoamerica (Johnson et al. 2015a,b; Mata-Silva et al. 2015; Terán-Juárez et al. 2016; Woolrich-Piña et al. 2016, 2017; Nevárez-de los Reyes et al. 2016; Cruz-Sáenz et al. 2017; Gonzalez-Sánchez et al. 2017; Lazcano et al. 2019; Ramírez-Bautista et al. 2020; Torres-Hernández et al. 2021; Cruz-Elizalde et al. 2022). Johnson (2015a) can be consulted for a formal statement of this position, with special reference to the subspecies concept.

### System for Determining Distributional Status

We employed the same system developed by Alvarado-Díaz et al. (2013) for the herpetofauna of Michoacán to ascertain the distributional status of members of the herpetofauna of Tabasco. Subsequently, Mata-Silva et al. (2015), Johnson et al. (2015a), Terán-Juárez et al. (2016), Woolrich-Piña et al. (2016, 2017), Nevárez-de los Reyes et al. (2016), Cruz-Sánchez et al. (2017), González-Sánchez et al. (2017), Lazcano et al. (2019), Ramírez-Bautista et al. (2020), Torres-Hernández et al. (2021), and Cruz-Elizalde et al. (2022) utilized this system, which consists of four categories: SE = endemic to Tabasco; CE = endemic to Mexico; NE = not endemic to Mexico; and NN = non-native in Mexico.

### Systems for Determining Conservation Status

To assess the conservation status of the herpetofauna of Tabasco, we employed the same three systems (i.e., SEMARNAT, IUCN, and EVS) used by Alvarado-Díaz et al. (2013), Mata-Silva et al. (2015), Johnson et al. (2015a), Terán-Juárez et al. (2016), Woolrich-Piña et al. (2016, 2017), Nevárez-de los Reyes et al. (2016), Cruz-Sánchez et al. (2017), González-Sánchez et al. (2017), Lazcano et al. (2019), Ramírez-Bautista et al. (2020), Torres-Hernández et al. (2021), and Cruz-Elizalde et al. (2022). Detailed descriptions of these three systems appear in the earlier papers of this series, and thus are not repeated here.

## The Mexican Conservation Series

The Mexican Conservation Series (MCS) was initiated in 2013, with a study of the herpetofauna of Michoacán (Alvarado-Díaz et al. 2013), as a part of a set of five papers designated as the “Special Mexico Issue” published in *Amphibian & Reptile Conservation*. The basic format of the entries in the MCS was established in this paper, i.e., providing an examination of the composition, physiographic distribution, and conservation status of the herpetofauna of a given Mexican state or group of states. Two years later, the MCS resumed with a paper on the herpetofauna of Oaxaca (Mata-Silva et al. 2015). That same year, Johnson et al. (2015a) presented a paper on the herpetofauna of Chiapas. The following year, three entries in the MCS appeared, on Tamaulipas (Terán-Juárez et al. 2016), Nayarit (Woolrich-Piña et al. 2016), and Nuevo León (Nevárez-de los Reyes et al. 2016). Thereafter, three entries were published in 2017, on Jalisco (Cruz-Sáenz et al. 2017), the Mexican Yucatan Peninsula (González-Sánchez et al. 2017), and Puebla (Woolrich-Piña et al. 2017), followed by subsequent entries on Coahuila (Lazcano et al. 2019), Hidalgo (Ramírez-Bautista et al. 2020), Veracruz (Torres-Hernández et al. 2021), and most recently one on Querétaro (Cruz-Elizalde et al. 2022). Therefore, this paper on the herpetofauna of Tabasco is number 14 in this series.

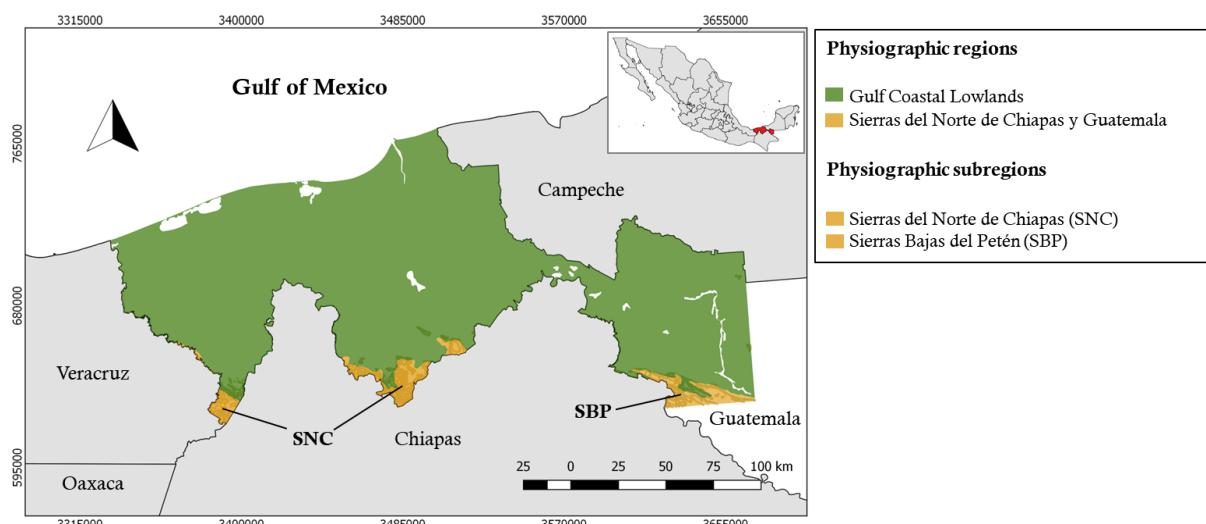
## Physiography and Climate

### Physiographic Regions

To analyze the distribution of the herpetofauna of Tabasco, we used the classification system of physiographic regions of INEGI (1986 and 2016). According to these studies, two physiographic regions are distinguished, one with two subregions (Fig. 1), which are described here.

**Gulf Coastal Plain (GCP).** This province (Fig. 2) comprises 95.7% of the state’s area. Located in southeastern Mexico, it encompasses the states of Campeche, Chiapas, Oaxaca, Tabasco, and Veracruz; and its average length in each state is between 125 and 150 km. To the north, its limits are defined by the Gulf of Mexico; to the east, by the Yucatan Peninsula and Belize; to the south, by the Central American Cordillera and the Sierras de Chiapas and Oaxaca; and to the west by the Sierra Madre del Sur and Sierra Volcánica Transversal or Eje Neovolcánico.

The Gulf Coastal Plain was formed by alluvium carried by the Papaloapan, Coatzacoalcos, Grijalva, and Usumacinta rivers, which cross the province before emptying into the Gulf of Mexico. In the central part of this plain, the lower basins of the Grijalva and Usumacinta rivers (the largest basins in the country) meet and then converge south of the port of Frontera, Tabasco, to exit into the Gulf of Mexico. The Usumacinta



**Fig. 1.** Physiographic regions in the state of Tabasco, Mexico, and location of the state in Mexico.

and Grijalva rivers contribute about 27% of Mexico's hydrologic resources (West et al. 1985). Throughout most of this province, relatively young sedimentary rocks form extensive alluvial plains and coastal plains with an almost flat relief at elevations below 100 m. This relief creates extensive flood plains and lagoons, among which La Machona, Mecoacán, Sitio Grande, and El Rosario are the most prominent (INEGI 2006; SAHOP 1980). Two types of climates are evident: (i) warm humid with abundant rainfall in summer, which covers 76.0% of the surface area and is distributed from the coastal zone to the vicinity of the mountains in the southern portion of the state, and (ii) warm subhumid with summer rains, which is present toward northeastern Tabasco, in the municipality of Balancán. This region is the least humid in the state, with an average annual temperature of 26.4 °C (INEGI 2016).

Grasslands used for grazing livestock have displaced the natural vegetation in this physiographic region, as they cover 30.6% of the area; and additional agricultural areas occupy 25.8% of this region. The third most common type of vegetation is the Tular-popal association, which forms dense patches that cover 26.6% of the swampy areas. In addition, some forests are dominated by a single species (16.2%), such as Cashan (*Terminalia amazonia*), laurel (*Nectandra* sp.), Mulato (*Bursera simaruba*) or Chicozapote (*Achras zapota*). To a lesser degree, the mangroves (2.8%), which are composed of a group of halophilic plants, are characterized by such dominant species as Red Mangrove (*Rhizophora mangle*), Black Mangrove (*Avicennia germinans*), or White Mangrove (*Laguncularia racemosa*) (INEGI 2016).

**Sierras Bajas del Petén (SBP).** This province (Fig. 3) only covers 4.3% of the area of the state, and includes the mountains that extend from southeastern Mexico to Guatemala. This region is characterized by a parallel

arrangement of folded mountain ranges with rounded summits, steep flanks, and wide intermontane valleys at its base (Zavala-Cruz and Ortiz-Pérez 2019). To the north, this province is limited by the occurrence of the Gulf Coastal Plain, to the east by Belize, to the south by Guatemala, and to the west it borders the Central American Mountain Cordillera. This province is divided into five physiographic subprovinces, two of which occur in Tabasco: the northern Sierras of Chiapas and the Lower Sierras of Petén.

**Sierras del Norte de Chiapas (SNC).** In Tabasco, this region (Fig. 4) is composed of two small portions to the south that together cover an area of 986.0 km<sup>2</sup> and comprise parts of the municipalities of Huimanguillo, Macuspana, Tacotalpa, and Teapa (INEGI 1986). In these areas, the highest elevations are the hills of La Pava and La Ventana (at elevations of 880 and 560 m, respectively); and the Madrigal, Tapijulapa, and Poana Mountains (at elevations from 560 to 900 m). The lower hills are La Campana, La Corona, Coconá, Mono Pelado, and El Tortuguero (CONAFOR 2013). Limestone rocks such as dolomites and marls dominate this region, and they alternate with shales and sandstones, but there also are many types of ancient alluvium, igneous rocks formed from volcanic clasts, andesites, and volcanic ash. The lithological diversity gives these mountain ranges a “complex character” (INEGI 1989; Zavala-Cruz and Ortiz-Pérez 2019), and karst features are prominent.

## Climate

**Temperature.** Here, we present the monthly minimum, mean, and maximum temperatures for a single locality in each of the three recognized physiographic regions in Tabasco (Table 1). The elevations for these three localities range from 10 m at Villahermosa in the Gulf



**Fig. 2.** Gulf Coastal Plain. Mangroves in the municipality Paraíso, Tabasco. Photo by José del Carmen Gerónimo-Torres.



**Fig. 4.** Sierra Norte de Chiapas. Mountain Cloud Forest fragment in the municipality of Huimanguillo, Tabasco. Photo by Liliana Ríos-Rodas.

Coastal Plain to 34 m at Huimanguillo in the Sierra Norte de Chiapas.

The mean annual temperature (MAT) is highest at Tenosique (elevation 19 m) in the Sierras Bajas del Petén (SBP) at 26.7 °C. The MAT for the other two localities in the Gulf Coastal Plain (GCP) and the Sierra Norte de Chiapas (SNC) differ by only 0.1 °C (26.4 °C for the GCP and 26.3 °C for the SNC). These values are reflective of the limited variation in elevational range in Tabasco.

The minimum annual temperatures range from 21.6 °C in the SBP and the SNC to 23 °C in the GCP, which only represents a difference of 1.4 °C (Table 1). The mean minimum monthly temperatures peak in May in the GCP and SBP (at 25.6 °C in the former, and 23.6 °C in the latter) and in June in the SNC (at 23.7 °C). The mean maximum monthly temperatures are highest in May in all three regions, respectively 34.8 °C, 35 °C, and 35.4 °C in the GLC, SNC, and SBP. The monthly maximum temperatures are lowest in January in the GCP (at 26.7 °C) and SBP (at 28.0 °C), and in December and January in the SNC (at 26.9 °C).

**Precipitation.** Naturally, monthly precipitation is lowest during the dry season in February (in the SBP), March (in the GCP), or April (in the SNC), and highest during the rainy season in September in all three regions (Table 2). The data in Table 2 demonstrate that 63.0–76.3% of the



**Fig. 3.** Sierras Bajas del Petén. Panoramic view of the Sierras Bajas del Petén, Ejido Nuevo Progreso, municipality of Tenosique, Tabasco, near the border with Guatemala. Photo by Nelly del Carmen Jiménez-Pérez.

yearly precipitation falls during the rainy season, from May to October. The annual rainfall ranges from 1,476.0 mm in the SBP to 2,316.8 mm in the SNC (Table 2).

## Composition of the Herpetofauna

### Families

The members of the native and non-native herpetofauna of Tabasco are arranged among 45 families, including 10 families of anurans, one of salamanders, one of caecilians, one of crocodylians, 24 of squamates, and eight of turtles (Table 3). The total of 45 families includes 72.6% of the 62 families with native, non-native, and introduced/questionable members represented in Mexico (J. Johnson, unpublished, 26 March 2022). Among the 12 amphibian families, 51.1% of the species (Tables 4 and 5) are classified in the families Craugastoridae (seven species) and Hylidae (16 species). Among the 33 reptile families, 59.5% of the species (Tables 4 and 5) are classified in the families Dactyloidae (14 species), Phrynosomatidae (five), Colubridae (20), Dipsadidae (30), and Viperidae (six).

### Genera

The genera of amphibians and reptiles represented in Tabasco number 104, including 24 genera of anurans, one of salamanders, one of caecilians, one of crocodylians, 67 of squamates, and 10 of turtles. These 104 genera include 48.8% of the 213 recorded for Mexico (J. Johnson, unpublished, 26 March 2022). Among the amphibians (Table 4), the largest numbers of species are classified in the genera *Craugastor* (seven species) and *Bolitoglossa* (five); among the reptiles (Table 4), the most speciose genera are *Norops* (14 species), *Sceloporus* (five), and *Coniophanes* (six).

### Species

The herpetofauna of Tabasco consists of 170 species, including 39 anurans, five salamanders, one caecilian, two crocodylians, 111 squamates, and 12 turtles (Tables 3

**Table 1.** Monthly minimum (Min), mean (Mean, in parentheses), maximum (Max), and annual temperature data (in °C) for the three physiographic regions of Tabasco, Mexico. The selected localities for each region and their elevations are as follows: Gulf Coastal Plain—Cárdenas (29 m asl), Centla (4 m), Villahermosa (10 m); Sierra Norte de Chiapas—Huimanguillo (29 m), Teapa (41 m), Macuspana (13 m); and Sierras Bajas del Petén—Tenosique (19 m). Data were taken from <https://smn.conagua.gob.mx/es/climatologia> (Accessed: 16 June 2021).

Physiographic region	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Gulf Coastal Plain	20.1 (22.8)	21.0 (24.1)	22.4 (26.2)	24.4 (28.6)	25.8 (29.5)	25.2 (28.1)	25.2 (28.4)	24.5 (28.1)	23.6 (26.9)	21.9 (24.4)	20.8 (23.5)	23.3 (26.4)	23.3 (26.4)
Sierra Norte de Chiapas	18.3 (22.2)	19.0 (23.4)	20.2 (25.3)	22.2 (27.7)	23.7 (28.9)	23.7 (28.1)	23.3 (27.8)	23.1 (27.6)	22.1 (26.8)	20.3 (25.6)	19.1 (24.0)	21.5 (22.8)	21.5 (25.8)
Sierras Bajas del Petén	18.8 (23.4)	19.4 (24.6)	20.4 (26.3)	22.5 (28.6)	23.6 (29.5)	23.5 (28.6)	22.9 (28)	22.9 (28.2)	22.3 (27.8)	20.7 (26.7)	19.4 (25.2)	21.6 (23.9)	21.6 (26.7)

and 4). The current numbers of native species in Mexico for these six groups are, respectively, 258, 155, 3, 3, 902, and 51 (J. Johnson, unpublished, 26 March 2022). The 165 native species in Tabasco comprise 12.0% of the 1,372 species in the entire native Mexican herpetofauna (J. Johnson, unpublished, 29 May 2021).

Three states in Mexico border Tabasco, and all have been evaluated in the Mexican Conservation Series (Chiapas: Johnson et al. 2015a; Campeche: González-Sánchez et al. 2017; Veracruz: Torres-Hernández et al. 2021). Based on these works, the total figures for the native taxa in these states are as follows: Chiapas, 326; Campeche, 125; and Veracruz, 351. The number of native species in Tabasco (165) is closest to that in Campeche, essentially another lowland state in the western portion of the Yucatan Peninsula. As expected, the two larger and more montane states to the north (Veracruz) and south (Chiapas) contain 2.1 and 2.0 times as many species, respectively, as Tabasco.

### Patterns of Physiographic Distribution

We used a system of three regions (Fig. 1) to analyze the physiographic distribution patterns of members of the Tabasco herpetofauna. The results for the 170 species are tabulated in Table 4 and summarized in Table 5.

The total number of taxa in each of the three regions we recognize ranges from 88 in the Gulf Coastal Plain to 145 in the Sierra Norte de Chiapas. The total for the remaining area (Sierras Bajas del Petén) is 93. The average of these three values is 108.7, or 63.9% of the number for the total herpetofauna (170). The lowest value (88) is 51.8% of the total value (170), and the corresponding percentages for the other two regions in numerical order are 54.7 (93/170) and 85.3 (145/170). These results indicate that the higher elevations in the state, as in the Sierra Norte de Chiapas (see above), exhibit much greater herpetofaunal diversity than the corresponding lower elevations. This situation is consistent with the recognition that herpetofaunal diversity in Mexico is highest in the nearby or bordering states of Oaxaca and Chiapas (Mata-Silva et al. 2015; Johnson et al. 2015a) to the south.

Six herpetofaunal groups are represented in Tabasco, i.e., anurans, salamanders, caecilians, crocodylians, squamates, and turtles. As is typical for the state herpetofaunas in Mexico, anurans and squamates contain the largest numbers of species and the caecilians and crocodylians the fewest, while the salamanders and turtles are represented by intermediate numbers. The largest numbers of anurans (36 of 39, or 92.3%), salamanders (four of five, or 80.0%), and squamates (96 of 111, or 86.5%) and of the herpetofauna in general (145 of 170, or 85.4%) occupy the Sierra Norte de Chiapas. Nonetheless, turtles do not follow this pattern, inasmuch as all 12 of the species in Tabasco occur on the Gulf Coastal Plain, with only six of them (50.0%) occurring in the Sierra Norte de Chiapas, and



**No. 1.** *Hyalinobatrachium viridissimum* (Taylor, 1942). The Northern Glassfrog is a non-endemic species distributed from Guerrero and Veracruz, Mexico, through Guatemala and Belize to northwestern Honduras, and possibly to the departments of Santa Ana and Cabañas in El Salvador (<https://amphibiansoftheworld.amnh.org/>). This individual is from Muku Chem, in the municipality of Tacotalpa, Tabasco. Torres-Hernández et al. (2021) calculated its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has not been assessed by either the IUCN or SEMARNAT. *Photo by Manuel Hernández-May.*



**No. 2.** *Craugastor alfredi* (Boulenger, 1898). Alfred's Rain Frog is distributed from central Veracruz, northern Oaxaca, and southward to the states of Tabasco and Chiapas, Mexico (<https://amphibiansoftheworld.amnh.org/>). This individual was located at Muku Chem, in the municipality of Tacotalpa, Tabasco. Wilson et al. (2013b) determined its EVS as 9, placing it at the upper limit of the low vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, but this species is not listed by SEMARNAT. *Photo by Liliana Ríos-Rodas.*



**No. 3.** *Craugastor berkenbuschii* (Peters, 1870). Berkenbusch's Robber Frog ranges along the Atlantic slopes of southern San Luis Potosí, Hidalgo, Puebla, Veracruz, Tabasco, and northern Oaxaca, north of the Isthmus of Tehuantepec, Mexico (<https://amphibiansoftheworld.amnh.org/>). This individual was located at Muku Chem, in the municipality of Tacotalpa, Tabasco. Wilson et al. (2013b) assessed its EVS as 14, placing it at the lower limit of the high vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN and as a species of Special Protection (Pr) by SEMARNAT. *Photo by Marco Antonio Torrez-Pérez.*



**No. 4.** *Duellmanohyla chamulae* (Duellman, 1961). The Chamula Mountain Brook Frog is known only from a few localities at elevations above 1,600 m on the northern slopes of the Central Highlands of Chiapas and into adjacent extreme southwestern Tabasco, Mexico (<https://amphibiansoftheworld.amnh.org/>). This individual was encountered at Ejido Villa Guadalupe, in the municipality of Huimanguillo, Tabasco. Wilson et al. (2013b) determined its EVS to be 13, placing it at the upper limit of the medium vulnerability category. Its conservation status has been evaluated as Endangered (EN) by IUCN, and as a species of Special Protection (Pr) by SEMARNAT. *Photo by José del Carmen Gerónimo-Torres.*

**Table 2.** Monthly and annual precipitation data (in mm) for the three physiographic regions of Tabasco, Mexico. The selected localities for each of the regions, with elevation given in parentheses) are as follows: Gulf Coastal Plain—Cárdenas (29 m asl), Centla (4 m), Villahermosa (10 m); Sierra Norte de Chiapas—Huimanguillo (29 m), Teapa (41 m), Macuspana (13 m); Sierras Bajas del Petén—Tenosique (19 m). Data were taken from <https://es.climate-data.org> and <https://smn.conagua.gob.mx/es/climatologia> (Accessed: 16 June 2021). The shaded area indicates the months of the rainy season.

Physiographic region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Gulf Coastal Plain	76.8	48.5	30.3	35.3	68.5	192.3	136.5	193.3	270.5	232.5	125.8	79.8	1,489.8
Sierra del Norte de Chiapas	172.5	140	82.5	74	120	257.3	193.8	247.8	341.5	299	210.3	178.3	2,316.8
Sierras Bajas del Petén	62	34	36	54	95	227	141	206	261	196	104	60	1,476

an intermediate number of nine (75.0%) occurs in the Selvas Bajas del Petén.

The members of the Tabasco herpetofauna are distributed in either one, two, or three physiographic regions (Table 4), as follows: one (69 of 170 species; 40.6%); two (46; 27.1%); and three (55, 32.4%). The mean regional occupancy figure is 1.9, which is slightly higher than the 1.6 value for Querétaro, another state with three physiographic regions that was assessed in the Mexican Conservation Series (Cruz-Elizalde et al. 2022). A sizable portion of the 170 species in Tabasco (115; 67.6%) occurs in only one or two of the three physiographic regions, which is of considerable conservation significance (see below).

The number of species occupying a single physiographic region ranges from eight in the Sierras Bajas del Petén (SBP) to 50 in the Sierra Norte de Chiapas (SNC).

The 50 single-region species in the SNC (Table 7) are as follows (numbers refer to distributional categories as reported by Wilson et al. [2017], and asterisks indicate the country endemics):

- Incilius macrocristatus* 4
- Hyalinobatrachium viridissimum* 4
- Craugastor berkenbuschii*\*
- Craugastor pelorus*\*
- Charadrahyla chaneque*\*
- Duellmanohyla chamulae*\*
- Exerodonta bivocata*\*
- Ptychohyla macrotympanum* 4
- Quilticohyla zoque*\*
- Rheohyla miotympnum*\*
- Triprion spinosus* 4
- Gastrophryne elegans* 4
- Agalychnis moreletii* 4
- Bolitoglossa platydactyla*\*
- Bolitoglossa rufescens* 4
- Bolitoglossa veracrucis*\*
- Norops barkeri*\*
- Norops capito* 4
- Norops compressicauda*\*
- Norops laeviventris* 4
- Norops petersi* 4
- Lepidophyma tuxtlae*\*
- Xenosaurus rackhami* 4
- Dendrophidion vinitor* 4
- Ficimia publia* 4
- Phrynonax poecilonotus* 6
- Senticolis triaspis* 7
- Stenorhina freminvillii* 4
- Tantilla rubra* 4
- Tantilla schistosa* 4
- Tantillita lintoni* 4
- Adelphicos quadrivirgatum* 4
- Amastridium sapperi* 4
- Coniophanes piceivittis* 4
- Dipsas brevifacies* 4
- Geophis carinosus* 4
- Geophis laticinctus*\*
- Geophis sanniolus* 4
- Leptodeira maculata* 4
- Leptodeira septentrionalis* 4
- Ninia diademata* 4
- Oxyrhopus petolarius* 6
- Rhadinaea decorata* 6
- Sibon dimidiatus* 4
- Sibon nebulatus* 6
- Xenodon rabdocephalus* 6
- Micrurus elegans* 4
- Scaphiodontophis annulatus* 4
- Amerotyphlops tenuis* 4
- Bothriechis schlegelii* 6

**Table 3.** Taxonomic composition of the native and non-native herpetofauna of Tabasco, Mexico.

Order	Families	Genera	Species
Anura	10	24	39
Caudata	1	1	5
Gymnophiona	1	1	1
<b>Subtotal</b>	<b>12</b>	<b>26</b>	<b>45</b>
Crocodylia	1	1	2
Squamata	24	67	111
Testudines	8	10	12
<b>Subtotal</b>	<b>33</b>	<b>78</b>	<b>125</b>
<b>Total</b>	<b>45</b>	<b>104</b>	<b>170</b>



**No. 5.** *Exerodonta bivocata* (Duellman and Hoyt, 1961). The Chiapan Highlands Treefrog is distributed along the Atlantic slopes of extreme southwestern Tabasco, Oaxaca, and Chiapas in southern Mexico (<https://amphibiansoftheworld.amnh.org/>). This individual was located in Ejido Villa Guadalupe, in the municipality of Huimanguillo, Tabasco. Wilson et al. (2013b) assessed its EVS as 15, placing it in the lower portion of the high vulnerability category. Its conservation status has been judged as Endangered (EN) by the IUCN, but this species is not listed by SEMARNAT. Photo by Liliana Ríos-Rodas.



**No. 6.** *Ptychohyla macrotympanum* (Tanner, 1957). The Pine Forest Stream Frog is distributed in humid montane and pine-oak forest, on the northern slopes of the Chiapan Highlands of Tabasco and Chiapas in Mexico (<https://amphibiansoftheworld.amnh.org/>). This individual was found in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. Wilson et al. (2013b) assessed its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been considered as Vulnerable (VU) by the IUCN, but this species is not listed by SEMARNAT. Photo by Jenny del Carmen Estrada-Montiel.



**No. 7.** *Quilticohyla zoque* (Canseco-Márquez, Aguilar-López, Luría-Manzano, Pineda-Arredondo, and Caviedes-Solis, 2017). The Zoque Treefrog is distributed in evergreen tropical forest at three localities in southern Mexico in the Selva Zoque, two in southern Veracruz (Paso del Moral and Arroyo Zarco), one in extreme southwestern Tabasco near the Veracruz and Chiapas borders, and one in northeastern Oaxaca (Chalchijapa) (<https://amphibiansoftheworld.amnh.org/>). This individual was located in Ejido Villa Guadalupe, in the municipality of Huimanguillo, Tabasco. Torres-Hernández et al. (2021) assessed its EVS as 14, placing it at the lower limit of the high vulnerability category. Its conservation status has been judged as Endangered (EN) by the IUCN, but this species is not listed by SEMARNAT. Photo by Liliana Ríos-Rodas.



**No. 8.** *Triprion spinosus* (Steindachner, 1864). The Coronated Treefrog occurs in humid forests, primarily in the premontane zone of eastern Mexico in the states of Tabasco, Veracruz, Puebla, Oaxaca, and Chiapas, and on into Central America south into Panama (<https://amphibiansoftheworld.amnh.org/>). This individual is from Cerro El Madrigal, in the municipality of Teapa, Tabasco. Wilson et al. (2013b) calculated its EVS as 10, placing it in the lower portion of the medium vulnerability category. Its conservation status has been considered as Near Threatened (NT) by IUCN, but this species is not listed by SEMARNAT. Photo by Marco Antonio Torrez-Pérez.

**Table 4.** Distribution of the herpetofauna of Tabasco, Mexico, by physiographic region. No asterisk = non-endemic; \* = country endemic; \*\* = non-native.

Taxon	Physiographic region			Number of regions	
	Gulf Coastal Plain (GCP)	Sierras de Chiapas y Guatemala			
		Sierra del Norte de Chiapas (SNC)	Sierras Bajas del Petén (SBP)		
<b>Total herpetofauna (170 species)</b>					
<b>AMPHIBIA (45 species)</b>					
<b>Anura (39 species)</b>					
<b>Bufoidae (3 species)</b>					
<i>Incilius macrocristatus</i>		+		1	
<i>Incilius valliceps</i>	+	+	+	3	
<i>Rhinella horribilis</i>	+	+	+	3	
<b>Centrolenidae (1 species)</b>					
<i>Hyalinobatrachium viridissimum</i>		+		1	
<b>Craugastoridae (7 species)</b>					
<i>Craugastor alfredi</i>		+	+	2	
<i>Craugastor berkenbuschii</i> *		+		1	
<i>Craugastor laticeps</i>		+	+	2	
<i>Craugastor loki</i>		+	+	2	
<i>Craugastor palenque</i>		+	+	2	
<i>Craugastor pelorus</i> *		+		1	
<i>Craugastor rhodopis</i> *	+	+	+	3	
<b>Eleutherodactylidae (2 species)</b>					
<i>Eleutherodactylus leprus</i>		+	+	2	
<i>Eleutherodactylus planirostris</i> **	+			1	
<b>Hylidae (16 species)</b>					
<i>Charadrahyla chaneque</i> *		+		1	
<i>Dendrosophus ebraccatus</i>	+	+		2	
<i>Dendrosophus microcephalus</i>	+	+	+	3	
<i>Duellmanohyla chamulae</i> *		+		1	
<i>Exerodonta bivocata</i> *		+		1	
<i>Ptychohyla macrotympanum</i>		+		1	
<i>Quilticohyla zoque</i> *		+		1	
<i>Rheohyla miotympanum</i> *		+		1	
<i>Scinax staufferi</i>	+	+	+	3	
<i>Smilisca baudinii</i>	+	+	+	3	
<i>Smilisca cyanosticta</i>		+	+	2	
<i>Tlalocohyla loquax</i>	+	+	+	3	
<i>Tlalocohyla picta</i>	+	+		2	
<i>Trachycephalus vermiculatus</i>	+	+	+	3	
<i>Triprion petasatus</i>			+	1	
<i>Triprion spinosus</i>		+		1	
<b>Leptodactylidae (3 species)</b>					
<i>Engystomops pustulosus</i>			+	1	
<i>Leptodactylus fragilis</i>	+	+		2	
<i>Leptodactylus melanotus</i>	+	+	+	3	
<b>Microhylidae (2 species)</b>					
<i>Gastrophryne elegans</i>		+		1	
<i>Hypopachus variolosus</i>		+	+	2	
<b>Phyllomedusidae (2 species)</b>					
<i>Agalychnis moreletii</i>		+		1	
<i>Agalychnis taylori</i>	+	+	+	3	
<b>Ranidae (2 species)</b>					
<i>Lithobates brownorum</i>	+	+	+	3	

The herpetofauna of Tabasco, Mexico

**Table 4 (continued).** Distribution of the herpetofauna of Tabasco, Mexico, by physiographic region. No asterisk = non-endemic; \* = country endemic; \*\* = non-native.

Taxon	Physiographic region			Number of regions	
	Gulf Coastal Plain (GCP)	Sierras de Chiapas y Guatemala			
		Sierra del Norte de Chiapas (SNC)	Sierras Bajas del Petén (SBP)		
<i>Lithobates vaillanti</i>	+	+	+	3	
<b>Rhinophrynidae (1 species)</b>					
<i>Rhinophryne dorsalis</i>	+	+	+	3	
<b>Caudata (5 species)</b>					
<b>Plethodontidae (5 species)</b>					
<i>Bolitoglossa alberchi*</i>			+	1	
<i>Bolitoglossa mexicana</i>	+	+	+	3	
<i>Bolitoglossa platydactyla*</i>		+		1	
<i>Bolitoglossa rufescens</i>		+		1	
<i>Bolitoglossa veracrucis*</i>		+		1	
<b>Gymnophiona (1 species)</b>					
<b>Dermophiidae (1 species)</b>					
<i>Dermophis mexicanus</i>	+	+	+	3	
<b>Reptilia (125 species)</b>					
<b>Crocodylia (2 species)</b>					
<b>Crocodylidae (2 Species)</b>					
<i>Crocodylus acutus</i>	+	+	+	3	
<i>Crocodylus moreletii</i>	+	+	+	3	
<b>Squamata (111 species)</b>					
<b>Corytophanidae (4 species)</b>					
<i>Basiliscus vittatus</i>	+	+	+	3	
<i>Corytophanes cristatus</i>		+	+	2	
<i>Corytophanes hernandezii</i>		+	+	2	
<i>Laemancus longipes</i>		+	+	2	
<b>Dactyloidae (14 species)</b>					
<i>Norops barkeri*</i>		+		1	
<i>Norops beckeri</i>	+	+	+	3	
<i>Norops biporcatus</i>	+	+	+	3	
<i>Norops capito</i>		+		1	
<i>Norops compressicauda*</i>		+		1	
<i>Norops laeviventris</i>		+		1	
<i>Norops lemurinus</i>	+	+	+	3	
<i>Norops petersii</i>		+		1	
<i>Norops rodriguezii</i>	+	+	+	3	
<i>Norops sagrei**</i>	+	+	+	3	
<i>Norops sericeus</i>	+	+	+	3	
<i>Norops tropidonotus</i>	+	+	+	3	
<i>Norops uniformis</i>	+	+	+	3	
<i>Norops unilobatus</i>		+	+	2	
<b>Diploglossidae (1 species)</b>					
<i>Celestus rozellae</i>		+	+	2	
<b>Eublepharidae (1 species)</b>					
<i>Coleonyx elegans</i>		+	+	2	
<b>Gekkonidae (2 species)</b>					
<i>Hemidactylus frenatus**</i>	+	+	+	3	
<i>Hemidactylus turcicus**</i>	+	+		2	
<b>Iguanidae (2 species)</b>					
<i>Ctenosaura similis</i>	+	+	+	3	

**Table 4 (continued).** Distribution of the herpetofauna of Tabasco, Mexico, by physiographic region. No asterisk = non-endemic; \* = country endemic; \*\* = non-native.

Taxon	Physiographic region			Number of regions	
	Gulf Coastal Plain (GCP)	Sierras de Chiapas y Guatemala			
		Sierra del Norte de Chiapas (SNC)	Sierras Bajas del Petén (SBP)		
<i>Iguana rhinolopha</i>	+	+	+	3	
<b>Mabuyidae (1 species)</b>					
<i>Marisora lineola</i>	+	+		2	
<b>Phrynosomatidae (5 species)</b>					
<i>Sceloporus chrysostictus</i>	+	+	+	3	
<i>Sceloporus lundelli</i>		+	+	2	
<i>Sceloporus serrifer</i>		+	+	2	
<i>Sceloporus teapensis</i>	+	+	+	3	
<i>Sceloporus variabilis</i>	+	+	+	3	
<b>Phyllodactylidae (1 species)</b>					
<i>Thecadactylus rapicauda</i>		+	+	2	
<b>Scincidae (2 species)</b>					
<i>Mesoscincus schwartzei</i>	+		+	2	
<i>Plestiodon sumichrasti</i>	+	+		2	
<b>Sphaerodactylidae (2 species)</b>					
<i>Sphaerodactylus continentalis</i>		+	+	2	
<i>Sphaerodactylus glaucus</i>	+	+	+	3	
<b>Sphenomorphidae (2 species)</b>					
<i>Scincella cherriei</i>	+	+	+	3	
<i>Scincella gemmingeri*</i>			+	1	
<b>Teiidae (5 species)</b>					
<i>Aspidoscelis deppii</i>	+	+	+	3	
<i>Aspidoscelis guttatus*</i>	+			1	
<i>Holcosus amphigrammus*</i>	+	+		2	
<i>Holcosus festivus</i>	+	+	+	3	
<i>Holcosus stuarti*</i>	+	+		2	
<b>Xantusiidae (2 species)</b>					
<i>Lepidophyma flavimaculatum</i>		+	+	2	
<i>Lepidophyma tuxtlae*</i>		+		1	
<b>Xenosauridae (1 species)</b>					
<i>Xenosaurus rackhami</i>		+		1	
<b>Boidae (1 species)</b>					
<i>Boa imperator</i>	+	+	+	3	
<b>Colubridae (20 species)</b>					
<i>Dendrophidion vinitor</i>		+		1	
<i>Drymarchon melanurus</i>	+	+	+	3	
<i>Drymobius margaritiferus</i>	+	+	+	3	
<i>Ficimia publia</i>		+		1	
<i>Lampropeltis polyzona</i>	+	+		2	
<i>Leptophis ahaetulla</i>		+	+	2	
<i>Leptophis mexicanus</i>	+	+	+	3	
<i>Masticophis mentovarius</i>	+	+	+	3	
<i>Mastigodryas melanolomus</i>	+	+		2	
<i>Oxybelis fulgidus</i>	+			1	
<i>Oxybelis potosiensis</i>	+	+	+	3	
<i>Phrynonax poecilonotus</i>		+		1	
<i>Pseudelaphe flavirufa</i>		+	+	2	
<i>Senticolis triaspis</i>		+		1	
<i>Spilotes pullatus</i>	+	+	+	3	

The herpetofauna of Tabasco, Mexico

**Table 4 (continued).** Distribution of the herpetofauna of Tabasco, Mexico, by physiographic region. No asterisk = non-endemic; \* = country endemic; \*\* = non-native.

Taxon	Physiographic region			Number of regions	
	Gulf Coastal Plain (GCP)	Sierras de Chiapas y Guatemala			
		Sierra del Norte de Chiapas (SNC)	Sierras Bajas del Petén (SBP)		
<i>Stenorhina degenhardtii</i>	+			1	
<i>Stenorhina freminvillii</i>		+		1	
<i>Tantilla rubra</i>		+		1	
<i>Tantilla schistosa</i>		+		1	
<i>Tantillita lintoni</i>		+		1	
<b>Dipsadidae (30 species)</b>					
<i>Adelphicos quadrivirgatum</i>		+		1	
<i>Amastridium sapperi</i>		+		1	
<i>Clelia scytalina</i>	+	+		2	
<i>Coniophanes bipunctatus</i>	+	+		2	
<i>Coniophanes fissidens</i>		+	+	2	
<i>Coniophanes imperialis</i>	+	+	+	3	
<i>Coniophanes piceivittis</i>		+		1	
<i>Coniophanes quinquevittatus</i>	+	+	+	3	
<i>Coniophanes schmidti</i>			+	1	
<i>Conophis lineatus</i>	+		+	2	
<i>Dipsas brevifacies</i>		+		1	
<i>Enulius flavitorques</i>	+			1	
<i>Geophis carinosus</i>		+		1	
<i>Geophis laticinctus*</i>		+		1	
<i>Geophis sanniolus</i>		+		1	
<i>Geophis sartorii</i>	+	+	+	3	
<i>Imantodes cenchoa</i>	+	+	+	3	
<i>Imantodes gemmistratus</i>		+	+	2	
<i>Leptodeira frenata</i>			+	1	
<i>Leptodeira maculata</i>		+		1	
<i>Leptodeira septentrionalis</i>		+		1	
<i>Ninia diademata</i>		+		1	
<i>Ninia sebae</i>	+	+	+	3	
<i>Oxyrhopus petolarius</i>		+		1	
<i>Pliocercus elapoides</i>	+	+		2	
<i>Rhadinaea decorata</i>		+		1	
<i>Sibon dimidiatus</i>		+		1	
<i>Sibon nebulatus</i>		+		1	
<i>Tretanorhinus nigroluteus</i>	+	+		2	
<i>Xenodon rabdocephalus</i>		+		1	
<b>Elapidae (2 species)</b>					
<i>Micrurus diastema*</i>	+	+		2	
<i>Micrurus elegans</i>		+		1	
<b>Leptotyphlopidae (1 species)</b>					
<i>Epictia phenops</i>	+			1	
<b>Natricidae (3 species)</b>					
<i>Nerodia rhombifera</i>	+			1	
<i>Thamnophis marcianus</i>	+		+	2	
<i>Thamnophis proximus</i>	+	+		2	
<b>Sibynophiidae (1 species)</b>					
<i>Scaphiodontophis annulatus</i>		+		1	
<b>Typhlopidae (2 species)</b>					
<i>Amerotyphlops tenuis</i>		+		1	

**Table 4 (continued).** Distribution of the herpetofauna of Tabasco, Mexico, by physiographic region. No asterisk = non-endemic; \* = country endemic; \*\* = non-native.

Taxon	Physiographic region			Number of regions	
	Gulf Coastal Plain (GCP)	Sierras de Chiapas y Guatemala			
		Sierra del Norte de Chiapas (SNC)	Sierras Bajas del Petén (SBP)		
<i>Virgöttyphlops braminus</i> **	+			1	
<b>Viperidae (6 species)</b>					
<i>Agiistrodon russeolus</i>			+	1	
<i>Bothriechis schlegelii</i>		+		1	
<i>Bothrops asper</i>	+	+	+	3	
<i>Crotalus tzacan</i>			+	1	
<i>Metlapilcoatlus mexicanus</i>		+	+	2	
<i>Porthidium nasutum</i>		+	+	2	
<b>Testudines (12 species)</b>					
<b>Cheloniidae (2 species)</b>					
<i>Chelonia mydas</i>	+			1	
<i>Lepidochelys kempii</i>	+			1	
<b>Chelydridae (1 species)</b>					
<i>Chelydra rossignonii</i>	+	+	+	3	
<b>Dermatemydidae (1 species)</b>					
<i>Dermatemys mawii</i>	+	+	+	3	
<b>Dermochelyidae (1 species)</b>					
<i>Dermochelys coriacea</i>	+			1	
<b>Emydidae (1 species)</b>					
<i>Trachemys venusta</i>	+	+	+	3	
<b>Geoemydidae (1 species)</b>					
<i>Rhinoclemmys areolata</i>	+		+	2	
<b>Kinosternidae (3 species)</b>					
<i>Kinosternon acutum</i>	+	+	+	3	
<i>Kinosternon leucostomum</i>	+	+	+	3	
<i>Kinosternon scorpioides</i>	+		+	2	
<b>Staurotypidae (2 species)</b>					
<i>Claudius angustatus</i>	+		+	2	
<i>Staurotypus triporcatus</i>	+	+	+	3	

Thirteen of these 50 species (26.0%) are country endemics and 37 (74.0%) are non-endemics. Thirty of the 37 non-endemics (81.1%) are MXCA species, and thus are distributed some distance from Mexico into Central America. Six of these non-endemics (16.2%) are MXSA species, and thus range from Mexico through Central America and into South America. Finally, one non-endemic (2.7%) is a USCA species, and thus ranges from the United States to Central America.

The 11 single-region species in the GCP (Table 7) are as follows (numbers refer to the distributional categories as designated by Wilson et al. [2017]; one asterisk indicates a country endemic species; and two asterisks a non-native species):

*Eleutherodactylus planirostris*\*\*  
*Aspidoscelis guttatus*\*

*Oxybelis fulgidus* 6  
*Stenorhina freminvillii* 4  
*Enulius flavitorques* 6  
*Epictia phenops* 4  
*Nerodia rhombifera* 3  
*Virgöttyphlops braminus*\*\*  
*Chelonia mydas* 9  
*Lepidochelys kempii* 9  
*Dermochelys coriacea* 9

Note that only one of these 11 species (9.1%) is a country endemic, two (18.2%) are non-natives, and eight (72.7%) are non-endemics. Of the eight non-endemics, one is a MXUS species (12.5%), the only one in Tabasco that ranges northward from Mexico into the United States. Two of these are MXCA species (25.0%), two are MXSA species (25.0%), and three are OCEA (or oceanic) species (37.5%; the sea turtles).



**No. 9.** *Leptodactylus fragilis* (Brocchi, 1877). The White-lipped Frog is distributed from the Lower Rio Grande Valley of southern Texas (USA) through eastern and southern Mexico (southeast from Colima), and into Central America through northern and western Colombia (<https://amphibiansoftheworld.amnh.org/>). This individual was found in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. Wilson et al. (2013b) calculated its EVS as 5, placing it in the lower portion of the low vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, but this species is not listed by SEMARNAT. Photo by José del Carmen Gerónimo-Torres.



**No. 10.** *Agalychnis taylori* Funkhouser, 1957. Taylor's Leaf Frog occurs on the Atlantic slopes and lowlands from southern Veracruz and northern Oaxaca in Mexico, through the more humid portions of Tabasco, Campeche, Quintana Roo and Yucatan, and on through Guatemala to west-central Honduras (<https://amphibiansoftheworld.amnh.org/>). This individual was found in the municipality of Centro, Tabasco. Torres-Hernández et al. (2021) calculated its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, but this species is not listed by SEMARNAT. Photo by José del Carmen Gerónimo-Torres.



**No. 11.** *Lithobates vaillanti* (Brocchi, 1877). Vaillant's Frog ranges from “low and moderate elevations from north-central Veracruz and northern Oaxaca to the central Rio Magdalena region in Colombia on the Atlantic versant and on the Pacific versant in southeastern Oaxaca and northwestern Chiapas, Mexico, and from northwestern Nicaragua to southwestern Ecuador” (<https://amphibiansoftheworld.amnh.org/>). This individual was located in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. Wilson et al. (2013b) determined its EVS as 9, placing it at the upper limit of the low vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, but this species is not listed by SEMARNAT. Photo by José del Carmen Gerónimo-Torres.



**No. 12.** *Bolitoglossa mexicana* Duméril, Bibron, and Duméril, 1854. The Mexican Mushroom-tongued Salamander is distributed from the “Atlantic slope from southern Veracruz (Mexico) across the base of the Yucatan Peninsula, with an isolated population in the northern part of Yucatan Peninsula, to Honduras (extending to the Pacific versant in the Ocotepeque) and El Salvador (Departamento de Chalatenango, municipio de La Palma, Cerro La Palma)” (<https://amphibiansoftheworld.amnh.org/>). This individual was encountered in Villa Luz, in the municipality of Tacotalpa, Tabasco. Wilson et al. (2013b) assessed its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN and it is allocated to the Special Protection (Pr) category by SEMARNAT. Photo by Liliana Ríos-Rodas.

**Table 5.** Distribution of herpetofaunal families in Tabasco, Mexico, by physiographic province. See Table 4 header for an explanation of the abbreviations.

Family	Number of species	Distribution among physiographic regions		
		GCP	SNC	SBP
Bufonidae	3	2	3	2
Centrolenidae	1	—	1	—
Craugastoridae	7	1	7	5
Eleutherodactylidae	2	1	1	1
Hylidae	16	7	15	7
Leptodactylidae	3	2	2	2
Microhylidae	2	—	2	1
Phyllomedusidae	2	1	2	1
Ranidae	2	2	2	2
Rhinophrynidae	1	1	1	1
<b>Subtotal</b>	<b>39</b>	<b>17</b>	<b>36</b>	<b>22</b>
Plethodontidae	5	1	4	2
<b>Subtotal</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>2</b>
Dermophiidae	1	1	1	1
<b>Subtotal</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Total</b>	<b>45</b>	<b>19</b>	<b>41</b>	<b>25</b>
Crocodylidae	2	2	2	2
<b>Subtotal</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
Corytophanidae	4	1	4	4
Dactyloidae	14	8	14	9
Diploglossidae	1	—	1	1
Eublepharidae	1	—	1	1
Gekkonidae	2	2	2	1
Iguanidae	2	2	2	2
Mabuyidae	1	1	1	—
Phrynosomatidae	5	3	5	5
Phyllodactylidae	1	—	1	1
Scincidae	2	2	1	1
Sphaerodactylidae	2	1	2	2
Sphenomorphidae	2	1	1	2
Teiidae	5	5	4	2
Xantusiidae	2	—	2	1
Xenosauridae	1	—	1	—
<b>Subtotal</b>	<b>45</b>	<b>26</b>	<b>42</b>	<b>32</b>
Boidae	1	1	1	1
Colubridae	20	10	18	8
Dipsadidae	30	11	26	10
Elapidae	2	1	2	—
Leptotyphlopidae	1	1	—	—
Natricidae	3	3	1	1
Sibynophiidae	1	—	1	—
Typhlopidae	2	1	1	—
Viperidae	6	1	4	5
<b>Subtotal</b>	<b>66</b>	<b>29</b>	<b>54</b>	<b>25</b>
Cheloniidae	2	2	—	—
Chelydridae	1	1	1	1
Dermatemyidae	1	1	1	1
Dermochelyidae	1	1	—	—
Emydidae	1	1	1	1
Geoemydidae	1	1	—	1
Kinosternidae	3	3	2	3
Staurotypidae	2	2	1	2
<b>Subtotal</b>	<b>12</b>	<b>12</b>	<b>6</b>	<b>9</b>
<b>Total</b>	<b>125</b>	<b>69</b>	<b>104</b>	<b>68</b>
<b>Sum total</b>	<b>170</b>	<b>88</b>	<b>145</b>	<b>93</b>

## The herpetofauna of Tabasco, Mexico

**Table 6.** Pair-wise comparison matrix of Coefficient of Biogeographic Resemblance (CBR) data of the herpetofaunal relationships for the three physiographic regions in Tabasco, Mexico. Underlined values = number of species in each region; upper triangular matrix values = species in common between two regions; and lower triangular matrix values = CBR values. The formula for this calculation is:  $CBR = 2C/N_1 + N_2$  (Duellman, 1990), where C is the number of species common to both regions,  $N_1$  is the number of species in the first region, and  $N_2$  is the number of species in the second region. See Table 4 for an explanation of the abbreviations, and Fig. 12 for the UPGMA dendrogram produced from the CBR data.

	Gulf Coastal Plain	Sierra Norte de Chiapas	Sierras Bajas del Petén
Gulf Coastal Plain	<b>88</b>	71	61
Sierra Norte de Chiapas	0.61	<b>145</b>	79
Sierras Bajas del Petén	0.67	0.66	<b>93</b>

The eight single-region species in the SBP (Table 7) are as follows (numbers refer to the distributional categories as designated by Wilson et al. [2017]; an asterisk indicates country endemics):

- Triprion petasatus* 4
- Engystomops pustulosus* 6
- Bolitoglossa alberchi*\*
- Scincella gemmingeri*\*
- Coniophanes schmidti* 4
- Leptodeira frenata* 4
- Akgistrodon russeolus* 4
- Crotalus tzabcan* 4

Two of these eight species (25.0%) are country endemics and the remaining six are non-endemics. Of the six non-endemic species, one is an MXSA species and the other five are MXCA species.

In summary, of the 69 single-region species distributed in Tabasco, 51 (73.9%) are non-endemics, 16 (23.2%) are country endemics, and two (2.9%) are non-natives. Of the three physiographic regions in Tabasco, the SNC is of greatest conservation importance, given that it supports the largest overall number of species (145), as well as the largest numbers of single-region species (50) and country-endemics (13).

We constructed a Coefficient of Biogeographic Resemblance (CBR) matrix for establishing the herpetofaunal similarity relationships among the three physiographic regions in Tabasco (Table 6). The SNC supports the highest level of species richness at 145 species, followed by 93 in the SBP, and 88 in the GCP. The mean species richness for the three regions is 108.7. The numbers of shared species among all regional pairs range from 61 between the GCP and the SBP to

79 between the SNC and the SBP. The average value of shared species among all three regions is 70.3.

The CBR data in Table 6 demonstrate values ranging from 0.61 to 0.67 (see below), with a mean value of 0.65. This range of CBR values is limited and the values are relatively high, indicating that many of these species are widespread.

We determined the numbers of species inhabiting one, two, and three of the recognized physiographic regions (Table 7). In each of the two smaller herpetofaunas for the Gulf Coastal Plain and the Sierras Bajas del Petén subregion the numbers of species found in one, two, and three regions increase from the lowest to the highest value. However, in the area with the largest herpetofauna (145 species), the Sierra de Norte de Chiapas, the number of single-region species (50) is higher than the number of the double-region species (40), and is closer to the number of species occupying all three regions (55). Of the 170 total herpetofaunal species in Tabasco, 101 (59.4%) are found in two or three physiographic regions, leaving 69 (40.6%) with a distribution in only a single region (see above). Thus, 50 of these 69 single-region species are restricted to the Sierra Norte de Chiapas.

The highest CBR value (0.67) is that between the GCP and the SBP, and the lowest value (0.61) is between the GCP and the SNC. We expected a relatively high level of resemblance among these three areas, since the two higher-elevation regions are adjacent to the lower-elevation region, and all three regions contain relatively low elevations (see above).

The overall CBR values among the three physiographic regions are as follows, arranged from the highest to lowest value (species numbers in parentheses):

$$\begin{aligned} GCP(88) - 0.61 - SNC(145) \\ SBP(93) - 0.66 - SNC(145) \\ GCP(88) - 0.67 - SBP(93) \end{aligned}$$

**Table 7.** Counts of the number of species within each of the three physiographic regions in Tabasco, Mexico, which occupy one, two, or three of the physiographic regions.

Physiographic region	Number of regions inhabited			Total
	One	Two	Three	
Gulf Coastal Plain	11	22	55	88
Sierra del Norte de Chiapas	50	40	55	145
Sierras Baja del Petén	8	30	55	93
State total	<b>69</b>	<b>46</b>	<b>55</b>	<b>170</b>



**No. 13.** *Bolitoglossa veracrucis* Taylor, 1951. The Veracruz Salamander previously was known only from the type locality (Veracruz, Mexico), at 100 to 1,000 m elevation (<https://amphibiansoftheworld.amnh.org/>). In 2008, however, a population of this species was recorded for the first time in the state of Tabasco, from Cuevas de Muku Chem, in the municipality of Tacotalpa (Gerónimo-Torres et al. 2022). Wilson et al. (2013b) calculated its EVS as 17, placing it in the middle portion of the high vulnerability category. Its conservation status has been considered as Endangered (EN) by IUCN, and as a species of Special Protection (Pr) by SEMARNAT. Photo by Marco Antonio Torrez-Pérez.



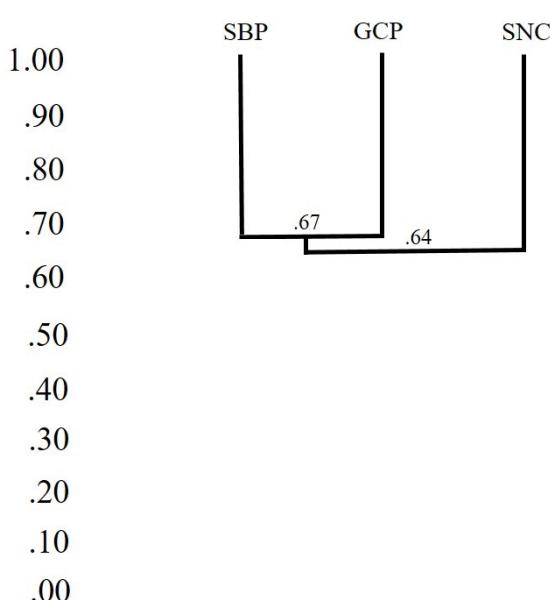
**No. 14.** *Corytophanes cristatus* (Merrem, 1820). The Smooth Helmeted Iguana is found at low and intermediate elevations on the Gulf and Caribbean slopes from central Veracruz to Colombia (Lee 1996). This lizard ranges from central Veracruz and the southern part of the Yucatan Peninsula in Mexico, southward on the Atlantic versant and lowlands of Central America through northern Guatemala and Belize to Costa Rica, where it occurs on both the Atlantic and Pacific slopes into northwestern Colombia (Campbell 1998). This individual was found in the municipality of Tacotalpa, Tabasco, in secondary vegetation. Its EVS has been determined as 11, placing it in the middle portion of the medium vulnerability category, and its IUCN status has been assessed as Least Concern (LC). This species was allocated to the Special Protection (Pr) category by SEMARNAT. Photo by Marco Antonio Torrez-Pérez.



**No. 15.** *Corytophanes hernandesii* (Wiegmann, 1831). Hernandez's Helmeted Basilisk occurs at low and moderate elevations on the Atlantic versant from southeastern San Luis Potosí, Mexico, to northwestern Honduras (McCrane et al. 2004). This individual was encountered in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. Wilson et al. (2013a) determined its EVS as 13, placing it at the upper limit of the medium vulnerability category. Its conservation status has not been determined by the IUCN, but this species was provided Special Protection (Pr) status by SEMARNAT. Photo by José del Carmen Gerónimo-Torres.



**No. 16.** *Norops barkeri* Schmidt, 1939. Barker's Anole is a semiaquatic anole endemic to southern Mexico. This species is known from states of Veracruz, Chiapas, Oaxaca, and Tabasco (Powell and Birt 2001). This individual was found in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. This lizard's EVS has been assessed as 15, placing it in the lower portion of the high vulnerability category (Wilson et al. 2013a). Its IUCN status has been determined as Vulnerable (VU), and it is considered a species of Special Protection (Pr) by SEMARNAT. Photo by Jenny del C.-Estrada-Montiel.



**Fig. 5.** UPGMA-generated dendrogram illustrating the similarity relationships of species richness among the herpetofaunal components in the three physiographic regions of Tabasco (based on the data in Table 6; Sokal and Michener 1958). Similarity values were calculated using Duellman's (1990) Coefficient of Biogeographic Resemblance (CBR).

Based on the data in Table 6, we created a UPGMA dendrogram (Fig. 5) to demonstrate the herpetofaunal resemblance patterns among the three physiographic regions in Tabasco (see map, Fig. 1). The dendrogram indicates that the CBP and GCP cluster at the 0.67 level and the SNC clusters to the previous pair at the 0.64 level. This overall pattern indicates that all three regions are closely aligned together at an intermediate level of resemblance.

### Distribution Status Categorizations

We utilized the same system as Alvarado-Díaz et al. (2013) to examine the distribution status of members of the Tabasco herpetofauna, and this system has been used in all the subsequent entries in the MCS (see above). The categories in this system are non-endemic, country endemic, state endemic (of which none occur in Tabasco), and non-native. These categorizations are listed in Table 8 and summarized in Table 9.

The numbers of species in each of the three applicable categories, in decreasing order of size, are as follows: non-endemics, 145 (85.3% of total of 170 species); country endemics, 20 (11.8%); and non-natives, five (2.9%). As with the states of Oaxaca (Mata-Silva et al. 2015), Chiapas (Johnson et al. 2015a), Tamaulipas (Terán-Juárez et al. 2016), Nuevo León (Nevárez-de los Reyes et al. 2016), Coahuila (Lazcano et al. 2019), and Veracruz (Torres-Hernández et al. 2021), as well as the tri-state Yucatan Peninsula (González-Sánchez et al. 2017),

most of the herpetofaunal taxa in Tabasco fall within the non-endemic category. In the other six states evaluated in the Mexican Conservation Series, the largest number falls within the country endemic category: Michoacán (Alvarado-Díaz et al. 2013); Nayarit (Woolrich-Piña et al. 2016); Jalisco (Cruz-Sáenz et al. 2017); Puebla (Woolrich-Piña et al. 2017); Hidalgo (Ramírez-Bautista et al. 2020); and Querétaro (Cruz-Elizalde et al. 2022).

Twenty country endemic species are present in Tabasco, and perhaps this relatively low number was expected because the state lies largely on the Gulf Coastal Plain and adjacent to relatively low-elevation areas, which generally are not known for significant herpetofaunal endemism. No state endemic species occur in Tabasco. In the 13 previous entries in the MCS (including the Oaxaca update; Mata-Silva et al. 2021), the number of state endemic species ranges from one in Nayarit and Nuevo León (Woolrich-Piña et al. 2016; Nevárez-de los Reyes 2016) to 105 in Oaxaca (Mata-Silva et al. 2021).

Five non-native species have been recorded from Tabasco, including *Eleutherodactylus planirostris*, *Norops sagrei*, *Hemidactylus frenatus*, *H. turcicus*, and *Virgophylops braminus*. Two of these five species (*H. frenatus* and *V. braminus*) are the most widespread of the non-native species recorded in the 13 entries in the MCS (Cruz-Elizalde et al. 2022), and to date they have been reported in 13 states or tri-state regions.

Wilson et al. (2017) introduced a system for the distributional categorization of the Mesoamerican herpetofauna. The data for the categories applicable to this work are summarized in Table 10. Previously, we noted that 145 species are non-endemic to Tabasco, and we allocated them to six of the nine categories developed by Wilson et al. (2017), including MXUS, MXCA, MXSA, USCA, USSA, and OCEA. As expected, the greatest number and proportion of species fall into the MXCA category (95, or 65.5%), given the proximity of Tabasco to Central America and since a significant portion of its eastern border is shared with Guatemala. Interestingly, the next largest number and proportion of species are allocated to the MXSA category (34, or 23.4%). Oddly, only a single species (0.7%) is assigned to the MXUS category. By way of comparison, this category contains 29 species, or 17.2%, in the herpetofauna of the adjacent state to the west (i.e., Veracruz; Torres-Hernández et al. 2021). The remaining 15 species are in the USCA (eight, or 5.5%), USSA (four, or 2.7%), and OCEA (three, or 2.1%) categories.

### Principal Environmental Threats

#### Deforestation

Deforestation in southeastern Mexico is a serious matter that has worsened over time, and the state of Tabasco is no exception (Fig. 6). The continuous loss of vegetational



**No. 17.** *Norops compressicauda* Smith and Kerster, 1955. The Malpaso Scaly Anole is endemic to Mexico. This anole has been reported from the states of Oaxaca, Veracruz, and Chiapas. Here we present the first records of this species from the state of Tabasco, from the municipalities of Teapa and Tacotalpa, in montane areas at elevations from 100 to 700 m (Ríos Rodas et al. 2017). Wilson et al. (2013a) calculated its EVS as 15, placing it in the lower portion of the high vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, but this species is not listed by SEMARNAT. Photo by Liliana Ríos-Rodas.



**No. 18.** *Coleonyx elegans* Gray, 1845. The Yucatan Banded Gecko is distributed on the Gulf and Pacific slopes in the states of the southeastern region of Mexico. In Tabasco, this species has been recorded in the municipalities of Tacotalpa, Huimanguillo, and Teapa. This individual is from Mukú Chem, in the municipality of Tacotalpa, Tabasco. Its EVS has been determined as 9, placing it at the upper limit of the low vulnerability category (Wilson et al. 2013a). Its IUCN status has been assessed as Least Concern (LC), and as Threatened (A) by SEMARNAT. Photo by Manuel Hernández-May.



**No. 19.** *Ctenosaura similis* (Gray, 1831). The Common Spiny-tailed Iguana occurs at low and moderate elevations from southern Veracruz and Oaxaca southward to Panama (Lee 1996). The native range of this species extends along the Atlantic versant from the Isthmus of Tehuantepec southeastward to northeastern Nicaragua, and on the Pacific versant from the Isthmus of Tehuantepec southeastward to Panama (Köhler 2003). This individual was found in rainforest at an elevation of 200 m, in the municipality of Tenosique, Tabasco. Wilson et al. (2013a) calculated its EVS as 8, placing it in the upper portion of the low vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN. This species was allocated to the Threatened (A) category by SEMARNAT. Photo by María del Rosario Barragán-Vázquez.



**No. 20.** *Sceloporus teapensis* Günther, 1890. The Teapen Rosebellied Lizard occurs at low elevations on the Atlantic slopes from southern Veracruz and Oaxaca, eastward through Chiapas, Tabasco, and Campeche, and through the Petén region of Guatemala to Belize, and south to Cobán, Alta Verapaz, Guatemala (Lee 1996). This individual was encountered in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. Wilson et al. (2013a) determined its EVS as 13, placing it at the upper limit of the medium vulnerability category. Its conservation status has been assessed as Least Concern (LC) by the IUCN, but has not been determined by SEMARNAT. Photo by Jenny del Carmen Estrada-Montiel.



**Fig. 6.** Deforestation due to road construction in the vicinity of Paraíso, Tabasco. Photo by José del Carmen Gerónimo-Torres.

cover in tropical forest has been precipitated primarily by a shift in land use for livestock and agricultural activities, lumber extraction, an increasing number of roads, oil production-related activities, and the direct effect of human population growth (Maldonado-Sánchez et al. 2016). To date, Tabasco has lost more than 90% of its original vegetational cover (Zavala-Cruz and Castillo 2003), and more recent data indicate that approximately only 2% of this vegetation remains (Sánchez-Munguía 2005). In the basins of the Grijalva and Usumacinta rivers, the tropical forest cover has been reduced from 36% in 1993 to only 9% in 2007 (Kolb and Galicia 2012).

The above numbers reveal the somber panorama that Tabasco currently faces, which directly affects the prospects for conserving biodiversity, including its herpetofauna. The last remnants of forest in Tabasco are distributed mostly in the municipalities of Teapa, Tenosique, Huimanguillo, and Macuspana (Castillo and Zavala 1996); ironically, these are the same geographic entities where various extension records of amphibians and reptiles have been reported in recent years. Species such as the Northern Glass Frog (*Hyalinobatrachium viridissimum*), the Chiapan Highlands Treefrog (*Exerodonta bivocata*), the Smooth-headed Helmeted Basilisk, locally known as Turipache (*Corytophanes cristatus*), Barker's Anole (*Norops barkeri*), and the Keeled Earth Snake (*Geophis carinosus*) are just a few worthy of mention. These records highlight the need for continuous and urgent exploration, especially in areas that still contain tropical forest.

### Agricultural Activities

As mentioned earlier, one of the main drivers of deforestation is farming (Fig. 7) and livestock activities. In this regard, Alejandro-Montiel et al. (2010) stated that these activities are responsible for 94% of the land change that has taken place in Tabasco. Noteworthy agricultural policies for Tabasco were developed in the 1960s and 1970s (Plan Chontalpa and Plan Balancán-



**Fig. 7.** Conversion of land use for agricultural purposes in the community of Villa Luz, in the municipality of Tacotalpa, Tabasco. Photo by Liliana Ríos-Rodas.

Tenosique), and have affected more than 200,000 ha, resulting in the complete elimination of evergreen tropical forest and the desiccation of wetlands for the later development of urban communities (Barkin 1978). For example, immediately after the completion of one of these projects, a subsequent study revealed that only 8% of the forests remained in the municipalities of Balancán and Tenosique, which increased flooding and soil erosion in those areas (Tudela 1989; Torres-Masuera 2021).

These programs did not have the promised results, but on the contrary were responsible for the loss of forest and biodiversity that have not recovered thus far. This infamous action was never reported; therefore, there are no actual numbers that can reveal the specific amount of biodiversity affected.

Currently, Tabasco dedicates more than 253,000 ha to the cultivation of banana, sugarcane, cocoa, corn, and oil palm. Unfortunately, these large-scale crops are damaging to the remaining natural ecosystems in the state, whose effects are exacerbated by the large amount of associated chemicals. The municipalities of Huimanguillo and Balancán have the largest amount of land used for cultivation, and Huimanguillo also has the largest livestock production (Infografía Agroalimentaria 2017). At the same time, the municipality of Huimanguillo contains remnants of evergreen tropical forest where additional species have been reported in recent times, expanding their geographic distributions. The current and historical situation regarding the development of agriculture in the state also indicates the continuous damage inflicted on natural ecosystems and, therefore, all of the species they harbor.

### Roads

Roads represent an important contributor to the intensification of productivity in communities, and simultaneously are an instrumental component for social, economic, and cultural integration. According to INEGI (2009), Tabasco has an extensive system of roads, and is



**No. 21.** *Sphaerodactylus continentalis* Werner, 1896. The Upper Central American Geckolet occurs at “low and moderate elevations from the Isthmus of Tehuantepec in northern Oaxaca, Mexico, to about the Catacamas, Olancho, region of east-central Honduras;” this species “also occurs on Utila Island in the Honduran Bay Islands and possibly on Cozumel Island, Quintana Roo, Mexico” (McCrane and Hedges 2012). This individual is from Muku Chem, in the municipality of Tacotalpa, Tabasco. Mata-Silva et al. (2021) determined its EVS as 10, placing it at the lower limit of the medium vulnerability category. Its conservation status has been evaluated as Least Concern (LC) by the IUCN, but it has not been assessed by SEMARNAT. *Photo by Liliana Ríos-Rodas.*



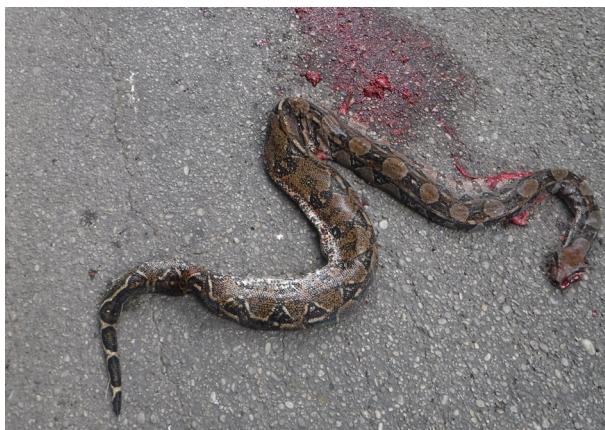
**No. 22.** *Holcosus stuarti* Smith, 1940. The Rainbow Ameiva occurs on the “Atlantic slopes of Mexico from the middle of the Isthmus of Tehuantepec eastward in the lowlands to the southern borders of Laguna de Términos and to Tenosique, Tabasco; southward up the valley of the Rio Grijalva at least as far as Tuxtla Gutiérrez, Chiapas” (Meza-Lázaro and Nieto-Montes de Oca 2015). This individual was located in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. Wilson et al. (2013a) determined its EVS as 7, placing it in the middle limit of the low vulnerability category. Its conservation status has been evaluated as Least Concern (LC) by the IUCN, but this species is not listed by SEMARNAT. *Photo by Jenny del Carmen Estrada-Montiel.*



**No. 23.** *Lepidophyma flavimaculatum* Duméril, 1851. The Yellow-spotted Night Lizard is found at low and moderate elevations on the Atlantic slope from Veracruz eastward through northern Guatemala, Belize, and northern Honduras. In the Yucatan Peninsula it is known from northeastern Chiapas, El Petén, Belize, and southern Quintana Roo (Lee 1996). This individual was located in the Ejido Villa Guadalupe of Huimanguillo, Tabasco. Wilson et al. (2013a) assessed its EVS as 8, placing it in the upper portion of the low vulnerability category. Its conservation status has been evaluated as Least Concern (LC) by the IUCN, and this species was placed in the Special Protection (Pr) category by SEMARNAT. *Photo by José del Carmen Gerónimo-Torres.*



**No. 24.** *Leptophis mexicanus* Duméril, Bibron, and Duméril, 1854. The Mexican Parrot Snake is distributed in southeastern Mexico, including Chiapas, Veracruz, Oaxaca, Tabasco, Yucatán, Campeche, San Luis Potosí, Querétaro, Tamaulipas, Puebla, Hidalgo, Nuevo León, Guerrero, and Yucatan Peninsula, into Guatemala, Honduras, Belize, El Salvador, Nicaragua, and Costa Rica. In Guatemala it occurs from near sea level to about 1,360 m in elevation (Lee 1996; Campbell 1998). This individual was found in the municipality of Tacotalpa, Tabasco, in secondary vegetation (*acahual*). Its EVS has been determined as 6, placing it in the middle portion of the low vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN and it is allocated to the Threatened (A) category by SEMARNAT. *Photo by Marco Antonio Torrez-Pérez.*



**Fig. 8.** Roads. A *Boa imperator* dead on the road in the Pantanos de Centla Biosphere Reserve, in the municipality of the same name, Tabasco. Photo by Coral J. Pacheco-Figueroa.

among the three best-served states in the country, with an index of 248 m/km<sup>2</sup> (Vidal-García and Negrete 2019). The construction and functioning of roads are elements that have drastic and long-term consequences on the natural landscape, as they significantly affect the survival of the native herpetofauna (Trombulak and Frissell 2000; Coffin 2007). The building and maintenance of roads implies the unavoidable removal of native vegetation cover, thus enabling a series of linked processes that ultimately lead to the detriment of adjacent habitats. With respect to the mortality of fauna on roads (Fig. 8), Pozo-Montuy et al. (2019) reported 111 individuals killed by vehicles on the road from Villahermosa to Zacatal; of those, 22.5% were reptiles and 20.7% amphibians. The species affected more frequently were in the families Iguanidae, Boidae, Colubridae, Viperidae, and Geoemydidae; more specifically for lizards they included Green Iguanas (*Iguana rhinolopha*) and Black Iguanas (*Ctenosaura similis*) (Canales-Delgadillo et al. 2020). Other studies carried out in the state reported the killing of *I. rhinolopha* on highway 186 (Villahermosa-Aeropuerto) and the Cane Toad (*Rhinella horribilis*) on the Tabascan plains. Lastly, a survey conducted at Reserva de la Biósfera Pantanos de Centla showed that 43% of the road-kills were amphibians, primarily Brown's Leopard Frog (*Lithobates brownorum*) (Pacheco-Figueroa 2021).

### Soil Pollution and Oil-related Activities

In Tabasco, the municipalities with the highest numbers of oil spills that affected numerous hectares of land from 1995 until 2001 were Cardenas, Huimanguillo, Cunduacan, and Comalcalco (Ochoa-Gaona et al. 2011). The long history of oil spills and gas explosions in Tabasco (Fig. 9) has led to serious consequences in many communities, because this activity also resulted in the pollution of soils and vegetation such as grasslands (Zavala-Cruz et al. 2005). Some studies have identified approximately 7,500 ha that are affected, more than 90% of which are located in wetlands (Adams-Schroeder



**Fig. 9.** Deforestation due to oil activities in the vicinity of Paraíso, Tabasco. Photo by José del Carmen Gerónimo-Torres.

1999; Beltrán-Paz 2006). It was estimated that 0.07% of the state was polluted with fossil fuels (Rivera-Cruz and Trujillo-Narcía 2004; Ferrera-Cerrato et al. 2006). All amphibian groups found in Tabasco have been affected by the oil industry, although a study by Reynoso-Rosales (1999) in southeastern Mexico, including Tabasco, determined that the detriment to amphibians is the result of a combined effect from both farming and the oil industry. With respect to the latter activity, this includes consecutive processes such as exploration, perforation, and production. Among the direct effects from the oil industry are the disturbances caused by permanent light sources at all installations, which likely affect the behavior of species present around these industrial facilities. For instance, toads (*Rhinella* and *Inciulus*) congregate at light sources to search for food.

### Myths and Cultural Factors

With respect to the herpetofauna, ethnozoological knowledge includes symbolic, spiritual, and social meanings in indigenous societies (Ávila-Nájera et al. 2018), although few studies have addressed this subject in Tabasco. Among the most frequent uses of native herpetofauna are for food (iguanas, turtles, and crocodiles, Hernández-López et al. 2012) and magic-religious uses in conjunction with medicinal application. For example, rattlesnakes (*Crotalus*) are used to treat cancer, diabetes, acne, and skin health issues (Gómez-Álvarez and Pacheco 2010). On the other hand, snakes generally are considered as dangerous, and their encounters usually result in their immediate elimination. A similar situation is experienced by amphibians, which are considered mostly as undesirable.

People in Tabasco have consumed native terrestrial vertebrates for millennia, primarily reptiles, birds, and mammals as food, as well as for skins, pets, and medicinal purposes (Pozo-Montuy et al. 2019). To date, 16 species of reptiles have been identified as traditionally consumed in Tabasco, such as iguanas, turtles, snakes,



**No. 25.** *Oxybelis potosiensis* (Taylor, 1941). The Gulf Coast Vine Snake is distributed from San Luis Potosí and northern Veracruz, southward to Yucatán, Mexico, and Belize (Jadin et al. 2020). This individual was found in the municipality of Huimanguillo, Tabasco. Its EVS has been determined as 5 (Cruz-Elizalde et al. 2022), placing it in the lower portion of the low vulnerability category. Its conservation status has not been evaluated (NE) by the IUCN, and it is considered as having No Status (NS) by SEMARNAT. Photo by Marco Antonio Torrez-Pérez.



**No. 26.** *Coniophanes imperialis* (Baird and Girard, 1859). The Black-striped Snake occurs at low and moderate elevations on the Atlantic slope from southern Texas southward on the Atlantic watershed through eastern Mexico, Yucatán, Belize, and northern and eastern Guatemala to Honduras; it also occurs locally on Pacific slopes in Oaxaca, Chiapas, Yucatán, Campeche, and Quintana Roo (Lee 1996; Campbell 1998). This individual was found in the municipality of Huimanguillo, Tabasco. Its EVS has been determined as 8, placing it in the upper portion of the low vulnerability category. Its conservation status has been established as Least Concern (LC) by the IUCN, but has been assigned No Status (NS) by SEMARNAT. Photo by Marco Antonio Torrez-Pérez.



**No. 27.** *Enulius flavitorques* (Cope, 1868). The Pacific Long-tailed Snake occurs at low and moderate elevations on the Pacific versant from Jalisco, Mexico, to Panama, and on the Atlantic versant in Chiapas, Mexico, Honduras (including Isla Utila in the Islas de la Bahía), Panama, northern Colombia, and northwestern Venezuela (Hernández-Valadez et al. 2016). This individual was found in a coconut plantation in Playa Chiltepec, in the municipality of Paraiso, Tabasco. Its EVS has been determined as 5, placing it in the lower portion of the low vulnerability category. Its conservation status has been evaluated as Least Concern (LC) by the IUCN, but its status remains undetermined (NS) by SEMARNAT. Photo by Marco Antonio López-Luna.



**No. 28.** *Imantodes cenchoa* (Linnaeus, 1758). The Neotropical Blunt-headed Treesnake occurs at low and moderate elevations in Mexico, from Chiapas on the Pacific slope and Tamaulipas on the Atlantic slope, southward throughout most of the Petén region in Guatemala and the northeastern portion of Yucatan Peninsula, through the remainder of Central America to Argentina and Paraguay (Lee 1996; Campbell 1998). This individual was found in Muku Chem, in the municipality of Tacotalpa, Tabasco. Wilson et al. (2013a) determined its EVS as 6, placing it in the middle portion of the low vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, and as a species of Special Protection (Pr) by SEMARNAT. Photo by José del Carmen Gerónimo-Torres.

The herpetofauna of Tabasco, Mexico

**Table 8.** Distributional and conservation status measures for members of the herpetofauna of Tabasco, Mexico. Distributional status: CE = endemic to country of Mexico; NE = not endemic to state or country; and NN = non-native. The numbers suffixed to the “NE” category signify the distributional categories developed by Wilson et al. (2017) and implemented in the taxonomic list at the *Mesoamerican Herpetology* website (<http://mesoamericanherpetology.com>), as follows: 3 (species distributed only in Mexico and the USA); 6 (species ranging from Mexico to South America); 7 (species ranging from the USA to Central America); and 8 (species ranging from the USA to South America). Environmental Vulnerability Score (taken from Wilson et al. 2013a,b): low (L) vulnerability species (EVS of 3–9); medium (M) vulnerability species (EVS of 10–13); and high (H) vulnerability species (EVS of 14–20). IUCN Categorization: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; NE = Not Evaluated. SEMARNAT Status: A = Threatened; P = Endangered; Pr = Special Protection; and NS = No Status. See Alvarado-Díaz et al. (2013), Johnson et al. (2015a), and Mata-Silva et al. (2015) for explanations of the EVS, IUCN, and SEMARNAT rating systems.

Taxa	Distributional status	Environmental Vulnerability Category (score)	IUCN categorization	SEMARNAT status
<i>Incilius macrocristatus</i>	NE4	M (11)	VU	NS
<i>Incilius valliceps</i>	NE4	L (6)	LC	NS
<i>Rhinella horribilis</i>	NE7	L (3)	NE	NS
<i>Hyalinobatrachium viridissimum</i>	NE4	M (10)	LC	NS
<i>Craugastor alfredi</i>	NE4	M (11)	VU	NS
<i>Craugastor berkenbuschii*</i>	CE	H (14)	NT	Pr
<i>Craugastor laticeps</i>	NE4	M (12)	NT	Pr
<i>Craugastor loki</i>	NE4	M (10)	LC	NS
<i>Craugastor palenque</i>	NE4	H (15)	DD	NS
<i>Craugastor pelorus*</i>	CE	H (15)	DD	NS
<i>Craugastor rhodopis*</i>	CE	H (14)	VU	NS
<i>Eleutherodactylus leprus</i>	NE4	M (12)	VU	NS
<i>Eleutherodactylus planirostris**</i>	NN	—	—	—
<i>Charadrahyla chanque*</i>	CE	M (13)	EN	Pr
<i>Dendropsophus ebraccatus</i>	NE6	M (10)	LC	NS
<i>Dendropsophus microcephalus</i>	NE6	L (7)	LC	NS
<i>Duellmanohyla chamulae*</i>	CE	M (13)	EN	Pr
<i>Exerodonta bivocata*</i>	CE	H (15)	DD	NS
<i>Ptychohyla macrotympanum</i>	NE4	M (11)	CR	NS
<i>Quilticohyla zoque*</i>	CE	H (14)	NE	NS
<i>Rheohyla miotympanum*</i>	CE	L (9)	NT	NS
<i>Scinax staufferi</i>	NE4	L (4)	LC	NS
<i>Smilisca baudinii</i>	NE7	L (3)	LC	NS
<i>Smilisca cyanosticta</i>	NE4	M (12)	NT	NS
<i>Tlalocohyla loquax</i>	NE4	L (7)	LC	NS
<i>Tlalocohyla picta</i>	NE4	L (8)	LC	NS
<i>Trachycephalus vermiculatus</i>	NE6	L (4)	LC	NS
<i>Triprion petasatus</i>	NE4	M (10)	LC	Pr
<i>Triprion spinosus</i>	NE4	H (14)	LC	NS
<i>Engystomops pustulosus</i>	NE6	L (7)	LC	NS
<i>Leptodactylus fragilis</i>	NE8	L (5)	LC	NS
<i>Leptodactylus melanotonus</i>	NE6	L (6)	LC	NS
<i>Gastrophryne elegans</i>	NE4	L (8)	LC	Pr
<i>Hypopachus variolosus</i>	NE7	L (4)	LC	NS
<i>Agalychnis moreletii</i>	NE4	L (7)	CR	NS
<i>Agalychnis taylori</i>	NE4	M (11)	LC	NS
<i>Lithobates brownorum</i>	NE4	L (8)	NE	Pr
<i>Lithobates vaillanti</i>	NE6	L (9)	LC	NS
<i>Rhinophryns dorsalis</i>	NE7	L (8)	LC	NS
<i>Bolitoglossa alberchi*</i>	CE	H (15)	VU	NS
<i>Bolitoglossa mexicana</i>	NE4	M (11)	LC	Pr
<i>Bolitoglossa platydactyla*</i>	CE	H (15)	NT	Pr
<i>Bolitoglossa rufescens</i>	NE4	L (9)	LC	Pr

**Table 8 (continued).** Distributional and conservation status measures for members of the herpetofauna of Tabasco, Mexico. Distributional status: CE = endemic to country of Mexico; NE = not endemic to state or country; and NN = non-native. The numbers suffixed to the “NE” category signify the distributional categories developed by Wilson et al. (2017) and implemented in the taxonomic list at the *Mesoamerican Herpetology* website (<http://mesoamericanherpetology.com>), as follows: 3 (species distributed only in Mexico and the USA); 6 (species ranging from Mexico to South America); 7 (species ranging from the USA to Central America); and 8 (species ranging from the USA to South America). Environmental Vulnerability Score (taken from Wilson et al. 2013a,b): low (L) vulnerability species (EVS of 3–9); medium (M) vulnerability species (EVS of 10–13); and high (H) vulnerability species (EVS of 14–20). IUCN Categorization: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; NE = Not Evaluated. SEMARNAT Status: A = Threatened; P = Endangered; Pr = Special Protection; and NS = No Status. See Alvarado-Díaz et al. (2013), Johnson et al. (2015a), and Mata-Silva et al. (2015) for explanations of the EVS, IUCN, and SEMARNAT rating systems.

Taxa	Distributional status	Environmental Vulnerability Category (score)	IUCN categorization	SEMARNAT status
<i>Bolitoglossa veracrucis</i> *	CE	H (17)	EN	Pr
<i>Dermophis mexicanus</i>	NE4	M (11)	VU	Pr
<i>Crocodylus acutus</i>	NE8	H (14)	VU	Pr
<i>Crocodylus moreletii</i>	NE4	M (13)	LC	Pr
<i>Basiliscus vittatus</i>	NE4	L (7)	LC	NS
<i>Corytophanes cristatus</i>	NE6	M (11)	LC	Pr
<i>Corytophanes hernandezii</i>	NE4	M (13)	LC	Pr
<i>Laemancus longipes</i>	NE4	L (9)	LC	Pr
<i>Norops barkeri</i> *	CE	H (15)	VU	Pr
<i>Norops beckeri</i>	NE4	M (12)	NE	Pr
<i>Norops biporcatus</i>	NE6	M (10)	NE	Pr
<i>Norops capito</i>	NE4	N (13)	NE	NS
<i>Norops compressicauda</i> *	CE	H (15)	LC	NS
<i>Norops laeviventris</i>	NE4	L (9)	NE	NS
<i>Norops lemurinus</i>	NE4	L (8)	NE	NS
<i>Norops petersi</i>	NE4	L (9)	NE	NS
<i>Norops rodriguezii</i>	NE4	M (10)	NE	NS
<i>Norops sagrei</i> **	NN	—	—	—
<i>Norops sericeus</i>	NE4	L (8)	NE	NS
<i>Norops tropidonotus</i>	NE4	L (9)	NE	NS
<i>Norops uniformis</i>	NE4	M (13)	NE	NS
<i>Norops unilobatus</i>	NE4	L (7)	NE	NS
<i>Celestus rozellae</i>	NE4	M (13)	NT	Pr
<i>Coleonyx elegans</i>	NE4	L (9)	LC	A
<i>Hemidactylus frenatus</i> **	NN	—	—	—
<i>Hemidactylus turcicus</i> **	NN	—	—	—
<i>Ctenosaura similis</i>	NE4	L (8)	LC	A
<i>Iguana rhinolopha</i>	NE6	M (10)	NE	Pr
<i>Marisora lineola</i>	NE4	M (10)	NE	NS
<i>Sceloporus chrysostictus</i>	NE4	M (13)	LC	NS
<i>Sceloporus lundelli</i>	NE4	H (14)	LC	NS
<i>Sceloporus serrifer</i>	NE4	L (6)	LC	NS
<i>Sceloporus teapensis</i>	NE4	M (13)	LC	NS
<i>Sceloporus variabilis</i>	NE4	L (5)	NE	NS
<i>Thecadactylus rapicauda</i>	NE6	M (10)	NE	Pr
<i>Mesoscincus schwartzei</i>	NE4	M (11)	LC	NS
<i>Plestiodon sumichrasti</i>	NE4	M (12)	LC	NS
<i>Sphaerodactylus continentalis</i>	NE4	M (10)	NE	NS
<i>Sphaerodactylus glaucus</i>	NE4	M (12)	LC	Pr
<i>Scincella cherriei</i>	NE4	L (7)	NE	NS
<i>Scincella gemmingeri</i> *	CE	M (11)	LC	Pr
<i>Aspidoscelis deppii</i>	NE4	L (8)	LC	NS
<i>Aspidoscelis guttatus</i> *	CE	M (12)	LC	NS
<i>Holcosus amphigrammus</i> *	CE	M (11)	NE	NS

The herpetofauna of Tabasco, Mexico

**Table 8 (continued).** Distributional and conservation status measures for members of the herpetofauna of Tabasco, Mexico. Distributional status: CE = endemic to country of Mexico; NE = not endemic to state or country; and NN = non-native. The numbers suffixed to the “NE” category signify the distributional categories developed by Wilson et al. (2017) and implemented in the taxonomic list at the *Mesoamerican Herpetology* website (<http://mesoamericanherpetology.com>), as follows: 3 (species distributed only in Mexico and the USA); 6 (species ranging from Mexico to South America); 7 (species ranging from the USA to Central America); and 8 (species ranging from the USA to South America). Environmental Vulnerability Score (taken from Wilson et al. 2013a,b): low (L) vulnerability species (EVS of 3–9); medium (M) vulnerability species (EVS of 10–13); and high (H) vulnerability species (EVS of 14–20). IUCN Categorization: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; NE = Not Evaluated. SEMARNAT Status: A = Threatened; P = Endangered; Pr = Special Protection; and NS = No Status. See Alvarado-Díaz et al. (2013), Johnson et al. (2015a), and Mata-Silva et al. (2015) for explanations of the EVS, IUCN, and SEMARNAT rating systems.

Taxa	Distributional status	Environmental Vulnerability Category (score)	IUCN categorization	SEMARNAT status
<i>Holcosus festivus</i>	NE6	M (11)	LC	NS
<i>Holcosus stuarti</i> *	CE	M (12)	NE	NS
<i>Lepidophyma flavimaculatum</i>	NE4	L (8)	LC	Pr
<i>Lepidophyma tuxtlae</i> *	CE	M (11)	DD	A
<i>Xenosaurus rackhami</i>	NE4	M (11)	NE	NS
<i>Boa imperator</i>	NE6	M (10)	NE	NS
<i>Dendrophidion vinitum</i>	NE4	M (13)	LC	NS
<i>Drymarchon melanurus</i>	NE6	L (6)	LC	NS
<i>Drymobius margaritiferus</i>	NE8	L (6)	NE	NS
<i>Ficimia publia</i>	NE4	L (9)	LC	NS
<i>Lampropeltis polyzona</i>	NE6	L (9)	NE	NS
<i>Leptophis ahaetulla</i>	NE6	M (10)	NE	A
<i>Leptophis mexicanus</i>	NE4	L (6)	LC	A
<i>Masticophis mentovarius</i>	NE6	L (6)	LC	A
<i>Mastigodryas melanolomus</i>	NE4	L (6)	LC	NS
<i>Oxybelis fulgidus</i>	NE6	L (9)	NE	NS
<i>Oxybelis potosiensis</i>	NE4	H (15)	NE	NS
<i>Phrynonax poecilonotus</i>	NE6	M (10)	LC	NS
<i>Pseudelaphe flavirufa</i>	NE4	M (10)	LC	NS
<i>Senticolis triaspis</i>	NE7	L (6)	LC	NS
<i>Spilotes pullatus</i>	NE6	L (6)	NE	NS
<i>Stenorhina degenhardtii</i>	NE6	L (9)	NE	NS
<i>Stenorhina freminvillii</i>	NE4	L (7)	NE	NS
<i>Tantilla rubra</i>	NE4	L (5)	LC	Pr
<i>Tantilla schistosa</i>	NE4	L (8)	LC	NS
<i>Tantillita lintoni</i>	NE4	M (12)	LC	Pr
<i>Adelphicos quadrivirgatum</i>	NE4	M (10)	LC	Pr
<i>Amastridium sapperi</i>	NE4	M (10)	LC	NS
<i>Clelia scytalina</i>	NE4	M (13)	LC	NS
<i>Coniophanes bipunctatus</i>	NE4	L (9)	LC	NS
<i>Coniophanes fissidens</i>	NE6	L (7)	NE	NS
<i>Coniophanes imperialis</i>	NE7	L (8)	LC	NS
<i>Coniophanes piceivittis</i>	NE4	L (7)	LC	NS
<i>Coniophanes quinquevittatus</i>	NE4	M (13)	LC	NS
<i>Coniophanes schmidti</i>	NE4	M (13)	LC	NS
<i>Conophis lineatus</i>	NE4	L (9)	LC	NS
<i>Dipsas brevisfacies</i>	NE4	H (15)	LC	Pr
<i>Enulius flavitorques</i>	NE6	L (5)	NE	NS
<i>Geophis carinosus</i>	NE4	L (8)	LC	NS
<i>Geophis laticinctus</i> *	CE	M (11)	LC	Pr
<i>Geophis sanniolus</i>	NE4	M (12)	LC	NS
<i>Geophis sartorii</i>	NE4	L (9)	LC	Pr
<i>Imantodes cenchoa</i>	NE6	L (6)	NE	Pr
<i>Imantodes gemmistratus</i>	NE6	L (6)	NE	Pr

**Table 8 (continued).** Distributional and conservation status measures for members of the herpetofauna of Tabasco, Mexico. Distributional status: CE = endemic to country of Mexico; NE = not endemic to state or country; and NN = non-native. The numbers suffixed to the “NE” category signify the distributional categories developed by Wilson et al. (2017) and implemented in the taxonomic list at the *Mesoamerican Herpetology* website (<http://mesoamericanherpetology.com>), as follows: 3 (species distributed only in Mexico and the USA); 6 (species ranging from Mexico to South America); 7 (species ranging from the USA to Central America); and 8 (species ranging from the USA to South America). Environmental Vulnerability Score (taken from Wilson et al. 2013a,b): low (L) vulnerability species (EVS of 3–9); medium (M) vulnerability species (EVS of 10–13); and high (H) vulnerability species (EVS of 14–20). IUCN Categorization: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; NE = Not Evaluated. SEMARNAT Status: A = Threatened; P = Endangered; Pr = Special Protection; and NS = No Status. See Alvarado-Díaz et al. (2013), Johnson et al. (2015a), and Mata-Silva et al. (2015) for explanations of the EVS, IUCN, and SEMARNAT rating systems.

Taxa	Distributional status	Environmental Vulnerability Category (score)	IUCN categorization	SEMARNAT status
<i>Leptodeira frenata</i>	NE4	M (12)	LC	NS
<i>Leptodeira maculata</i>	NE4	L (7)	LC	Pr
<i>Leptodeira septentrionalis</i>	NE8	L (8)	NE	NS
<i>Ninia diademata</i>	NE4	L (9)	LC	NS
<i>Ninia sebae</i>	NE4	L (4)	LC	NS
<i>Oxyrhopus petolarius</i>	NE6	H (14)	NE	NS
<i>Pliocercus elapoides</i>	NE4	M (10)	LC	NS
<i>Rhadinaea decorata</i>	NE6	L (9)	NE	NS
<i>Sibon dimidiatus</i>	NE4	L (10)	LC	NS
<i>Sibon nebulatus</i>	NE6	L (5)	NE	NS
<i>Tretanorhinus nigroluteus</i>	NE4	M (10)	LC	NS
<i>Xenodon rabdocephalus</i>	NE6	M (13)	NE	NS
<i>Micrurus diastema*</i>	CE	H (17)	LC	Pr
<i>Micrurus elegans</i>	NE4	M (13)	LC	Pr
<i>Epictia phenops</i>	NE4	L (4)	NE	NS
<i>Nerodia rhombifer</i>	NE3	M (10)	LC	NS
<i>Thamnophis marcianus</i>	NE7	M (10)	LC	A
<i>Thamnophis proximus</i>	NE7	L (7)	LC	A
<i>Scaphiodontophis annulatus</i>	NE4	M (11)	LC	NS
<i>Amerotyphlops tenuis</i>	NE4	M (11)	LC	NS
<i>Virgatyphlops braminus</i>	NN	—	—	—
<i>Agkistrodon russeolus</i>	NE4	H (15)	NE	NS
<i>Bothriechis schlegelii</i>	NE6	M (13)	NE	NS
<i>Bothrops asper</i>	NE6	M (12)	NE	NS
<i>Crotalus tzabcan</i>	NE4	H (16)	LC	NS
<i>Metlapilcoatlus mexicanus</i>	NE4	M (12)	LC	NS
<i>Porthidium nasutum</i>	NE6	H (14)	LC	Pr
<i>Chelonia mydas</i>	NE9	—	EN	P
<i>Lepidochelys kempii</i>	NE9	—	CR	P
<i>Chelydra rossignonii</i>	NE4	H (17)	VU	NS
<i>Dermatemys mawii</i>	NE4	H (17)	CR	P
<i>Dermochelys coriacea</i>	NE9	—	VU	P
<i>Trachemys venusta</i>	NE6	H (19)	VU	NS
<i>Rhinoclemmys areolata</i>	NE4	M (13)	NT	A
<i>Kinosternon acutum</i>	NE4	H (14)	NT	Pr
<i>Kinosternon leucostomum</i>	NE6	M (10)	NE	Pr
<i>Kinosternon scorpioides</i>	NE6	M (10)	NE	Pr
<i>Claudius angustatus</i>	NE4	H (14)	NT	Pr
<i>Staurotypus triporcatus</i>	NE4	H (14)	NT	A



**No. 29.** *Ninia sebae* (Duméril, Bibron, and Duméril, 1854). The Redback Coffee Snake occurs at low and moderate elevations on the Atlantic slope from Veracruz and the Pacific slope from Oaxaca, Mexico, southeastward and eastward through Central America to Costa Rica (Lee 1996). In Panama it has been recorded in Changuinola district (Ponce et al. 2008). In Guatemala it ranges from near sea level to about 2,000 m in elevation (Campbell 1998). This individual was found in a cornfield in the municipality of Tenosique, Tabasco. Its EVS has been determined as 5 (Wilson et al. 2013a), placing it in the lower portion of the low vulnerability category. Its conservation status has been assessed as Least Concern (LC) by the IUCN, but as Not Evaluated (NS) by SEMARNAT. *Photo by María del Rosario Barragán-Vázquez.*



**No. 30.** *Sibon dimidiatus* (Günther, 1872). The Slender Snail Sucker occurs at low, moderate, and intermediate elevations on the Pacific slope of Guatemala, and in premontane areas from northern Veracruz, Mexico, southward through Central America to northern Brazil, Colombia, Peru, Venezuela, Guyana, and Ecuador west of the Andes (Lee 1996; Espinal et al. 2021). This individual is from Mukú Chem, in the municipality of Tacotalpa, Tabasco. Wilson et al. (2013a) determined its EVS as 10, placing it at the lower limit of the medium vulnerability category. Its conservation status has been assessed as Least Concern by the IUCN, but it has not been assessed by SEMARNAT. *Photo by Marco Antonio Torrez-Pérez.*



**No. 31.** *Micrurus elegans* Jan, 1858. The Elegant Coral Snake is distributed from Mexico to southwestern Guatemala. In Mexico it has been reported from the states of Chiapas, Oaxaca, Puebla, Veracruz, and in the municipality of Teapa, Tabasco (Soto-Huerta and Clause 2017). This species ranges from 100 to 1,700 m in elevation. This individual was found in the municipality of Tacotalpa, Tabasco. Its EVS has been determined as 13 (Torres-Hernández et al. 2021), placing it at the upper limit of the medium vulnerability category. Its conservation status has been considered as Least Concern (LC) by the IUCN, but it is considered a species of Special Protection (Pr) by SEMARNAT. *Photo by Marco Antonio Torrez-Pérez.*



**No. 32.** *Epictia phenops* (Cope, 1875). The distribution of the Slender Threadsnake extends “from southern Mexico to western Honduras” (Wallach 2016: 254). This individual was found in the city of Villahermosa. The EVS of this blindsnake has been calculated as 4 (Mata-Silva et al. 2021), placing it in the lower portion of the low vulnerability category. The conservation status of this species has not been assessed by either the IUCN or SEMARNAT. *Photo by Marco Antonio Torrez-Pérez.*

**Table 9.** Summary of the distributional status data for herpetofaunal families in Tabasco, Mexico.

Family	Number of species	Distributional status		
		Non-endemic (NE)	Country Endemic (CE)	Non-native (NN)
Bufonidae	3	3	—	—
Centrolenidae	1	1	—	—
Craugastoridae	7	4	3	—
Eleutherodactylidae	2	1	—	1
Hylidae	16	11	5	—
Leptodactylidae	3	3	—	—
Microhylidae	2	2	—	—
Phyllomedusidae	2	2	—	—
Ranidae	2	2	—	—
Rhinophrynidiae	1	1	—	—
<b>Subtotal</b>	<b>39</b>	<b>30</b>	<b>8</b>	<b>1</b>
Plethodontidae	5	2	3	—
<b>Subtotal</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>—</b>
Dermophiidae	1	1	—	—
<b>Subtotal</b>	<b>1</b>	<b>1</b>	<b>—</b>	<b>—</b>
<b>Total</b>	<b>45</b>	<b>33</b>	<b>11</b>	<b>1</b>
Crocodylidae	2	2	—	—
<b>Subtotal</b>	<b>2</b>	<b>2</b>	<b>—</b>	<b>—</b>
Corytophanidae	4	4	—	—
Dactyloidae	14	11	2	1
Diploglossidae	1	1	—	—
Eublepharidae	1	1	—	—
Gekkonidae	2	—	—	2
Iguanidae	2	2	—	—
Mabuyidae	1	1	—	—
Phrynosomatidae	5	5	—	—
Phyllodactylidae	1	1	—	—
Scincidae	2	2	—	—
Sphaerodactylidae	2	2	—	—
Sphenomorphidae	2	1	1	—
Teiidae	5	2	3	—
Xantusiidae	2	1	1	—
Xenosauridae	1	1	—	—
<b>Subtotal</b>	<b>45</b>	<b>35</b>	<b>7</b>	<b>3</b>
Boidae	1	1	—	—
Colubridae	20	20	—	—
Dipsadidae	30	29	1	—
Elapidae	2	1	1	—
Leptotyphlopidae	1	1	—	—
Natricidae	3	3	—	—
Sibynophiidae	1	1	—	—
Typhlopidae	2	1	—	1
Viperidae	6	6	—	—
<b>Subtotal</b>	<b>66</b>	<b>63</b>	<b>2</b>	<b>1</b>
Cheloniidae	2	2	—	—
Chelydridae	1	1	—	—
Dermatemyidae	1	1	—	—
Dermochelyidae	1	1	—	—
Emydidae	1	1	—	—
Geoemydidae	1	1	—	—
Kinosternidae	3	3	—	—
Staurotypidae	2	2	—	—
<b>Subtotal</b>	<b>12</b>	<b>12</b>	<b>—</b>	<b>—</b>
<b>Total</b>	<b>125</b>	<b>112</b>	<b>9</b>	<b>4</b>
<b>Sum Total</b>	<b>170</b>	<b>145</b>	<b>20</b>	<b>5</b>



**No. 33.** *Thamnophis marcianus* (Baird and Girard, 1853). The Checkered Garter Snake occurs at low and moderate elevations throughout the southwestern United States and northern Mexico, and on the Pacific slope of the Isthmus of Tehuantepec. On the Atlantic slope, it ranges from northern Chiapas and eastern Tabasco through the Yucatan Peninsula and southward to Costa Rica (Lee 1996). This individual was found in the municipality of Huianguillo, Tabasco. Its EVS has been determined as 10 (Wilson et al. 2013a), placing it at the lower limit of the medium vulnerability category. Its conservation status has been assessed as Least Concern (LC) by the IUCN, and it has been allocated to the Threatened (A) category by SEMARNAT. *Photo by Marco Antonio Torrez-Pérez.*



**No. 34.** *Agkistrodon russeolus* Gloyd, 1972. The distribution of the Mexican Moccasin primarily extends along the outer part of the Yucatan Peninsula, from west-central Campeche and the northern portion of Yucatán and Quintana Roo on the Gulf side, and in northern Belize on the Caribbean side, although isolated records are available from extreme southeastern Campeche and central Petén, Guatemala (Porras et al. 2013). This individual was found at Nuevo Pochote, in the municipality of Emiliano Zapata, Tabasco (Charruau et al. 2014). Its EVS has been determined as 15 (Porras et al. 2013), placing it in the lower portion of the high vulnerability category (González-Sánchez et al. 2017). Its conservation status has been evaluated as Near Threatened (NT) by the IUCN and it has been allocated to the Special Protection (Pr) category by SEMARNAT. *Photo by Marco Antonio López-Luna.*



**No. 35.** *Crotalus tzabcan* Klauber, 1952. The Yucatan Neotropical Rattlesnake occurs in the Yucatan Peninsula, including Campeche, northeastern Chiapas, Quintana Roo, Tabasco, and Yucatán, México, northern Belize and El Petén, Guatemala (Lee 1996; Campbell 1998; Campbell and Lamar 2004). This individual was found in the village of El Triunfo in the municipality of Balancán, Tabasco. Its EVS has been determined as 16 (González-Sánchez et al. 2017), placing it in the middle portion of the high vulnerability category. Its conservation status has been designated as Least Concern (LC) by the IUCN, but as No Status (NS) by SEMARNAT. *Photo by Marco Antonio López-Luna.*



**No. 36.** *Metlapilcoatlus mexicanus* (Duméril, Bibron, and Duméril, 1854). The Central American Jumping Pitviper occurs at low, moderate, and intermediate elevations on the Atlantic slope “from southern Mexico through Central America south to Costa Rica and Panama, where it is also found on the Pacific versant” (Heimes 2016). This individual was found in the municipality of Tacotalpa, Tabasco, in secondary vegetation. Its EVS has been determined as 12 (Wilson et al. 2013a), placing it in the upper portion of the medium vulnerability category. Its conservation status has been assessed as Least Concern (LC) by the IUCN and it is allocated to the Threatened (A) category by SEMARNAT. *Photo by Marco Antonio López-Luna.*

**Table 10.** Summary of the distributional categories of the herpetofaunal families in Tabasco, Mexico, containing non-endemic species. The categorizations are as follows: MXUS (species distributed only in Mexico and the United States (except perhaps for a few also found in Canada); MXCA (species found only in Mexico and Central America); MXSA (species ranging from Mexico to South America); USCA (species ranging from the United States to Central America (except perhaps for a few also found in the Antilles); USSA (species ranging from the United States to South America); and OCEA (oceanic species).

Family	Number of non-endemic species	Distributional status					
		MXUS species (3)	MXCA species (4)	MXSA species (6)	USCA species (7)	USSA species (8)	OCEA species (9)
Bufonidae	3	—	2	—	1	—	—
Centrolenidae	1	—	1	—	—	—	—
Craugastoridae	4	—	4	—	—	—	—
Eleutherodactylidae	1	—	1	—	—	—	—
Hylidae	11	—	7	3	1	—	—
Leptodactylidae	3	—	—	2	—	1	—
Microhylidae	2	—	1	—	1	—	—
Phyllomedusidae	2	—	2	—	—	—	—
Ranidae	2	—	1	1	—	—	—
Rhinophrynidiae	1	—	—	—	1	—	—
<b>Subtotal</b>	<b>30</b>	—	<b>19</b>	<b>6</b>	<b>4</b>	<b>1</b>	—
Plethodontidae	3	—	3	—	—	—	—
<b>Subtotal</b>	<b>3</b>	—	<b>3</b>	—	—	—	—
Dermophiidae	1	—	1	—	—	—	—
<b>Subtotal</b>	<b>1</b>	—	<b>1</b>	—	—	—	—
<b>Total</b>	<b>34</b>	—	<b>23</b>	<b>6</b>	<b>4</b>	<b>1</b>	—
Crocodylidae	2	—	1	—	—	1	—
<b>Subtotal</b>	<b>2</b>	—	<b>1</b>	—	—	<b>1</b>	—
Corytophanidae	4	—	3	1	—	—	—
Dactyloidae	10	—	9	1	—	—	—
Diploglossidae	1	—	1	—	—	—	—
Eublepharidae	1	—	1	—	—	—	—
Iguanidae	2	—	1	1	—	—	—
Mabuyidae	1	—	1	—	—	—	—
Phrynosomatidae	5	—	5	—	—	—	—
Phyllodactylidae	1	—	—	1	—	—	—
Scincidae	2	—	2	—	—	—	—
Sphaerodactylidae	2	—	2	—	—	—	—
Sphenomorphidae	1	—	1	—	—	—	—
Teiidae	2	—	1	1	—	—	—
Xantusiidae	1	—	1	—	—	—	—
Xenosauridae	1	—	1	—	—	—	—
<b>Subtotal</b>	<b>34</b>	—	<b>29</b>	<b>5</b>	—	—	—
Boidae	1	—	—	1	—	—	—
Colubridae	20	—	10	8	1	1	—
Dipsadidae	29	—	19	8	1	1	—
Elapidae	1	—	1	—	—	—	—
Leptotyphlopidae	1	—	1	—	—	—	—
Natricidae	3	1	—	—	2	—	—
Sibynophiidae	1	—	1	—	—	—	—
Typhlopidae	1	—	1	—	—	—	—
Viperidae	6	—	3	3	—	—	—
<b>Subtotal</b>	<b>63</b>	<b>1</b>	<b>36</b>	<b>20</b>	<b>4</b>	<b>2</b>	—
Cheloniidae	2	—	—	—	—	—	2
Chelydridae	1	—	1	—	—	—	—
Dermatemyidae	1	—	1	—	—	—	—
Dermochelyidae	1	—	—	—	—	—	1
Emydidae	1	—	—	1	—	—	—
Geoemydidae	1	—	1	—	—	—	—
Kinosternidae	3	—	1	2	—	—	—
Staurotypidae	2	—	2	—	—	—	—
<b>Subtotal</b>	<b>12</b>	—	<b>6</b>	<b>3</b>	—	—	<b>3</b>
<b>Total</b>	<b>111</b>	<b>1</b>	<b>72</b>	<b>28</b>	<b>4</b>	<b>3</b>	<b>3</b>
<b>Sum total</b>	<b>145</b>	<b>1</b>	<b>95</b>	<b>34</b>	<b>8</b>	<b>4</b>	<b>3</b>



**Fig. 10.** The human consumption of meat from iguanid lizards of the genus *Ctenosaura* documented in the municipality of Paraíso, Tabasco. Photo by Liliana Ríos-Rodas.

and crocodiles. Among the turtles, the species most affected are the Hicotea (*Trachemys venusta*), Pochitoque Tres Lomos (*Kinosternon scorpioides*), Pochitoque Jahuactero (*Kinosternon acutum*), and Chiquiguao (*Chelydra rossignonii*). Furthermore, the Lagarto or Cocodrilo (*Crocodylus moreletii*) and the Iguana Verde (*Iguana rhinolopha*) also are in frequent demand (Pozo-Montuy et al. 2019). The consumption of these species varies according to the region and season of the year. For instance, the consumption of freshwater turtles is a tradition for numerous Tabascan families during Lent.

### Illegal Trade

Unfortunately, the illegal trafficking of reptile species in Tabasco is a common activity due to the high demand for meat (iguanas and crocodiles) and turtle eggs (Figs. 10–11). More specifically, many turtles in the state have been part of the Tabascan gastronomy (Guevara-Chumacero et al. 2017). Among turtles, people primarily eat *Dermatemys mawii* due to its size and meat quality, and consequently this consumption has pushed the species to near extinction (Zenteno-Ruiz et al. 2004). Although this species is consumed mostly in local communities, the species also is sold outside its distributional range, with prices varying according to the time of year (Guichard-Romero 2006). The crocodile (*C. moreletii*) is desired for its fat, since local communities use it for treating asthma. Furthermore, all of the species reported above often are purchased by people to keep as pets in tanks within their homes. With regard to amphibians, individuals of the treefrog *Agalychnis taylori* are sold as pets due to their attractive coloration, and often are advertised on websites by people lacking legal documentation. A similar situation is happening with the Central American Boa (*Boa imperator*), of which individuals usually are kept as pets, but also are sacrificed for their skin.



**Fig. 11.** Illegal trafficking of turtle species in the municipality of Centla, Tabasco. Photo by Liliana Ríos-Rodas.



**Fig. 12.** Forest fires caused by agricultural activities, Laguna San Isidro, Reserva de la Biosfera Pantanos de Centla, Tabasco. Photo by Marco Antonio Torrez-Pérez.



**No. 37.** *Dermatemys mawii* (Gray, 1847). The Central American River Turtle occurs in the Caribbean lowlands of southern Mexico from central Veracruz southeastward through the southern portion of the Yucatan Peninsula (Campbell 1998). In Tabasco this species is distributed practically throughout the state; however, wild populations have decreased considerably because it is hunted as a food source and its habitat has been severely modified (Rangel-Mendoza and Weber 2015). This individual belongs to the management unit of the Academic Division of Biological Sciences at the Universidad Juárez Autónoma de Tabasco. Its EVS has been determined as 17 (Wilson et al. 2013a), placing it in the middle portion of the high vulnerability category, and its IUCN status has been assessed as Critically Endangered (CR). It was allocated to the Endangered (P) category by SEMARNAT. *Photo by Liliana Ríos-Rodas.*



**No. 38.** *Kinosternon leucostomum* (Duméril, Bibron, and Duméril, 1851). The White-lipped Mud Turtle occurs at low elevations from southern Veracruz, Mexico, southeastward through Central America to Colombia and the Pacific lowlands of Ecuador (Lee 1996). This individual was located at División Académica de Ciencias Biológicas of Universidad Juárez Autónoma de Tabasco, in the municipality of Centro. Wilson et al. (2013a) assessed its EVS as 10, placing it at the lower limit of the medium vulnerability category. Its conservation status has not been evaluated by the IUCN, but was assessed as Special Protection (Pr) by SEMARNAT. *Photo by Liliana Ríos-Rodas.*



**No. 39.** *Claudius angustatus* Cope, 1865. The Narrow-bridged Musk Turtle occurs at low elevations on the Gulf versant of Mexico from southeastern Veracruz, Tabasco, and Campeche, and it is restricted to the base of the Península de Yucatán, through northern Guatemala and northern Belize (Lee 1996). This individual was located at División Académica de Ciencias Biológicas of Universidad Juárez Autónoma de Tabasco, in the municipality of Centro. Wilson et al. (2013a) assessed its EVS as 14, placing it at the lower limit of the high vulnerability category. Its conservation status was evaluated as Near Threatened (NT) by the IUCN, and it was placed in the Endangered (P) category by SEMARNAT. *Photo by Liliana Ríos-Rodas.*



**No. 40.** *Staurotypus triporcatus* (Wiegmann, 1828). The Mexican Giant Musk Turtle occurs at low elevations on the Atlantic slope from central Veracruz, northern Oaxaca, northern and eastern Chiapas, western Campeche, Mexico, as well as southward and eastward through northern Guatemala and Belize (Lee 1996; Reynoso et al. 2016). This individual was located at División Académica de Ciencias Biológicas of Universidad Juárez Autónoma de Tabasco, in the municipality of Centro. Wilson et al. (2013a) assessed its EVS as 14, placing it at the lower limit of the high vulnerability category. Its conservation status has been evaluated as Near Threatened (NT) by the IUCN, and as Threatened (A) by SEMARNAT. *Photo by Liliana Ríos-Rodas.*

## Wildfires

In general, farming activities cause most wild fires in Tabasco. The deliberate burning of grasses before cultivation is a frequent practice by farmers who burn the land to eliminate undesirable plants in order to benefit their grasslands. Furthermore, the resulting ashes from these fires are regarded as valuable fertilizer for their grasses (Cámarra-Cabral et al. 2019). Unfortunately, these practices are performed without any regulations, and may end up accidentally burning a larger area than originally planned, including entire forest plantations (Cámarra-Cabral et al. 2019). In addition, remnant areas of tropical forest also are burned, since many farms are located within this vegetation type. Fires have caused communities such as Villa de Guadalupe in Huimanguillo, Sierra El Madrigal in Teapa, and Sierra de Tenosique, to eradicate large tracts of tropical forest, and consequently many animals are killed, impeded by their slow movement. Another important area that has suffered the consequences of wildfires is Reserva de la Biosfera Pantanos de Centla, where local villagers traditionally use fires to capture turtles during the dry season; and these fires not only kill the turtles, but also burn their nests and eggs (Beauregard-Solis et al. 2010; Zenteno-Ruiz et al. 2004).

## Conservation Status

We used the same three systems of conservation assessment as in the previous entries in the Mexican Conservation Series (see above), i.e., SEMARNAT (2010), the IUCN Red List (<http://iucnredlist.org>), and the EVS (Wilson et al. 2013a, b). We have continued to update the assessments from these three systems as necessary.

## The SEMARNAT System

The Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT) of the federal government of Mexico developed a system of conservation assessment for the national fauna (SEMARNAT 2010), which is used by many Mexican herpetologists. Three categories are employed in the SEMARNAT system: endangered (P), threatened (A), and under special protection (Pr). We allocated the species remaining unassessed in this system to date into a “No Status” (NS) category. The ratings available for the Tabasco herpetofauna are given in Table 8 and summarized in Table 11.

As noted in previous entries in the Mexican Conservation Series (see above), only a small portion of the herpetofauna of Tabasco has been assessed using this system. Of the 165 native species occurring in Tabasco, only 56 species (33.9%) have been provided with SEMARNAT ratings and are placed in the three categories as follows: Endangered (P), four (2.4%);

Threatened (A), 10 (6.1%); and Special Protection (Pr), 42 (25.5%). The majority of the species native to Tabasco (109, or 66.1%), however, have a No Status (NS) rating by the SEMARNAT system. In our opinion, until and unless all the species occurring in the state are assessed this system will be of little help in understanding the conservation needs of the herpetofauna of Tabasco.

Assuming that the SEMARNAT personnel have placed a greater emphasis on assessing endemic species in Mexico, then this should be evident by comparing the distributional category assignments and the SEMARNAT assessments. To ascertain whether such a bias exists, the pertinent data in Table 12 indicate that the majorities of species in Tabasco are non-endemic and have not been assessed (98, or 59.4%), and the evaluated species are also largely non-endemic (47, or 28.5%). Thus, these data indicate no bias toward the assessment of country endemic species.

## The IUCN System

The system of conservation assessment developed and implemented by the International Union for Conservation of Nature is used broadly, but it has been criticized in earlier entries of the Mexican Conservation Series for several reasons, as discussed in Johnson et al. (2015b). Still, the assessments available for the Tabasco herpetofauna are collated in Table 8 and summarized in Table 13.

Of the 165 native herpetofaunal species in Tabasco, 114 (69.1%) have been evaluated using the IUCN system (Table 13). Of these 114 species, 19 have been allocated to the three threat categories of CR (four, or 3.5%); EN (four, or 3.5%); and VU (11, or 9.6%). The four CR species are the anurans *Ptychohyla macrotympanum* and *Agalychnis moreletii* and the turtles *Lepidochelys kempii* and *Dermatemys mawii*; and all four are non-endemic. The four EN species are the anurans *Charadrahyla chaneque* and *Duellmanohyla chamulae*, the salamander *Bolitoglossa veracrucis*, and the turtle *Chelonia mydas*; and the anurans and the salamander are country endemics while the turtle is non-endemic. The 11 VU species are the anurans *Incilius macrocristatus*, *Craugastor alfredi*, *C. rhodopis*, and *Eleutherodactylus leprus*, the salamander *Bolitoglossa alberchi*, the caecilian *Dermophis mexicanus*, the crocodylian *Crocodylus acutus*, the lizard *Norops Barkeri*, and the turtles *Chelydra rossignonii*, *Dermochelys coriacea*, and *Trachemys venusta*. The three anurans are non-endemic, except for *C. rhodopis*, which is a country endemic, the salamander is a country endemic, the caecilian and crocodylian are non-endemic, the lizard is a country endemic, and the three turtles are non-endemic.

The remaining 95 species are placed in the “lower risk” categories of NT (10, or 6.1% of the total of 165 species) and LC (85, or 51.5%). The 10 NT species are the anurans *Craugastor berkenbuschii*, *C. laticeps*, *Rheohyla*

**Table 11.** SEMARNAT categorizations for the herpetofaunal species in Tabasco, Mexico, arranged by families. Non-native species are excluded.

Family	Number of species	SEMARNAT categorizations			
		Endangered (P)	Threatened (A)	Special protection (Pr)	No status (NS)
Bufonidae	3	—	—	—	3
Centrolenidae	1	—	—	—	1
Craugastoridae	7	—	—	2	5
Eleutherodactylidae	1	—	—	—	1
Hylidae	16	—	—	3	13
Leptodactylidae	3	—	—	—	3
Microhylidae	2	—	—	1	1
Phyllomedusidae	2	—	—	—	2
Ranidae	2	—	—	1	1
Rhinophrynidiae	1	—	—	—	1
<b>Subtotal</b>	<b>38</b>	<b>—</b>	<b>—</b>	<b>7</b>	<b>31</b>
Plethodontidae	5	—	—	4	1
<b>Subtotal</b>	<b>5</b>	<b>—</b>	<b>—</b>	<b>4</b>	<b>1</b>
Dermophiidae	1	—	—	1	—
<b>Subtotal</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>—</b>
<b>Total</b>	<b>44</b>	<b>—</b>	<b>—</b>	<b>12</b>	<b>32</b>
Crocodylidae	2	—	—	2	—
<b>Subtotal</b>	<b>2</b>	<b>—</b>	<b>—</b>	<b>2</b>	<b>—</b>
Corytophanidae	4	—	—	3	1
Dactyloidae	13	—	—	3	10
Diploglossidae	1	—	—	1	—
Eublepharidae	1	—	1	—	—
Iguanidae	2	—	1	1	—
Mabuyidae	1	—	—	—	1
Phrynosomatidae	5	—	—	—	5
Phyllodactylidae	1	—	—	1	—
Scincidae	2	—	—	—	2
Sphaerodactylidae	2	—	—	1	1
Sphenomorphidae	2	—	—	1	1
Teiidae	5	—	—	—	5
Xantusiidae	2	—	1	1	—
Xenosauridae	1	—	—	—	1
<b>Subtotal</b>	<b>42</b>	<b>—</b>	<b>3</b>	<b>12</b>	<b>27</b>
Boidae	1	—	—	—	1
Colubridae	20	—	3	2	15
Dipsadidae	30	—	—	7	23
Elapidae	2	—	—	2	—
Leptotyphlopidae	1	—	—	—	1
Natricidae	3	—	2	—	1
Sibynophiidae	1	—	—	—	1
Typhlopidae	1	—	—	—	1
Viperidae	6	—	—	1	5
<b>Subtotal</b>	<b>65</b>	<b>—</b>	<b>5</b>	<b>12</b>	<b>48</b>
Cheloniidae	2	2	—	—	—
Chelydridae	1	—	—	—	1
Dermatemyidae	1	1	—	—	—
Dermochelyidae	1	1	—	—	—
Emydidae	1	—	—	—	1
Geoemydidae	1	—	1	—	—
Kinosternidae	3	—	—	3	—
Staurotypidae	2	—	1	1	—
<b>Subtotal</b>	<b>12</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>2</b>
<b>Total</b>	<b>121</b>	<b>4</b>	<b>10</b>	<b>30</b>	<b>77</b>
<b>Sum total</b>	<b>165</b>	<b>4</b>	<b>10</b>	<b>42</b>	<b>109</b>

**Table 12.** Comparison of the SEMARNAT and distributional categorizations for the Tabasco herpetofauna. Non-native species are excluded.

Distributional categories	SEMARNAT categories				
	Endangered (P)	Threatened (A)	Special Protection (Pr)	No Status (NS)	Total
Non-endemic species (NE)	4	9	34	98	<b>145</b>
Country-endemic species (CE)	—	1	9	10	<b>20</b>
<b>Total</b>	<b>4</b>	<b>10</b>	<b>43</b>	<b>108</b>	<b>165</b>

*miotympanum*, and *Smilisca cyanosticta* (two country endemics and two non-endemics), the salamander *Bolitoglossa platydactyla* (a country endemic), the lizard *Celestus rozellae* (a non-endemic), and the turtles *Rhinoclemmys areolata*, *Kinosternon acutum*, *Claudius angustatus*, and *Staurotypus triporcatus* (all non-endemics). The 85 LC species comprise the largest group of the native species (Table 13), but whether this large portion of the native species are in reality of “Least Concern” is a question we examine below.

Of the remaining 51 species in the herpetofauna, four are allocated to the DD category (2.4% of the total of 165 species) and 47 are in the NE category (28.5%). In the next section, we examine the status of these 51 species using the EVS system. To determine the relationship between the application of the IUCN categories and the distribution categories, the data on these correlations are assembled in Table 14. These data indicate that of the 20 country endemic species, six (30.0%) are allocated to the “threat categories.” None of these six species is placed in the CR category, thus three species are in the EN category, including the anurans *Charadrahyla chaneque* and *Duellmanohyla chamulae*, and the salamander *Bolitoglossa veracrucis*. The other three species are consigned to the VU category, including the anuran *Craugastor rhodopis*, the salamander *Bolitoglossa alberchi*, and the anole *Norops barkeri*. The remaining CE species, numbering 14, are distributed rather uniformly among the other IUCN categories, with the highest number (five) placed in the LC category. As expected, the majority of the 145 non-endemic species (80, or 55.2%) are also allocated to the LC category. The next largest number (44, or 30.3%) was placed in the Not Evaluated (NE) category. The remaining non-endemic species (21, or 14.5%) are distributed among the remaining IUCN categories, with 13 placed in the “threat categories” (CR, EN, and VU). Based on the data in Table 14, no correlation is evident between the placements of the country endemic or non-endemic species among the IUCN’s “threat categories.” More to the point, as commonly found in earlier entries of the Mexican Conservation Series, most species of either distribution category (country endemic or non-endemic) are placed either in the LC category or are not assessed using the IUCN system. In the case of Tabasco, these species amount to 124 of the 145 non-endemic species (85.5%) and eight of the 20 country-endemic species

(40.0%). In total, 132 of the 165 total native herpetofaunal species in Tabasco (80.0%) are placed either in the Least Concern or NE categories using the IUCN system. At this juncture, the IUCN assessment system has demonstrated that the majority of the evaluated herpetofauna is either of little concern (i.e., is in reasonably good shape from a conservation perspective) or simply has been ignored (i.e., non-evaluated). We further examine these LC and NE species in the next section.

### The EVS System

The EVS (Environmental Vulnerability Score) system of conservation evaluation initially was created as a means for assessing the conservation status of the amphibians and reptiles of Honduras (Wilson and McCranie 2004). Subsequently, it has been used for the same purpose with other segments of the Mexican and Central American herpetofaunas (e.g., Townsend and Wilson 2010, 2013a,b; Johnson et al. 2015b, 2017; Mata-Silva et al. 2015, 2019; and all entries in the MCS [see above]). In this study, the EVS values for all 162 native non-marine species occurring in Tabasco are given in Table 8 and summarized in Table 15.

The EVS values range from 3 to 19, one less than the entire theoretical range of 3–20. The most frequent values (applied to 10 or more species) are 6 (13 species), 7 (12), 8 (13), 9 (16), 10 (21), 11 (16), 12 (15), 13 (17), 14 (11), and 15 (10). These 10 values are applied to 144 native non-marine species (88.9% of the total of 162 species). The lowest possible score of 3 was established for two anuran species (*Rhinella horribilis* and *Smilisca baudini*) and the highest score of 19 for one turtle (*Trachemys venusta*).

As with previous MCS reports, herein the EVS scores are aggregated into three categories of low (EVS of 3–9), medium (10–13), and high (14–19) vulnerability. On the basis of this categorization, the species counts increase slightly from low (66) to medium (69) and then decrease markedly to high (27). This sort of pattern is emblematic of herpetofaunas that contain more non-endemic species (145 in the case of Tabasco) than endemic species (20), as was previously determined in Chiapas (Johnson et al. 2015a), Tamaulipas (Terán-Juárez et al. 2016), Nuevo León (Nevárez-de los Reyes et al. 2016), Jalisco (Cruz-Sáenz et al. 2017), the Mexican Yucatan Peninsula (González-Sánchez et al. 2017), and Coahuila (Lazcano et al. 2019).

**Table 13.** IUCN Red List categorizations for the herpetofaunal families in Tabasco, Mexico. Non-native species are excluded. The shaded columns to the left are the “threat categories,” and those to the right are the categories for which too little information on conservation status exists to allow the taxa to be placed in any other IUCN category, or they have not been evaluated.

Family	Number of species	IUCN Red List categorization						
		Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)	Near Threatened (NT)	Least Concern (LC)	Data Deficient (DD)	Not Evaluated (NE)
Bufonidae	3	—	—	1	—	1	—	1
Centrolenidae	1	—	—	—	—	1	—	—
Craugastoridae	7	—	—	2	2	1	2	—
Eleutherodactylidae	1	—	—	1	—	—	—	—
Hylidae	16	1	2	—	2	9	1	1
Leptodactylidae	3	—	—	—	—	3	—	—
Microhydidae	2	—	—	—	—	2	—	—
Phyllomedusidae	2	1	—	—	—	1	—	—
Ranidae	2	—	—	—	—	1	—	1
Rhinophrynidiae	1	—	—	—	—	1	—	—
<b>Subtotal</b>	<b>38</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>20</b>	<b>3</b>	<b>3</b>
Plethodontidae	5	—	1	1	1	2	—	—
<b>Subtotal</b>	<b>5</b>	<b>—</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>—</b>	<b>—</b>
Dermophiidae	1	—	—	1	—	—	—	—
<b>Subtotal</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>
<b>Total</b>	<b>44</b>	<b>2</b>	<b>3</b>	<b>6</b>	<b>5</b>	<b>22</b>	<b>3</b>	<b>3</b>
Crocodylidae	2	—	—	1	—	1	—	—
<b>Subtotal</b>	<b>2</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>—</b>
Corytophanidae	4	—	—	—	—	4	—	—
Dactyloidae	13	—	—	1	—	1	—	11
Diploglossidae	1	—	—	—	1	—	—	—
Eublepharidae	1	—	—	—	—	1	—	—
Iguanidae	2	—	—	—	—	1	—	1
Mabuyidae	1	—	—	—	—	—	—	1
Phrynosomatidae	5	—	—	—	—	4	—	1
Phyllodactylidae	1	—	—	—	—	—	—	1
Scincidae	2	—	—	—	—	2	—	—
Sphaerodactylidae	2	—	—	—	—	1	—	1
Sphenomorphidae	2	—	—	—	—	1	—	1
Teiidae	5	—	—	—	—	3	—	2
Xantusiidae	2	—	—	—	—	1	1	—
Xenosauridae	1	—	—	—	—	—	—	1
<b>Subtotal</b>	<b>42</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>1</b>	<b>19</b>	<b>1</b>	<b>20</b>
Boidae	1	—	—	—	—	—	—	1
Colubridae	20	—	—	—	—	12	—	8
Dipsadidae	30	—	—	—	—	21	—	9
Elapidae	2	—	—	—	—	2	—	—
Leptotyphlopidae	1	—	—	—	—	—	—	1
Natricidae	3	—	—	—	—	3	—	—
Sibynophiidae	1	—	—	—	—	1	—	—
Typhlopidae	1	—	—	—	—	1	—	—
Viperidae	6	—	—	—	—	3	—	3
<b>Subtotal</b>	<b>65</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>43</b>	<b>—</b>	<b>22</b>
Cheloniidae	2	1	1	—	—	—	—	—
Chelydridae	1	—	—	1	—	—	—	—
Dermatemyidae	1	1	—	—	—	—	—	—
Dermochelyidae	1	—	—	1	—	—	—	—
Emydidae	1	—	—	1	—	—	—	—
Geoemydidae	1	—	—	—	1	—	—	—
Kinosternidae	3	—	—	—	1	—	—	2
Staurotypidae	2	—	—	—	2	—	—	—
<b>Subtotal</b>	<b>12</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>—</b>	<b>—</b>	<b>2</b>
<b>Total</b>	<b>121</b>	<b>2</b>	<b>1</b>	<b>5</b>	<b>5</b>	<b>63</b>	<b>1</b>	<b>44</b>
<b>Sum total</b>	<b>165</b>	<b>4</b>	<b>4</b>	<b>11</b>	<b>10</b>	<b>85</b>	<b>4</b>	<b>47</b>
<b>Category total</b>	<b>165</b>		<b>19</b>			<b>95</b>		<b>51</b>

# The herpetofauna of Tabasco, Mexico

**Table 14.** Comparison of IUCN and distributional categorizations for the Tabasco herpetofauna. Non-native species are excluded.

Distributional categories	IUCN category								Total
	Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)	Near Threatened (NT)	Least Concern (LC)	Data Deficient (DD)	Not Evaluated (NE)		
Non-endemic species (NE)	4	1	8	7	80	1	44	145	
Country-endemic species (CE)	—	3	3	3	5	3	3	20	
<b>Total</b>	<b>4</b>	<b>4</b>	<b>11</b>	<b>10</b>	<b>85</b>	<b>4</b>	<b>47</b>	<b>165</b>	

The results of applying the IUCN categories to the Tabasco herpetofauna are compared to those obtained from using the EVS system in Table 16. This comparison demonstrates that only 16 of the 27 high vulnerability species (59.3%) are placed in the three IUCN “threat categories.” These 16 species are the anurans *Incilius macrocristatus* (VU 11), *Craugastor alfredi* (VU 11), *C. rhodopis* (VU 14), *Eleutherodactylus leprus* (VU 12), *Charadrahyla chaneque* (EN 13), *Duellmanohyla chamulae* (EN 13), *Ptychohyla macrotympanum* (CR 11), *Agalychnis moreletii* (CR 7), the salamanders *Bolitoglossa alberchi\** (VU 15) and *Bolitoglossa veracrucis\** (EN 17), the caecilian *Dermophis mexicanus* (VU 11), the crocodylian *Crocodylus acutus* (VU 14), the anole *Norops barkeri\** (VU 15), and the turtles *Chelydra rossignonii* (VU 17), *Dermatemys mawii* (CR 17), and *Trachemys venusta* (VU 19). At the other extreme, the 65 low vulnerability species constitute 75.6% of the 86 LC species (Table 16). As demonstrated in the other MCS studies, there is a general lack of correspondence between the application of the IUCN and EVS assessment systems.

Only four of the 162 native non-marine species in the Tabasco herpetofauna are allocated to the DD category (Table 17), which are the anurans *Craugastor palenque*, *C. pelorus\**, and *Exerodontia bivocata\**, and the night lizard *Lepidophyma tuxtlae\**. Based on similar arguments presented in previous MCS studies (e.g., Torres-Hernández et al. 2021), we suggest that the three anurans, each with an EVS of 15, would be better served by being placed in the EN category and the lizard, with an EVS of 11, in the NT category.

Forty-seven species still remain to be evaluated using the IUCN system, and thus we allocated them to the NE category (Tables 8 and 18). Only three of these species are country endemics (the anuran *Quilticohyla zoque* and the lizards *Holcosus amphiagrammus* and *H. stuarti*). The remaining 44 species are all non-endemics. The EVS values range from 3–15, which allocates a certain number of species to each of the three summary categories (Table 8). Twenty-four species have a low EVS score, 19 have medium scores, and four have high scores. When these species are assessed by the IUCN, we suggest that the four high vulnerability species (*Quilticohyla zoque*, *Oxybelis potosiensis*, *Oxyrhopus petolarius*, and

*Agkistrodon russeolus*), with an EVS of 14 or 15, should be placed in one of the three “threat categories.” The 10 species with an EVS of 11, 12, or 13 should be allocated to the NT category. The remaining 33 species, with an EVS of 3–10, can be placed in the LC category.

As with all the previous entries in the Mexican Conservation Series, in this entry we ascertained that IUCN has placed a rather large segment of the Tabasco herpetofauna in the Least Concern category (Table 19). This includes 85 species, or 52.5% of the total of 162 native non-marine species. Since over half of the species in Tabasco have been judged by IUCN to be of Least Concern, one might conclude that the conservation status of this herpetofauna is in reasonably good shape. To examine whether this is the case, the determinations of the EVS values for these 85 species are shown in Table 19. Given that the majority of the Tabasco herpetofauna is comprised of non-endemic species, one might expect that a large portion of these species should be assigned to the LC category, which proves to be the case. Only five (5.9%) of these LC species are country endemics. The EVS values for the 85 LC species range from 3 to 17, or only three fewer than the entire theoretical range for the EVS (i.e., 3–20). This range is two fewer than the entire range for Tabasco (3–19). Allocation of the EVS values for the 85 LC species into the three summary categories indicates the following: low (3–9), 40 species; medium (10–13), 38 species; and high (14–20), 7 species. On the basis of these allocations, we suggest that a more realistic evaluation would position the seven high vulnerability species in one of the three threat categories, as: CR (*Micrurus diastema*); EN (*Crotalus tzabcan*); and VU (*Triprion spinosus*, *Norops compressicauda*, *Sceloporus lundelli*, *Dipsas brevifacies*, and *Porthidium nasutum*). The 40 medium vulnerability species most logically should be allocated to the NT category, and the 40 low vulnerability species should be retained in the LC category, at least until more up-to-date, targeted conservation status surveys can be completed.

## Relative Herpetofaunal Priority

Johnson et al. (2015a) developed the concept of Relative Herpetofaunal Priority (RHP) in the third entry of the MCS. This device is a simple means for measuring the

**Table 15.** Environmental Vulnerability Scores (EVS) for the herpetofaunal species in Tabasco, Mexico, arranged by family. The shaded area to the left encompasses low vulnerability scores, and the one to the right indicates the high vulnerability scores. Non-native species are excluded.

Family	Number of species	Environmental Vulnerability Score																
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Bufonidae	3	1	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—
Centrolenidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Craugastoridae	7	—	—	—	—	—	—	—	1	1	1	—	2	2	—	—	—	—
Eleutherodactylidae	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Hylidae	16	1	2	—	—	2	1	1	2	1	1	2	2	1	—	—	—	—
Leptodactylidae	3	—	—	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Microhylidae	2	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Phyllomedusidae	2	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—
Ranidae	2	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—
Rhinophrynidae	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
<b>Subtotal</b>	<b>38</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>
Plethodontidae	5	—	—	—	—	—	—	1	—	1	—	—	2	—	1	—	—	—
<b>Subtotal</b>	<b>5</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>2</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>—</b>
Dermophiidae	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
<b>Subtotal</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>
<b>Total</b>	<b>44</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>—</b>	<b>1</b>	<b>—</b>	<b>—</b>
Crocodylidae	2	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
<b>Subtotal</b>	<b>2</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>1</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>
Corytophanidae	4	—	—	—	—	1	—	1	—	1	—	1	—	—	—	—	—	—
Dactyloidae	13	—	—	—	—	1	2	3	2	—	1	2	—	2	—	—	—	—
Diploglossidae	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Eublepharidae	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Iguanidae	2	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—
Mabuyidae	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Phrynosomatidae	5	—	—	1	1	—	—	—	—	—	—	—	2	1	—	—	—	—
Phyllodactylidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Scincidae	2	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—
Sphaerodactylidae	2	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—
Sphenomorphidae	2	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—
Teiidae	5	—	—	—	—	—	1	—	—	2	2	—	—	—	—	—	—	—
Xantusiidae	2	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—
Xenosauridae	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
<b>Subtotal</b>	<b>42</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>7</b>	<b>6</b>	<b>6</b>	<b>1</b>	<b>2</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>
Boidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Colubridae	20	—	—	1	7	1	1	4	3	—	1	1	—	1	—	—	—	—
Dipsadidae	30	—	1	2	2	3	3	4	5	2	2	4	1	1	—	—	—	—
Elapidae	2	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—
Leptotyphlopidae	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Natricidae	3	—	—	—	—	—	1	—	2	—	—	—	—	—	—	—	—	—
Sibynophiidae	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Typhlopidae	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Viperidae	6	—	—	—	—	—	—	—	—	—	2	1	1	1	1	—	—	—
<b>Subtotal</b>	<b>65</b>	<b>—</b>	<b>2</b>	<b>3</b>	<b>9</b>	<b>5</b>	<b>4</b>	<b>8</b>	<b>11</b>	<b>3</b>	<b>6</b>	<b>7</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>—</b>	<b>—</b>
Chelydridae	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Dermatemyidae	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Emydidae	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Geoemydidae	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Kinosternidae	3	—	—	—	—	—	—	2	—	—	—	1	—	—	—	—	—	—
Staurotypidae	2	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—
<b>Subtotal</b>	<b>9</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>—</b>	<b>2</b>	<b>—</b>	<b>—</b>	<b>1</b>	<b>3</b>	<b>—</b>	<b>—</b>	<b>2</b>	<b>—</b>	<b>1</b>	<b>—</b>
<b>Total</b>	<b>118</b>	<b>—</b>	<b>2</b>	<b>4</b>	<b>11</b>	<b>8</b>	<b>9</b>	<b>13</b>	<b>17</b>	<b>10</b>	<b>12</b>	<b>15</b>	<b>7</b>	<b>5</b>	<b>1</b>	<b>3</b>	<b>—</b>	<b>1</b>
<b>Sum total</b>	<b>162</b>	<b>2</b>	<b>5</b>	<b>5</b>	<b>13</b>	<b>12</b>	<b>13</b>	<b>16</b>	<b>21</b>	<b>16</b>	<b>15</b>	<b>17</b>	<b>11</b>	<b>10</b>	<b>1</b>	<b>4</b>	<b>—</b>	<b>1</b>
<b>Category total</b>	<b>162</b>	<b>66</b>						<b>69</b>						<b>27</b>				

The herpetofauna of Tabasco, Mexico

**Table 16.** Comparison of Environmental Vulnerability Scores (EVS) and IUCN categorizations for members of the herpetofauna of Tabasco, Mexico. Non-native species and marine species are excluded. The shaded area at the top encompasses low vulnerability category scores, and the one at the bottom includes the high vulnerability category scores.

EVS	IUCN category							
	Critically Endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data Deficient	Not Evaluated	Total
3	—	—	—	—	1	—	1	2
4	—	—	—	—	4	—	1	5
5	—	—	—	—	2	—	3	5
6	—	—	—	—	8	—	4	12
7	1	—	—	—	7	—	4	12
8	—	—	—	—	9	—	4	13
9	—	—	—	1	9	—	7	17
10	—	—	—	—	13	—	9	22
11	1	—	3	—	9	1	2	16
12	—	—	1	2	7	—	4	14
13	—	2	—	2	9	—	4	17
14	—	—	2	4	3	—	2	11
15	—	—	2	1	2	3	2	10
16	—	—	—	—	1	—	—	1
17	1	1	1	—	1	—	—	4
19	—	—	1	—	—	—	—	1
<b>Total</b>	<b>3</b>	<b>3</b>	<b>10</b>	<b>10</b>	<b>85</b>	<b>4</b>	<b>47</b>	<b>162</b>

relative importance of the herpetofaunal components of the physiographic regions in any given geographic entity, such as states in Mexico in the case of the MCS. Ascertaining the RHP is accomplished by using two metrics, i.e., (1) the proportions of state and country endemics (only country endemics in the case of Tabasco) among the physiographic regional herpetofaunas, and (2) the absolute quantity of high vulnerability category species in each physiographic regional herpetofauna. The data resulting from these calculations are presented in Tables 20 and 21, respectively.

The data in Table 20 are based on the relative number of country endemics (since there are no state endemic species in Tabasco). These data demonstrate that the first rank is occupied by the SNC with 17 species of a total of 145 species (11.7%). The second rank is held by the GCP with five country endemics among a total of 89 species (5.6%), and the third rank is the SBP with three country endemics among a total of 93 species (3.2%).

The data in Table 21 show the relative numbers of high vulnerability species, but the rankings differ

somewhat from those seen in Table 20. The first rank is the same in both instances, i.e., the Sierra Norte de Chiapas, with 23 high vulnerability species among a total of 142 species (16.2%). The second rank relative to the high vulnerability species, however, is held by the Sierras Bajas de Petén with 15 such species among a total of 91 (16.5%), although it holds rank number three with respect to country endemics. The third rank in Table 21 is for the Gulf Coastal Plain, with 10 high vulnerability species among a total of 79 (12.7%), while this region's status is rank two relative to country endemics.

Based on the results of the RHP analyses, the physiographic region with the highest priority is clearly the SNC, since it supports the highest numbers of both country endemics (Table 20) and high vulnerability species (Table 21). The 17 country endemics, as indicated by the asterisks in Table 4, include eight anurans (*Craugastor berkenbuschii*, *C. pelorus*, *C. rhodopis*, *Charadrahyla chaneque*, *Duellmanohyla chamulae*, *Exerodonta bivocata*, *Quilticohyla zoque*, and *Rheohyla miotympanum*), two salamanders (*Bolitoglossa*

**Table 17.** Environmental Vulnerability Scores (EVS) for members of the herpetofauna of Tabasco, Mexico, allocated to the IUCN Data Deficient category. \* = country endemic.

Species	Environmental Vulnerability Score (EVS)			
	Geographic distribution	Ecological distribution	Reproductive mode/Degree of persecution	Total score
<i>Craugastor palenque</i>	4	7	4	15
<i>Craugastor pelorus</i> *	5	6	4	15
<i>Exerodonta bivocata</i> *	6	8	1	15
<i>Lepidophyma tuxtlae</i> *	5	4	2	11

**Table 18.** Environmental Vulnerability Scores (EVS) for members of the herpetofauna of Tabasco, Mexico, currently Not Evaluated (NE) by the IUCN. Non-native species are excluded. \* = country endemic.

Species	Environmental Vulnerability Score (EVS)			
	Geographic distribution	Ecological distribution	Reproductive mode/Degree of persecution	Total score
<i>Rhinella horribilis</i>	1	1	1	3
<i>Quilticohyla zoque</i> *	5	8	1	14
<i>Lithobates brownorum</i>	4	3	1	8
<i>Norops beckeri</i>	3	6	3	12
<i>Norops biporcatus</i>	3	4	3	10
<i>Norops capito</i>	3	7	3	13
<i>Norops laeviventris</i>	3	3	3	9
<i>Norops lemurinus</i>	3	2	3	8
<i>Norops petersi</i>	2	4	3	9
<i>Norops rodriguezii</i>	4	3	3	10
<i>Norops sericeus</i>	2	3	3	8
<i>Norops tropidonotus</i>	4	2	3	9
<i>Norops uniformis</i>	4	6	3	13
<i>Norops unilobatus</i>	1	3	3	7
<i>Iguana rhinolopha</i>	1	3	6	10
<i>Marisora lineola</i>	4	3	3	10
<i>Sceloporus variabilis</i>	1	1	3	5
<i>Thecadactylus rapicauda</i>	3	4	3	10
<i>Sphaerodactylus continentalis</i>	4	3	3	10
<i>Scincella cherriei</i>	3	2	3	8
<i>Holcosus amphigrammus</i> *	5	3	3	11
<i>Holcosus stuarti</i> *	5	4	3	12
<i>Xenosaurus rackhami</i>	4	4	3	11
<i>Boa imperator</i>	3	1	6	10
<i>Drymobius margaritiferus</i>	1	1	4	6
<i>Lampropeltis polyzona</i>	1	1	6	8
<i>Leptophis ahaetulla</i>	3	3	4	10
<i>Oxybelis fulgidus</i>	3	2	4	9
<i>Oxybelis potosiensis</i>	5	7	3	15
<i>Spilotes pullatus</i>	1	1	4	6
<i>Stenorhina degenhardtii</i>	3	3	3	9
<i>Stenorhina freminvillii</i>	1	2	4	7
<i>Coniophanes fissidens</i>	1	3	3	7
<i>Enulius flavitorques</i>	1	1	3	5
<i>Imantodes cenchoa</i>	1	3	2	6
<i>Imantodes gemmistratus</i>	1	3	2	6
<i>Leptodeira septentrionalis</i>	2	2	4	8
<i>Oxyrhopus petolarius</i>	3	6	5	14
<i>Rhadinaea decorata</i>	1	6	2	9
<i>Sibon nebulatus</i>	1	2	2	5
<i>Xenodon rabdocephalus</i>	3	5	5	13
<i>Epictia phenops</i>	1	4	1	6
<i>Agkistrodon russeolus</i>	4	6	5	15
<i>Bothriechis schlegelii</i>	2	6	5	13
<i>Bothrops asper</i>	3	4	5	12
<i>Kinosternon leucostomum</i>	3	4	3	10
<i>Kinosternon scorpioides</i>	3	4	3	10

The herpetofauna of Tabasco, Mexico

**Table 19.** Environmental Vulnerability Scores (EVS) for members of the herpetofauna of Tabasco, Mexico, assigned to the IUCN Least Concern (LC) category. Non-native species are excluded. \* = country endemic.

Species	Environmental Vulnerability Score (EVS)			
	Geographic distribution	Ecological distribution	Reproductive mode/Degree of persecution	Total score
<i>Incilius valliceps</i>	3	2	1	6
<i>Hyalinobatrachium viridissimum</i>	3	4	3	10
<i>Craugastor loki</i>	2	4	4	10
<i>Dendrosophus ebraccatus</i>	3	6	1	10
<i>Dendrosophus microcephalus</i>	3	3	1	7
<i>Scinax staufferi</i>	2	1	1	4
<i>Smilisca baudinii</i>	1	1	1	3
<i>Tlalocohyla loquax</i>	3	3	1	7
<i>Tlalocohyla picta</i>	2	5	1	8
<i>Trachycephalus vermiculatus</i>	1	2	1	4
<i>Triprion petasatus</i>	4	5	1	10
<i>Triprion spinosus</i>	3	6	5	14
<i>Engystomops pustulosus</i>	3	2	2	7
<i>Leptodactylus fragilis</i>	1	2	2	5
<i>Leptodactylus melanotonus</i>	1	3	2	6
<i>Gastrophryne elegans</i>	2	5	1	8
<i>Hypopachus variolosus</i>	2	1	1	4
<i>Agalychnis taylori</i>	3	5	3	11
<i>Lithobates vaillanti</i>	3	5	1	9
<i>Rhinophryne dorsalis</i>	2	5	1	8
<i>Bolitoglossa mexicana</i>	4	3	4	11
<i>Bolitoglossa rufescens</i>	1	4	4	9
<i>Crocodylus moreletii</i>	2	5	6	13
<i>Basiliscus vittatus</i>	1	3	3	7
<i>Corytophanes cristatus</i>	3	5	3	11
<i>Corytophanes hernandezii</i>	4	6	3	13
<i>Laemancus longipes</i>	1	5	3	9
<i>Norops compressicauda*</i>	5	7	3	15
<i>Coleonyx elegans</i>	2	3	4	9
<i>Ctenosaura similis</i>	1	4	3	8
<i>Sceloporus chrysostictus</i>	4	6	3	13
<i>Sceloporuslundelli</i>	4	7	3	14
<i>Sceloporus serrifer</i>	2	1	3	6
<i>Sceloporus teapensis</i>	4	6	3	13
<i>Mesoscincus schwartzei</i>	2	6	3	11
<i>Plestiodon sumichrasti</i>	4	5	3	12
<i>Sphaerodactylus glaucus</i>	4	5	3	12
<i>Scincella gemmingeri*</i>	5	3	3	11
<i>Aspidoscelis deppii</i>	1	4	3	8
<i>Aspidoscelis guttatus*</i>	5	4	3	12
<i>Holcosus festivus</i>	3	5	3	11
<i>Lepidophyma flavimaculatum</i>	1	5	2	8
<i>Dendrophidion vinitum</i>	3	7	3	13
<i>Drymarchon melanurus</i>	1	1	4	6
<i>Ficimia publia</i>	4	3	2	9
<i>Leptophis mexicanus</i>	1	1	4	6
<i>Masticophis mentovarius</i>	1	1	4	6
<i>Mastigodryas melanolomus</i>	1	1	4	6
<i>Phrynonax poecilonotus</i>	3	4	3	10
<i>Pseudelaphe flavirufa</i>	2	4	4	10

**Table 19 (continued).** Environmental Vulnerability Scores (EVS) for members of the herpetofauna of Tabasco, Mexico, assigned to the IUCN Least Concern (LC) category. Non-native species are excluded. \* = country endemic.

Species	Environmental Vulnerability Score (EVS)			
	Geographic distribution	Ecological distribution	Reproductive mode/Degree of persecution	Total score
<i>Senticolis triaspis</i>	2	1	3	6
<i>Tantilla rubra</i>	2	1	2	5
<i>Tantilla schistosa</i>	3	3	2	8
<i>Tantillita lintoni</i>	4	6	2	12
<i>Adelphicos quadrivirgatum</i>	4	4	2	10
<i>Amastridium sapperi</i>	4	4	2	10
<i>Clelia scytalina</i>	4	5	4	13
<i>Coniophanes bipunctatus</i>	1	5	3	9
<i>Coniophanes imperialis</i>	2	3	3	8
<i>Coniophanes piceivittis</i>	1	3	3	7
<i>Coniophanes quinquevittatus</i>	4	6	3	13
<i>Coniophanes schmidti</i>	4	6	3	13
<i>Conophis lineatus</i>	2	3	4	9
<i>Dipsas brevifacies</i>	4	7	4	15
<i>Geophis carinosus</i>	2	4	2	8
<i>Geophis laticinctus</i> *	5	4	2	11
<i>Geophis sanniolus</i>	4	6	2	12
<i>Geophis sartorii</i>	2	2	5	9
<i>Leptodeira frenata</i>	4	4	4	12
<i>Leptodeira maculata</i>	2	1	4	7
<i>Ninia diademata</i>	4	3	2	9
<i>Ninia sebae</i>	1	2	2	5
<i>Pliocercus elapoides</i>	4	1	5	10
<i>Sibon dimidiatus</i>	1	5	4	10
<i>Tretanorhinus nigroluteus</i>	3	5	2	10
<i>Micrurus diastema</i> *	5	7	5	17
<i>Micrurus elegans</i>	4	4	5	13
<i>Nerodia rhombifer</i>	1	5	4	10
<i>Thamnophis marcianus</i>	1	5	4	10
<i>Thamnophis proximus</i>	1	2	4	7
<i>Scaphiodontophis annulatus</i>	1	5	5	11
<i>Amerotyphlops tenuis</i>	4	7	1	12
<i>Crotalus tzabcan</i>	4	7	5	16
<i>Metlapilcoatlus mexicanus</i>	3	4	5	12
<i>Porthidium nasutum</i>	3	6	5	14

*platyactyla* and *B. veracrucis*), five lizards (*Norops barkeri*, *N. compressicauda*, *Holcosus amphiagrammus*, *H. stuarti*, and *Lepidophyma tuxtlae*), and two snakes (*Geophis laticinctus* and *Micrurus diastema*). The 23 high vulnerability species found in the SNC are identified in Table 8 and are listed here for emphasis:

*Craugastor berkenbuschii*\*

*Craugastor palenque*

*Craugastor pelorus*\*

*Craugastor rhodopis*\*

*Exerodonta bivocata*\*

*Quilticohyla zoque*\*

*Triprion spinosus*

*Bolitoglossa platyactyla*\*

*Bolitoglossa veracrucis*\*

*Crocodylus acutus*

*Norops barkeri*\*

*Norops compressicauda*\*

*Sceloporus lundelli*

*Oxybelis potosiensis*

*Dipsas brevifacies*

*Oxyrhopus petolarius*

*Micrurus diastema*\*

*Porthidium nasutum*

*Chelydra rossignonii*

*Dermatemys mawii*

*Trachemys venusta*

*Kinosternon acutum*

*Staurotypus triporcatus*

# The herpetofauna of Tabasco, Mexico

**Table 20.** Number of herpetofaunal species in the three distributional status categories among the three physiographic regions of Tabasco, Mexico. Rank order is based on the number of country endemics.

Physiographic region	Distributional categories			Total	Rank order
	Non-endemics	Country Endemics	Non-natives		
Gulf Coastal Plain	78	5	5	88	2
Sierra Norte de Chiapas	125	17	3	145	1
Sierras Baja del Petén	88	3	2	93	3

Of these 23 species, 10 are country endemics (\*) with EVS values ranging from 14 to 19.

The GCP includes five country endemics: the anuran *Craugastor rhodopis*, the lizards *Aspidoscelis guttatus*, *Holcosus amphigrammus*, and *H. stuarti*, and the snake *Micrurus diastema*. The GCP also harbors 10 high vulnerability species, which are indicated in Table 8 and listed here for emphasis:

*Craugastor rhodopis\**  
*Crocodylus acutus*  
*Oxybelis potosiensis*  
*Micrurus diastema\**  
*Chelydra rossignonii*  
*Dermatemys mawii*  
*Trachemys venusta*  
*Kinosternon acutum*  
*Claudius angustatus*  
*Staurotypus triporcatus*

Only two of these 10 species are country endemics (\*), but the EVS values for all ten range from 14 to 19.

Finally, the SBP contains only three country endemics: the anuran *Craugastor rhodopis*, the salamander *Bolitoglossa alberchi*, and the lizard *Scincella gemmingeri*. This region, however, supports 15 high vulnerability species that are listed in Table 8 and here for emphasis:

*Craugastor palenque*  
*Craugastor rhodopis\**  
*Bolitoglossa alberchi\**  
*Crocodylus acutus*  
*Sceloporus lundelli*  
*Oxybelis potosiensis*  
*Agkistrodon russeolus*  
*Crotalus tzabcan*  
*Porthidium nasutum*

*Chelydra rossignonii*  
*Dermatemys mawii*  
*Trachemys venusta*  
*Kinosternon acutum*  
*Claudius angustatus*  
*Staurotypus triporcatus*

Only two of these 15 species are country endemics (\*), but the EVS values for all 15 species range from 14 to 19.

In each of the three physiographic regions we recognize in Tabasco, the largest distributional group, as expected, is comprised of the non-endemic species. Similarly, the high vulnerability species in each region are non-endemic species. As a result, unlike the many states surveyed thus far in the MCS, the group of principal conservation concern in Tabasco is the non-endemic segment. Consequently, this group of species is examined more closely below in an effort to protect the herpetofauna of Tabasco.

## Natural Protected Areas in Tabasco

The ostensible purpose for the establishment of natural protected areas in any location is to protect key portions of the ecosystems contained within them from the depredations of societal elements outside them for perpetuity. Basically, there are two types of issues, i.e., agriculturalization and urbanization. To be maximally effective, such protected areas should include functionally capable segments of the ecosystems originally present in a given entity (e.g., a state), whose size and extent is sufficient to support viable populations of all the organisms found within the designated protected area. Most often, however, such areas are established without the completion of the requisite work to demonstrate the existence of survivable populations of anything more than a handful of the resident creatures. When

**Table 21.** Number of herpetofaunal species in the three EVS categories among the three physiographic regions of Tabasco, Mexico. Rank order is determined by the relative number of high EVS species. Non-native and marine species are excluded.

Physiographic province	Low	Medium	High	Total	Rank order
Gulf Coastal Plain	39	31	10	79	3
Sierra Norte de Chiapas	60	59	23	142	1
Sierras Baja del Petén	38	38	15	91	2

**Table 22.** Characteristics of Natural Protected Areas in Tabasco, Mexico. Abbreviations in Facilities available are as follows: A = administrative services; R = park guards; S = system of pathways; and V = facilities for visitors. Category abbreviations: RB= Reserva de la Biosfera; APFF= Área de Protección de Flora y Fauna; PE= Parque Estatal; CICN= Centro de Integración y Conocimiento de la Naturaleza; RE= Reservas estatales; MN= Monumento Natural; and ADVC= Áreas destinadas voluntariamente a la conservación. The two data sources consulted were: (i) Avalos-Lázaro AA, Bautista-López SA y Martínez-Rivera AK. 2010. Composición y estructura de la comunidad herpetofanística en la temporada de estiaje del ANP Yumká en Villahermosa, Tabasco. XI Reunión Nacional de Herpetología. Programa y Resúmenes. Sociedad Herpetológica Mexicana, UAEM. Toluca, Estado de México; and (ii) Secretaría de Bienestar, Sustentabilidad y Cambio Climático (SBSCC). 2019. Listado de áreas Naturales Protegidas. Sistema Estatal de Áreas Naturales Protegidas, <https://tabasco.gob.mx/areas-naturales-protegidas-tabasco>, Accessed: 30 July 2021.

Name	Category	Date of Decree (dd/mm/yyyy)	Area (ha)	Municipalities	Jurisdiction	Physiographic region	Facilities available	Occupied by landowners	Management plan available	Herpetofaunal survey completed
Pantanos de Centla	Reserva de la Biosfera	06/08/1992	302,707	Centla, Jonuta and Macuspana	Mexican federal government	Llanura Costera del Golfo Sur	A,R,S,V	Yes	Yes	Yes
Cañón del Usumacinta	APFF	22/09/2008	46,128	Tenosique	Mexican federal government	Sierras Bajas del Petén	S,V	Yes	Yes	No
Agua Blanca	PE	19/12/1987	2,025	Macuspana	State	Llanura Costera del Golfo Sur	A,R,S,V	Yes	Yes	Yes
La Sierra de Tabasco	PE	24/02/1988	15,113.2	Tacotalpa, Teapa	State	Sierras del Norte de Chiapas	R,S	Yes	No	No
Laguna del Camarón	PE	19/12/2012	83	Centro	State	Llanura Costera del Golfo Sur	S	Yes	No	Yes
CICN Yumká	RE	19/12/1998	101	Centro	State	Llanura Costera del Golfo Sur	A,R,S,V	No	No	Yes
Reserva Ecológica de la Chontalpa	RE	08/02/1995	277	Cárdenas	State	Llanura Costera del Golfo Sur	A,R,S,V	No	No	No
Laguna de las Ilusiones	RE	08/02/1995	259.3	Centro	State	Llanura Costera del Golfo Sur	A,R,S,V	No	Yes	Yes
Yu-Balcáh	RE	10/06/2000	572	Tacotalpa	State	Sierras del Norte de Chiapas	A,R,S,V	No	No	No
Cascadas de Reforma	RE	23/11/2002	5,748.4	Balancán	State	Llanura Costera del Golfo Sur	S,V	Yes	No	No
Río Playa	RE	29/09/2004	711	Centla	State	Llanura Costera del Golfo Sur	A,S	Yes	No	No
Grutas del Cerro Coconá	MN	24/02/1988	442	Teapa	State	Sierras del Norte de Chiapas	A,R,S,V	Yes	No	Yes
Laguna Mecoacán	PE	25/09/2019	18,774.7	Jalpa de Méndez, Paraiso	State	Llanura Costera del Golfo Sur	S,V	Yes	No	No
Guaritec	ADVC	10/07/2014	7	Centla	Private	Llanura Costera del Golfo Sur	A,R,S,V	No	Yes	No

The herpetofauna of Tabasco, Mexico

**Table 23.** Distribution of herpetofaunal species in the Natural Protected Areas of Tabasco, Mexico, based on herpetofaunal surveys. Abbreviations are as follows: \* = species endemic to Mexico and \*\* = non-native species. The numbers signifying the 14 Natural Protected Areas in Tabasco are as follows: 1 = Pantanos de Centla; 2 = Cañon del Usumacinta; 3 = Agua Blanca; 4 = La Sierra de Tabasco; 5 = Laguna del Camarón; 6 = CICN Yumká; 7 = Reserva Ecológico de la Chontalpa; 8 = Laguna de las Ilusiones; 9 = Yu-Balchá; 10 = Cascadas de Reforma; 11 = Río Playa; 12 = Grutas del Cerro Coconá; 13 = Laguna Mecoacán; and 14 = Guaritec.

Taxon	Natural Protected Area													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Anura (38 species)</b>														
<b>Bufonidae (3 species)</b>														
<i>Incilius valliceps</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Incilius macrocristatus</i>					+							+		
<i>Rhinella horribilis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Centrolenidae (1 species)</b>														
<i>Hyalinobatrachium viridissimum</i>	+				+									
<b>Craugastoridae (7 species)</b>														
<i>Craugastor alfredi</i>		+	+	+						+		+		
<i>Craugastor berkenbuschii</i> *			+											
<i>Craugastor laticeps</i>		+	+							+		+		
<i>Craugastor loki</i>				+								+		
<i>Craugastor palenque</i>		+												
<i>Craugastor pelorus</i> *				+	+									
<i>Craugastor rhodopis</i> *		+	+	+						+		+		
<b>Eleutherodactylidae (2 species)</b>														
<i>Eleutherodactylus leprus</i>	+	+	+									+		
<i>Eleutherodactylus planirostris</i> **								+						
<b>Hylidae (15 species)</b>														
<i>Charadrahyla chaneque</i> *					+									
<i>Dendrosophus ebraccatus</i>														
<i>Dendrosophus microcephalus</i>	+	+		+				+	+		+	+		
<i>Duellmanohyla chamulae</i> *					+									
<i>Exerodontia bivocata</i> *					+									
<i>Ptychohyla macrotympanum</i>					+									
<i>Quilticohyla zoque</i> *					+									
<i>Rheohyla miotympanum</i> *														
<i>Scinax staufferi</i>	+	+	+	+		+	+	+	+	+	+	+	+	+
<i>Smilisca baudinii</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Smilisca cyanosticta</i>		+	+	+										
<i>Tlalocohyla loquax</i>	+			+	+	+	+	+	+	+	+	+	+	+
<i>Tlalocohyla picta</i>	+				+			+				+		+
<i>Trachycephalus vermiculatus</i>	+	+		+				+	+			+	+	+
<i>Triprion petasatus</i>					+									
<i>Triprion spinosus</i>					+							+		
<b>Leptodactylidae (3 species)</b>														
<i>Engystomops pustulosus</i>		+								+				
<i>Leptodactylus fragilis</i>	+	+		+			+	+					+	
<i>Leptodactylus melanotonus</i>	+	+	+	+								+		
<b>Microhylidae (2 species)</b>														
<i>Gastrophryne elegans</i>					+							+		

**Table 23 (continued).** Distribution of herpetofaunal species in the Natural Protected Areas of Tabasco, Mexico, based on herpetofaunal surveys. Abbreviations are as follows: \* = species endemic to Mexico and \*\* = non-native species. The numbers signifying the 14 Natural Protected Areas in Tabasco are as follows: 1 = Pantanos de Centla; 2 = Cañon del Usumacinta; 3 = Agua Blanca; 4 = La Sierra de Tabasco; 5 = Laguna del Camarón; 6 = CICN Yumká; 7 = Reserva Ecológico de la Chontalpa; 8 = Laguna de las Ilusiones; 9 = Yu-Balchá; 10 = Cascadas de Reforma; 11 = Río Playa; 12 = Grutas del Cerro Coconá; 13 = Laguna Mecoacán; and 14 = Guaritec.

Taxon	Natural Protected Area													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Hypopachus variolosus</i>	+	+												
<b>Phyllomedusidae (2 species)</b>														
<i>Agalychnis moreletii</i>														
<i>Agalychnis callidryas</i>	+	+		+										
<b>Ranidae (2 species)</b>														
<i>Lithobates brownorum</i>	+			+	+			+		+	+	+	+	+
<i>Lithobates vaillanti</i>	+	+	+	+					+	+			+	+
<b>Rhinophrynidae (1 species)</b>														
<i>Rhinophryne dorsalis</i>	+			+	+	+	+	+			+		+	+
<b>Caudata (5 species)</b>														
<b>Plethodontidae (5 species)</b>														
<i>Bolitoglossa alberchi*</i>		+												
<i>Bolitoglossa mexicana</i>		+		+								+		
<i>Bolitoglossa platydactyla*</i>				+										
<i>Bolitoglossa rufescens</i>					+									
<i>Bolitoglossa veracrucis*</i>														
<b>Gymnophiona (1 species)</b>														
<b>Dermophiidae (1 species)</b>														
<i>Dermophis mexicanus</i>	+							+		+	+	+	+	
<b>Reptilia (124 species)</b>														
<b>Crocodylia (2 species)</b>														
<b>Crocodylidae (2 species)</b>														
<i>Crocodylus acutus</i>		+				+								
<i>Crocodylus moreletii</i>	+	+			+	+		+		+	+	+	+	
<b>Squamata (110 species)</b>														
<b>Corytophanidae (4 species)</b>														
<i>Basiliscus vittatus</i>	+	+	+	+						+	+	+	+	+
<i>Corytophanes cristatus</i>					+								+	
<i>Corytophanes hernandezii</i>		+	+	+									+	
<i>Laemancus longipes</i>	+	+		+						+	+			
<b>Dactyloidae (14 species)</b>														
<i>Norops barkeri*</i>		+	+	+									+	
<i>Norops beckeri</i>				+	+									
<i>Norops biporcatus</i>				+	+									
<i>Norops capito</i>					+								+	
<i>Norops compressicauda*</i>					+								+	
<i>Norops laeviventris</i>													+	
<i>Norops lemurinus</i>	+	+	+	+		+	+	+	+	+	+	+	+	+
<i>Norops rodriguezii</i>			+	+	+								+	
<i>Norops sagrei**</i>	+	+	+		+	+	+	+		+	+	+		

The herpetofauna of Tabasco, Mexico

**Table 23 (continued).** Distribution of herpetofaunal species in the Natural Protected Areas of Tabasco, Mexico, based on herpetofaunal surveys. Abbreviations are as follows: \* = species endemic to Mexico and \*\* = non-native species. The numbers signifying the 14 Natural Protected Areas in Tabasco are as follows: 1 = Pantanos de Centla; 2 = Cañon del Usumacinta; 3 = Agua Blanca; 4 = La Sierra de Tabasco; 5 = Laguna del Camarón; 6 = CICN Yumká; 7 = Reserva Ecológico de la Chontalpa; 8 = Laguna de las Ilusiones; 9 = Yu-Balchá; 10 = Cascadas de Reforma; 11 = Río Playa; 12 = Grutas del Cerro Coconá; 13 = Laguna Mecoacán; and 14 = Guaritec.

Taxon	Natural Protected Area													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Norops sericeus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Norops tropidonotus</i>		+	+	+									+	
<i>Norops petersii</i>				+									+	
<i>Norops uniformis</i>		+	+	+									+	
<i>Norops unilobatus</i>	+													
<b>Diploglossidae (1 species)</b>														
<i>Celestus rozellae</i>													+	
<b>Eublepharidae (1 species)</b>														
<i>Coleonyx elegans</i>		+	+	+		+						+	+	
<b>Gekkonidae (2 species)</b>														
<i>Hemidactylus frenatus</i> **	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Hemidactylus turcicus</i> **	+	+					+			+		+	+	+
<b>Iguanidae (2 species)</b>														
<i>Ctenosaura similis</i>	+	+		+				+	+	+				+
<i>Iguana rhinolopha</i>	+	+	+	+	+	+	+	+		+	+	+	+	+
<b>Mabuyidae (1 species)</b>														
<i>Marisora lineola</i>	+				+	+	+	+					+	+
<b>Phrynosomatidae (5 species)</b>														
<i>Sceloporus chrysostictus</i>	+	+									+			
<i>Sceloporuslundelli</i>		+	+											
<i>Sceloporus serrifer</i>		+	+										+	
<i>Sceloporus teapensis</i>		+		+									+	
<i>Sceloporus variabilis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Phyllodactylidae (1 species)</b>														
<i>Thecadactylus rapicauda</i>		+	+											
<b>Scincidae (2 species)</b>														
<i>Mesoscincus schwartzei</i>	+	+	+							+				
<i>Plestiodon sumichrasti</i>	+		+	+									+	
<b>Sphaerodactylidae (2 species)</b>														
<i>Sphaerodactylus glaucus</i>	+	+		+										
<i>Sphaerodactylus millepunctatus</i>		+		+										
<b>Sphenomorphidae (2 species)</b>														
<i>Scincella cherriei</i>	+	+	+	+									+	
<i>Scincella gemmingeri</i> *				+										
<b>Teiidae (5 species)</b>														
<i>Aspidoscelis deppii</i>	+		+										+	
<i>Aspidoscelis guttatus</i> *			+											
<i>Holcosus amphigrammus</i> *	+	+	+	+						+		+	+	+
<i>Holcosus festivus</i>	+	+	+	+					+					
<i>Holcosus stuarti</i> *	+			+						+				
<i>Holcosus undulatus</i>	+	+	+	+	+			+		+		+	+	+

**Table 23 (continued).** Distribution of herpetofaunal species in the Natural Protected Areas of Tabasco, Mexico, based on herpetofaunal surveys. Abbreviations are as follows: \* = species endemic to Mexico and \*\* = non-native species. The numbers signifying the 14 Natural Protected Areas in Tabasco are as follows: 1 = Pantanos de Centla; 2 = Cañon del Usumacinta; 3 = Agua Blanca; 4 = La Sierra de Tabasco; 5 = Laguna del Camarón; 6 = CICN Yumká; 7 = Reserva Ecológico de la Chontalpa; 8 = Laguna de las Ilusiones; 9 = Yu-Balcah; 10 = Cascadas de Reforma; 11 = Río Playa; 12 = Grutas del Cerro Coconá; 13 = Laguna Mecoacán; and 14 = Guaritec.

Taxon	Natural Protected Area													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Xantusiidae (2 species)</b>														
<i>Lepidophyma flavimaculatum</i>		+	+	+								+		
<i>Lepidophyma tuxtlae</i> *														
<b>Xenosauridae (1 species)</b>														
<i>Xenosaurus rackhami</i>														
<b>Boidae (1 species)</b>														
<i>Boa imperator</i>	+		+		+	+	+	+			+		+	
<b>Colubridae (20 species)</b>														
<i>Dendrophidion vinitor</i>					+									
<i>Drymarchon melanurus</i>	+	+	+	+						+			+	
<i>Drymobius margaritiferus</i>		+	+	+		+	+	+						
<i>Ficimia publia</i>				+	+							+		
<i>Lampropeltis polyzona</i>	+													
<i>Leptophis ahaetulla</i>				+	+							+		
<i>Leptophis mexicanus</i>	+	+			+									
<i>Masticophis mentovarius</i>	+	+										+		
<i>Mastigodryas melanolomus</i>	+			+								+		
<i>Oxybelis fulgidus</i>														
<i>Oxybelis potosiensis</i>		+	+	+								+		
<i>Phrynonax poecilonotus</i>		+	+	+								+	+	
<i>Pseudelaphe flavirufa</i>					+									
<i>Senticolis triaspis</i>	+	+			+						+		+	
<i>Spilotes pullatus</i>	+				+		+	+	+				+	
<i>Stenorhina degenhardtii</i>														
<i>Stenorhina freminvillii</i>														
<i>Tantilla schistosa</i>						+								
<i>Tantilla rubra</i>					+									
<i>Tantillita lintoni</i>					+									
<b>Dipsadidae (27 species)</b>														
<i>Adelphicos visoninum</i>					+									
<i>Amastridium sapperi</i>						+								
<i>Clelia scytalina</i>						+								
<i>Coniophanes bipunctatus</i>	+	+			+									
<i>Coniophanes fissidens</i>		+			+									
<i>Coniophanes imperialis</i>	+	+			+							+		
<i>Coniophanes quinquevittatus</i>	+	+			+									
<i>Coniophanes schmidti</i>				+										
<i>Conophis lineatus</i>	+	+												
<i>Dipsas brevifacies</i>				+										
<i>Geophis carinosus</i>						+								
<i>Geophis laticinctus</i> *						+					+			

The herpetofauna of Tabasco, Mexico

**Table 23 (continued).** Distribution of herpetofaunal species in the Natural Protected Areas of Tabasco, Mexico, based on herpetofaunal surveys. Abbreviations are as follows: \* = species endemic to Mexico and \*\* = non-native species. The numbers signifying the 14 Natural Protected Areas in Tabasco are as follows: 1 = Pantanos de Centla; 2 = Cañon del Usumacinta; 3 = Agua Blanca; 4 = La Sierra de Tabasco; 5 = Laguna del Camarón; 6 = CICN Yumká; 7 = Reserva Ecológico de la Chontalpa; 8 = Laguna de las Ilusiones; 9 = Yu-Balchá; 10 = Cascadas de Reforma; 11 = Río Playa; 12 = Grutas del Cerro Coconá; 13 = Laguna Mecoacán; and 14 = Guaritec.

Taxon	Natural Protected Area													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Geophis sartorii</i>		+		+				+				+	+	
<i>Imantodes cenchoa</i>				+	+							+		
<i>Imantodes gemmistratus</i>	+			+						+		+	+	+
<i>Leptodeira frenata</i>		+	+	+				+			+			
<i>Leptodeira maculata</i>				+										
<i>Leptodeira septentrionalis</i>	+		+	+	+	+	+	+		+		+		
<i>Ninia diademata</i>		+		+								+		
<i>Ninia sebae</i>	+	+	+									+	+	
<i>Oxyrhopus petolarius</i>		+	+	+								+	+	
<i>Pliocercus elapoides</i>	+			+								+		
<i>Rhadinaea decorata</i>		+	+	+								+		
<i>Sibon dimidiatus</i>				+								+		
<i>Sibon nebulatus</i>				+	+									
<i>Tretanorhinus nigroluteus</i>	+		+	+		+	+	+		+	+		+	
<i>Xenodon rabdocephalus</i>					+				+					
<b>Elapidae (2 species)</b>											+	+		
<i>Micrurus diastema</i> *					+							+	+	
<i>Micrurus elegans</i>					+									
<b>Leptotyphlopidae (1 species)</b>														
<i>Epictia goudotii</i>	+				+	+		+			+			
<b>Natricidae (3 species)</b>														
<i>Nerodia rhombifera</i>	+							+		+				
<i>Thamnophis marcianus</i>	+			+								+		
<i>Thamnophis proximus</i>	+									+			+	
<b>Sibynophiidae (1 species)</b>														
<i>Scaphiodontophis annulatus</i>		+	+	+					+			+	+	
<b>Typhlopidae (2 species)</b>														
<i>Amerotyphlops tenuis</i>		+		+				+				+		
<i>Indotyphlops braminus</i> **								+	+				+	
<b>Viperidae (7 species)</b>														
<i>Agkistrodon russeolus</i>		+		+							+			
<i>Bothriechis schlegelii</i>			+	+							+			
<i>Bothrops asper</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Crotalus tzabcan</i>		+									+			
<i>Metlapilcoatlus mexicanus</i>					+									
<i>Porthidium nasutum</i>		+		+										
<b>Testudines (12 species)</b>														
<b>Cheloniidae (2 species)</b>														
<i>Chelonia mydas</i>														
<i>Lepidochelys kempii</i>														
<b>Chelydridae (1 species)</b>														

**Table 23 (continued).** Distribution of herpetofaunal species in the Natural Protected Areas of Tabasco, Mexico, based on herpetofaunal surveys. Abbreviations are as follows: \* = species endemic to Mexico and \*\* = non-native species. The numbers signifying the 14 Natural Protected Areas in Tabasco are as follows: 1 = Pantanos de Centla; 2 = Cañon del Usumacinta; 3 = Agua Blanca; 4 = La Sierra de Tabasco; 5 = Laguna del Camarón; 6 = CICN Yumká; 7 = Reserva Ecológico de la Chontalpa; 8 = Laguna de las Ilusiones; 9 = Yu-Balchá; 10 = Cascadas de Reforma; 11 = Río Playa; 12 = Grutas del Cerro Coconá; 13 = Laguna Mecoacán; and 14 = Guaritec.

Taxon	Natural Protected Area													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>Chelydra rossignonii</i>	+			+							+	+		
<b>Dermatemydidae (1 species)</b>														
<i>Dermatemys mawii</i>	+	+									+			
<b>Dermochelyidae (1 species)</b>														
<i>Dermochelys coriacea</i>														
<b>Emydidae (1 species)</b>														
<i>Trachemys venusta</i>	+					+		+		+	+		+	+
<b>Geoemydidae (1 species)</b>														
<i>Rhinoclemmys areolata</i>	+										+		+	
<b>Kinosternidae (3 species)</b>														
<i>Kinosternon acutum</i>	+	+					+			+			+	
<i>Kinosternon leucostomum</i>	+			+		+		+			+		+	
<i>Kinosternon scorpioides</i>	+		+				+	+		+	+			
<b>Staurotypidae (2 species)</b>														
<i>Claudius angustatus</i>	+					+		+		+	+		+	
<i>Staurotypus triporcatus</i>	+				+	+		+		+	+	+		
<b>Total</b>	70	82	61	111	18	27	26	38	24	39	29	73	43	18

such information is available, generally it is assembled in a sufficiently detailed management plan that, in the best-case scenario, is used to justify the recognition of a given natural protected area. Oftentimes, however, the management plan is drawn up after the official designation of the protected area, or does not exist at the time of the designation. This scenario often is the case with herpetofaunal surveys.

In order to assess the extent to which the natural protected areas of Tabasco are able to protect the state herpetofauna, we collected a variety of data on these areas (Table 22). The number of these areas in Tabasco is rather substantial, amounting to 14 entities, which is the same number as seen in the state of Puebla (Woolrich-Piña et al. 2017). The Mexican Federal government administers two of these 14 areas, 11 are administered at the state level, and one is a private reserve. The 14 areas range in size from seven to 302,707 ha. Their total area is 743,808.5 ha or 7,438.1 km<sup>2</sup>, which is 30.1% of the total area of the state and close to three times the proportion occupied by the 14 areas located in Puebla (Woolrich et al. 2017). In Tabasco, these areas were established relatively recently, during the 33-year period from 1988 to 2019. The representation of these areas among the physiographic regions of Tabasco is skewed toward the Llanura Costera de Golfo Sur or Gulf Coastal Lowlands, with 10 of the 14 located there. Three areas are found

within the Sierras del Norte de Chiapas and only one in the Sierras Baja del Petén.

With respect to the range of facilities available in these 14 protected areas, eight have the full range (Table 22), and the remaining six have fewer. A major concern for the stability of the state's protected areas is that, to some degree, landowners occupy nine of the 14 (64.3%) areas. Unfortunately, the nine occupied areas include all of the largest ones, and the largest area not occupied by landowners encompasses only 572 hectares (5.72 km<sup>2</sup>). Also unfortunate is that only five of the 14 areas have had management plans developed for them. Fewer than half (six) of the 14 areas have had herpetofaunal surveys conducted for them. Below we examine the impact of this situation on the protection of the state's herpetofauna.

Of the 165 native species known from Tabasco, all but seven (158, or 95.8%) have been recorded from one or more of the state's natural protected areas (Table 23). In addition, all five non-native species have been recorded from one or more of these areas (Table 24). The number of species recorded from these 14 areas ranges from 18 in PE Laguna del Camarón and ADVC Guaritec to 112 in PE La Sierra de Tabasco (Table 23). The seven species that are not represented in any of the 14 areas are: *Rheohyla miotympanum*\*; *Bolitoglossa veracrucis*\*; *Lepidophyma tuxtlae*\*; *Xenosaurus rackhami*; *Chelonia mydas*; *Lepidochelys kempii*; and *Dermochelys coriacea*.

# The herpetofauna of Tabasco, Mexico

These seven species include three country endemics, and all three of the sea turtles known from the state.

Unlike the situation commonly encountered in the other states surveyed in the MCS, a high percentage of the known herpetofauna in Tabasco has been documented in the 14 natural protected areas in the state (Table 24). To date, of the 162 species thus far recorded from these areas, most (141, or 87.0%) are non-endemic species, which is a similar percentage (85.3%) for the representation of non-endemic species in the herpetofauna as a whole (Table 9). In Tabasco, 16 of the 162 (9.9%) species known from these areas are country endemics, again similar to the percentage (11.8%) for the state as a whole (Table 9). All five of the non-native species (100%) have been shown to occur in the natural protected areas in the state, which is not desirable, as these species have been recorded in from one to all 14 of these areas. Nonetheless, the goal of complete representation of the native herpetofauna in the established natural protected areas is within reach, as only seven species need to be added. As noted above, however, four of these seven species are country endemics and three are sea turtles. All but one of these species have been recorded from only a single physiographic region (Table 4), with the four terrestrial species documented from the Sierra del Norte de Chiapas and the three marine species from the Gulf Coastal Plain. Apparently, a special effort must be undertaken to incorporate all seven species within the existing system of natural protected areas.

## Conclusions and Recommendations

### Conclusions

A. The herpetofauna of Tabasco presently consists of 165 native species, including 38 anurans, five salamanders, one caecilian, two crocodylians, 107 squamates, and 12 turtles. In addition, five non-native species have been recorded from the state, including one anuran and four squamates.

B. We recognize three physiographic regions in Tabasco: the Gulf Coastal Plain (GCP), the Sierras Bajas del Petén (SBP), and the Sierra Norte de Chiapas (SNC).

C. The three physiographic regions we recognize in Tabasco support from 88 species in the Gulf Coastal Plain (GCP) to 145 in the Sierra del Norte de Chiapas (SNC), with an intermediate number of 93 in the Sierra Bajas del Petén (SBP).

D. The numbers of species shared among the physiographic regions range from 61 between the GCP and the SBP to 79 between the SNC and the SBP. The Coefficient of Biogeographic Resemblance (CBR) values range from 0.61 between the GCP and the SNC to 0.67 between the GCP and the SBP. The UPGMA dendrogram (Fig. 5) indicates that the SBP and GCP cluster at the

0.67 level, while the SNC clusters to the previous pair at the 0.64 level. This pattern indicates that all three regions are closely aligned at a relatively intermediate level of overall resemblance.

E. The level of herpetofaunal endemism in Tabasco is relatively low. Of the 165 recorded native species, only 20 are country endemics (12.1%), including eight anurans, three salamanders, and nine squamates. No state endemics are known from this state.

F. The distribution status of the 170 species comprising the Tabasco herpetofauna is as follows (in decreasing order of species numbers): non-endemics (145, 85.3%); country endemics (20, 11.8%); and non-natives (5, 2.9%). Of the 145 non-endemic species, their allocation among six of the nine distributional categories are as follows: MXCA (95, 65.5%); MXSA (34, 23.4%); USCA (eight, 5.5%); USSA (four, 2.7%); OCEA (three, 2.1%); and MXUS (one, 0.7%).

G. The principal environmental threats to the herpetofauna of Tabasco are deforestation, agricultural activities, roads, soil contamination and oil extraction, myths and cultural factors (gastronomy), illegal commerce, and forest fires.

H. The conservation status of the Tabasco herpetofauna was evaluated by using the SEMARNAT, IUCN, and EVS systems. As in previous MCS entries, the SEMARNAT system was determined to be of limited value, given that of 165 native species distributed in Tabasco, only 56 (33.9%) have been assessed using this system. A comparison of the SEMARNAT and distributional categorizations demonstrates that the majority of the species in Tabasco that have not been evaluated (98, 59.4%) are non-endemic species. Otherwise, the species that have been assessed also are primarily non-endemic species (47 or 28.5%), indicating no bias toward the consideration of country endemic species.

I. The results of the application of the IUCN system (by category and proportion) are: CR (four, 2.4% of 165 native species); EN (four, 2.4%); VU (11, 6.7%); NT (10, 6.1%); LC (85, 51.5%); DD (four, 2.4%); and NE (47, 28.5%).

J. A comparison of the IUCN and distributional categorizations illustrates that most of the 165 native species (132, 80.0%) are either allocated to the LC category (85, 51.5%) or Not Evaluated (NE; 47, 28.5%).

K. The application of the EVS system of conservation assessment to the 162 native non-marine species of Tabasco demonstrates that the categorical values increase slightly from low vulnerability (66, 40.7% of 162 native non-marine species) to medium vulnerability (69, 42.6%), and then decrease markedly at high vulnerability (27, 16.7%).

L. A comparison of the IUCN and EVS conservation status categorizations demonstrates that only 16 of the 27 high vulnerability species (59.3%) are placed in the three “threat categories” (CR, EN, or VU), while 66 low vulnerability species or 77.6% are among the 85 species in the IUCN LC category. As found in previous MCS studies, these two conservation systems lacked correspondence when applied to the Tabasco herpetofauna.

M. An examination of the conservation status of the species allocated to the IUCN DD, NE, and LC categories indicates that many of these 136 species (82.4% of the 165 native species) have not been assessed adequately compared to their respective EVS values. Thus, we strongly recommend that these species be reassessed to better demonstrate their prospects for future survival.

N. The Relative Herpetofaunal Priority (RHP) measure was utilized to determine the conservation significance of the three regional herpetofaunas in Tabasco. This analysis demonstrates that the herpetofauna of the Sierra del Norte de Chiapas is the most significant among the three regions, inasmuch as it supports the greatest numbers of country endemic species and high vulnerability species. The two other areas differ in their rankings (i.e., the rankings are reversed) based on these two RHP measures.

O. The number of protected areas in Tabasco is 14, of which the Mexican Federal Government administers two, while 11 are administered at the state level, and one is a private reserve. These 14 areas have been established relatively recently, from 1988 to 2019. Collectively, these areas comprise 30.1% of the total area of the state. Most of these areas (10 of the 14) are located in the Gulf Coastal Plain, while three are found in the Sierra del Norte de Chiapas, and only one is in the Sierras Baja del Petén. Landowners occupy nine (64.3%) of the 14 areas, an undesirable situation with respect to the protection of the included herpetofaunal species. Unfortunately, only five of the 14 areas have developed management plans. In addition, only six of the 14 have completed herpetofaunal surveys.

P. One highly desirable aspect, however, is that 158 (95.8%) of the 165 native species from the state have been recorded from one or more of the 14 areas. On the other hand, however, all five non-native species known from the state also are found in one or more of these areas. Of the 158 native species, 141 are non-endemics and 17 are country endemics.

Q. Future conservation efforts should be directed toward either locating sustainable populations of the seven unrecorded species within existing natural protected areas or establishing new areas, or perhaps enlarging

existing areas to encompass these species. In addition, herpetofaunal surveys need to be prepared for the eight areas presently lacking them.

## Recommendations

A. Our principal interest in preparing this 14<sup>th</sup> entry in the MCS is to document the composition, physiographic distribution, and conservation status of the 165 native species constituting the herpetofauna of Tabasco. The use of the EVS conservation system demonstrates that the categorical values increase only slightly from low vulnerability (66 species) to medium vulnerability (69 species), and then decrease markedly at high vulnerability (27). The Relative Herpetofaunal Priority measure indicates that the herpetofauna of the Sierra del Norte de Chiapas is the most significant among the three physiographic regions in Tabasco, because it supports the highest numbers of country endemic species and high vulnerability species.

B. The most important conservation challenge in Tabasco is to conduct the herpetofaunal surveys for eight of the 14 protected areas, with the hope that populations of the species not known to be represented within this system can be found in one or more of the areas located in the Gulf Coastal Plain and Sierra del Norte de Chiapas.

C. Once the presence of the entire native herpetofauna has been ascertained in the system of natural protected areas, then the next step will be to establish monitoring programs for all native species in order to guarantee their long-term survival. We submit that these steps need to be taken with the greatest speed, given that Tabasco is the 20<sup>th</sup> most populous state in Mexico and the 12<sup>th</sup> most densely populated.

*“Living wild species are like a library of books still unread. Our heedless destruction of them is akin to burning the library without ever having read its books.”*

John D. Dingell (1991)

**Acknowledgments.**—We are grateful to the following individuals for providing their photographs for this article: Jenny del Carmen Estrada-Montiel, Coral J. Pacheco-Figueroa, José del Carmen Gerónimo-Torres, Manuel Alberto Hernández-May, Marco Antonio Torrez-Pérez, Manuel Hernández-May, and Marco Antonio López-Luna. We also are very thankful to Guillermo Woolrich-Piña for his perceptive and helpful review of the manuscript.

## Literature Cited

Adams-Schroeder RH, Domínguez Rodríguez VI, García Hernández L. 1999. Potencial de la biorremediación

- de suelo y agua impactados por petróleo en el trópico mexicano. *Terra Latinoamericana* 17(2): 159–174.
- Alvarado-Díaz J, Suazo-Ortuño I, Wilson LD, Medina-Aguilar O. 2013. Patterns of physiographic distribution and conservation status of the herpetofauna of Michoacán, Mexico. Contribution to Special Mexico Issue. *Amphibian & Reptile Conservation* 7: 128–170 (e71).
- Ávila-Nájera DM, Mendoza GD, Villarreal O, Serna-Lagunes R. 2018. Uso y valor cultural de la herpetofauna en México: una revisión de las últimas dos décadas (1997–2017). *Acta Zoológica Mexicana Nueva Serie* 34: 1–15.
- Barkin D. 1978. *Desarrollo Regional y Reorganización Campesina: La Chontalpa como Reflejo del Problema Agropecuario Mexicano*. Editorial Nueva Imagen, México, DF, México. 173 p.
- Beauregard-Solís G, Zenteno-Ruiz CE, Armijo-Torres R, Guzmán-Juárez E. 2010. Las tortugas de agua dulce: patrimonio zoológico y cultural de Tabasco. *Kuxulkab'17*: 5–19.
- Beltrán-Paz OI, Vela-Correa G. 2006. *Suelos Contaminados con Hidrocarburos y su Efecto en la Formación de Agregados del Suelo en La Venta, Tabasco*. Universidad Autónoma Metropolitana-Xochimilco, México, DF, México. 6 p.
- Cámara-Cabrales LS, Rullán-Silva CD, Galindo-Alcántara A. 2019. Estudio de caso: Incendios Forestales en la Región de los Ríos. La biodiversidad en Tabasco. *Estudio de Estado III*: 1–64.
- Campbell JA. 1998. *Amphibians and Reptiles of Northern Guatemala, the Yucatán, and Belize*. University of Oklahoma Press, Norman, Oklahoma, USA. xix + 380 p.
- Campbell JA, Lamar WW. 2004. *The Venomous Reptiles of the Western Hemisphere*. 2 Volumes. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, USA. 870 p.
- Canales-Delgadillo J, Pérez-Ceballos R, Zaldívar-Jiménez A, Gómez-Ponce M, Vázquez-Pérez N, De la Rosa M, Potenciano-Morales L. 2020. Muertes por tráfico sobre la carretera costera del golfo de México: ¿cuántas y cuáles especies de fauna silvestre se están perdiendo? *Revista Mexicana de Biodiversidad* 91: 1–12.
- Castillo AO, Zavala CJ. 1996. Fisiografía, recursos vegetales y alternativas de manejo en el Parque Estatal Agua Blanca Tabasco. *Universidad y Ciencia* 12: 63–70.
- Coffin AW. 2007. From roadkill to road ecology: a review of the ecological effects of roads. *Journal of Transportation Geography* 15: 396–406.
- CONAFOR. 2013. *Inventario Estatal Forestal y de Suelos-Tabasco*. SEMARNAT, México, DF, México. 125 p.
- Cruz-Elizalde R, Ramírez-Bautista A, Pineda-López R, Mata-Silva V, DeSantis DL, García-Padilla E, Johnson JD, Fucsko LA, Wilson LD. 2022. The herpetofauna of Querétaro, Mexico: composition, distribution, and conservation status. *Amphibian & Reptile Conservation* 16(1) [General Section]: 148–192 (e308).
- Cruz-Sáenz D, Muñoz-Nolasco FJ, Mata-Silva V, Johnson JD, García-Padilla E, Wilson LD. 2017. The herpetofauna of Jalisco, Mexico: composition, distribution, and conservation status. *Mesoamerican Herpetology* 4: 22–118.
- Dingall JD. 1991. The Endangered Species Act: legislative perspectives on a living law. Pp. 25–30 In: *Balancing on the Brink of Extinction: Endangered Species Act and Lessons for the Future*. Editor, Kohm KA. Island Press, Washington, DC, USA. 329 p.
- Duellman WE. 1990. Herpetofauna in neotropical rainforests: comparative composition, history, and resource use. Pp. 455–505 In: *Four Neotropical Rainforests*. Editor, Gentry AH. Yale University Press, New Haven, Connecticut, USA. 627 p.
- Espinal MR, Solís JM, Mora JM. 2021. First record of *Sibon dimidiatus* (Günther, 1872) for the department of La Paz, south-western Honduras. *Herpetology Notes* 14: 99–102.
- Ferrera-Cerrato R, Rojas-Avelizapa NG, Poggio-Varaldo HM, Alarcón A, Cañizares-Villanueva RO. 2006. Procesos de biorremediación de suelo y agua contaminados por hidrocarburos del petróleo y otros compuestos. *Revista Latinoamericana de Microbiología* 48: 179–187.
- Gerónimo-Torres JC, Barragán-Vázquez MR, Ríos-Rodas L. 2022. Incorporando la distintividad taxonómica en estudios de diversidad: Anfibios del Parque Estatal de la Sierra de Tabasco, México. *Ecosistemas* 31: 2294.
- Gómez-Álvarez G, Pacheco N. 2010. Uso medicinal de serpientes comercializadas en dos mercados de la ciudad de México. *Etnobiología* 8: 51–58.
- González-Sánchez VH, Johnson JD, García-Padilla E, Mata-Silva V, DeSantis DL, Wilson LD. 2017. The herpetofauna of the Mexican Yucatan Peninsula: composition, distribution, and conservation. *Mesoamerican Herpetology* 4: 263–380.
- Guevara-Chumacero M, Pichardo-Fragoso A, Martínez Cornelio M. 2017. La tortuga en Tabasco: comida, identidad y representación. *Estudios de Cultura Maya* 49: 97–122.
- Guichard-Romero CA. 2006. *Situación actual de las poblaciones de tortuga blanca (*Dermatemys mawii*) en el sureste de México. Instituto de Historia Natural y Ecología. Informe final SNIB-CONABIO proyecto No. AS003*. CONABIO, México, DF, México. 32 p.
- Heimes P. 2016. *Snakes of Mexico. Herpetofauna Mexicana. Volumen I*. Edition Chimaira, Frankfurt am Main, Germany, and ECO Publishing, Rodeo, New Mexico, USA. 572 p.
- Hernández-López A, López-Alamilla E, Rodríguez Ramírez A, Aquino-Bravata V. 2012. Diagnóstico del

- uso de la fauna silvestre, en el área de Protección de Flora y Fauna “Cañón del Usumacinta,” Tenosique, Tabasco. *Ra Ximhai* Número Especial 1, 9: 1–13.
- Infografía Agroalimentaria. 2017. *Tabasco*. Servicio de Información Agroalimentaria y Pesquera (SIAP), México, DF, México. 51 p.
- INEGI (Instituto Nacional de Estadística, Geografía e Informática). 1986. *Síntesis Geográfica, Nomenclátor y Anexo Cartográfico del Estado de Tabasco*. Instituto Nacional de Estadística, Geografía e Informática, México, DF, México.
- INEGI (Instituto Nacional de Estadística, Geografía e Informática). 1989. *Censos Económicos*. Instituto Nacional de Estadística, Geografía e Informática, México, DF, México.
- INEGI (Instituto Nacional de Estadística, Geografía e Informática). 2016. *Anuario Estadístico y Geográfico de Tabasco*. Instituto Nacional de Estadística, Geografía e Informática, México, DF, México.
- INEGI (Instituto Nacional de Estadística, Geografía e Informática). 2009. *Anuario Estadístico del Estado de Tabasco*. Instituto Nacional de Estadística, Geografía e Informática, México, DF, México.
- Johnson JD, Mata-Silva V, García-Padilla E, Wilson LD. 2015a. The herpetofauna of Chiapas, Mexico: composition, distribution, and conservation. *Mesoamerican Herpetology* 2: 271–329.
- Johnson JD, Mata-Silva V, Wilson LD. 2015b. A conservation reassessment of the Central American herpetofauna based on the EVS measure. *Amphibian & Reptile Conservation* 9 [General Section]: 1–94 (e100).
- Kolb M, Galicia L. 2012. Challenging the linear forestation narrative in the Neo-tropic: regional patterns and processes of deforestation and regeneration in southern Mexico. *The Geographical Journal* 178: 147–161.
- Lazcano D, Nevárez-de los Reyes M, García-Padilla E, Johnson JD, Mata-Silva V, DeSantis DL, Wilson LD. 2019. The herpetofauna of Coahuila, Mexico: composition, distribution, and conservation status. *Amphibian & Reptile Conservation* 13(2) [General Section]: 31–94 (e189).
- Lee JC. 1996. *The Amphibians and Reptiles of the Yucatán Peninsula*. Comstock Publishing Associates, Cornell University Press, Ithaca, New York, USA. xii + 500 p.
- Maldonado-Sánchez EA, Ochoa-Gaona S, Ramos R, Guadarrama-Olivera MA, González-Valdivia N, De Jong BHJ. 2016. La selva inundable de canacoite en Tabasco, México, una comunidad vegetal amenazada. *Acta Botánica Mexicana* 115: 75–101.
- Mata-Silva V, Johnson JD, Wilson LD, García-Padilla E. 2015. The herpetofauna of Oaxaca, Mexico: composition, physiographic distribution, and conservation. *Mesoamerican Herpetology* 2: 5–62.
- Mata-Silva V, DeSantis DL, García-Padilla E, Johnson JD, Wilson LD. 2019. The endemic herpetofauna of Central America: a casualty of anthropocentrism. *Amphibian & Reptile Conservation* 13(1) [General Section]: 1–64 (e168).
- Mata-Silva V, García-Padilla E, Rocha A, DeSantis DL, Johnson JD, Ramírez-Bautista A, Wilson LD. 2021. A reexamination of the herpetofauna of Oaxaca, Mexico: composition update, physiographic distribution, and conservation commentary. *Zootaxa* 4996: 201–252.
- McCrane JR, Townsend JH, Wilson LD. 2004. *Corytophanes hernandesii*. *Catalogue of American Amphibians and Reptiles* 790.1–790.6.
- McCrane JR, Hedges SB. 2012. Two new species of geckos from Honduras and resurrection of *Sphaerodactylus continentalis* Werner from the synonymy of *Sphaerodactylus millepunctatus* Hallowell (Reptilia, Squamata, Gekkonoidae, Sphaerodactylidae). *Zootaxa* 3492: 65–76.
- Meza-Lázaro RN, Nieto-Montes de Oca A. 2015. Long forsaken species diversity in the Middle American lizard *Holcosus undulatus* (Teiidae). *Zoological Journal of the Linnaean Society* 175(1): 1–22.
- Nevárez de los Reyes M, Lazcano D, García-Padilla E, Mata-Silva V, Johnson JD, Wilson LD. 2016. The herpetofauna of Nuevo León, Mexico: composition, distribution, and conservation. *Mesoamerican Herpetology* 3: 557–638.
- Ochoa-Gaona S, Pérez-Hernández I, Frías-Hernández JA, Jarquín-Sánchez A, Méndez-Valencia A. 2011. *Estudio Prospectivo de Especies Arbóreas Promisorias para la Fitorremediación de Suelos Contaminados por Hidrocarburos*. Gobierno del Estado de Tabasco/Secretaría de Recursos Naturales y Protección Ambiental/El Colegio de la Frontera Sur/Petróleos Mexicanos, Villahermosa, Tabasco, Mexico. 145 p.
- Pacheco-Figueroa C, Luna-Ruiz RC, Valdez-Leal JD, Saenz JC, Gordillo-Chávez EJ, Moguel-Ordoñez E, Gama-Campillo LM, Mata-Zayas EE, Rangel-Ruiz LJ, Santiago-Plata VM. 2021. Puntos de alta siniestralidad de vertebrados en la carretera costera en Tabasco. Pp. 348–367 In: *Impacto de las vías de comunicación sobre la fauna silvestre en áreas protegidas. Estudios de caso para el sureste de México*. Editors, Benítez J. A, Escalona-Segura G. El Colegio de la Frontera Sur, Chetumal, Quintana Roo, México. 732 p.
- Ponce M, Solís FA, Ibáñez R, Jaramillo CA. 2008. Geographic distribution. *Ninia sebae*. *Herpetological Review* 39: 372.
- Porras LW, Wilson LD, Schuett GW, Reiserer RS. 2013. A taxonomic reevaluation and conservation assessment of the common cantil, *Akgistrodon bilineatus* (Squamata: Viperidae): a race against time. *Amphibians & Reptile Conservation* 7(1): 48–73 (e63).
- Pozo-Montuy G, De la Cruz-Félix HK, Guzmán-Aguirre CC. 2019. Uso tradicional de los vertebrados

- terrestres. Pp. 309–317 In: *La Biodiversidad de Tabasco. Estudio de Estado*. Tomo 1. CONABIO, México, DF, México. 393 p.
- Ramírez-Bautista A, Hernández-Salinas U, Cruz-Elizalde R, Berriozabal-Islas C, Moreno-Lara I, DeSantis DL, Johnson JD, García-Padilla E, Mata-Silva V, Wilson LD. 2020. The herpetofauna of Hidalgo, Mexico: composition, distribution, and conservation status. *Amphibian & Reptile Conservation* 14(1) [General Section]: 63–118 (e224).
- Rangel-Mendoza JA, Weber M. 2015. Evaluación del estado físico de la tortuga blanca, *Dermatemys mawii*, bajo condiciones de cautiverio en Tabasco, México. *Agrociencia* 49: 499–511.
- Raven PH. 2021. *Driven by Nature: a Personal Journey from Shanghai to Botany and Global Sustainability*. Missouri Botanical Garden Press, Saint Louis, Missouri, USA. 359 p.
- Reynoso-Rosales VH, Vázquez-Cruz ML, Rivera-Arroyo RC. 2016. *Estado de Conservación, Uso, Gestión, Comercio y Cumplimiento de los Criterios de Inclusión a los Apéndices de la CITES para las Especies *Claudius angustatus* y *Staurotypus triporcatus**. Instituto de Biología. Informe final SNIB-CONABIO, Ciudad de México, México. 202 p.
- Rivera-Cruz MC, Trujillo-Narcía A. 2004. Estudio de toxicidad vegetal en suelos con petróleos nuevo e intemperizado. *Interciencia* 29: 369–376.
- Ríos-Rodas L, Barragán-Vázquez M del R, Torres Pérez MA, Triana Ramírez DI. 2017. Ampliación de distribución de *Anolis compressicauda* Smith and Kerster, 1955 (Squamata: Dactyloidae) en el estado de Tabasco, México. *Acta Zoológica Mexicana Nueva Serie* 33: 120–122.
- Sánchez-Munguía A. 2005. *Uso del Suelo Agropecuario y Deforestación en Tabasco 1950–2000*. División Académica de Ciencias Biológicas, Universidad Juárez Autónoma de Tabasco, Villahermosa, Tabasco, México. 123 p.
- SEMARNAT (Secretaría de Medio Ambiente y Recursos Naturales). 2010. *Norma Oficial Mexicana NMX-059-Semarnat-2010, Protección Ambiental-Especies Nativas de México de Flora y Fauna Silvestres-Categorías de Riesgo y Especificaciones para su Inclusión, Exclusión o Cambio-Lista de Especies en Riesgo*. Diario Oficial de la Federación, 30 de diciembre de 2010. SEMARNAT, México, DF, Mexico.
- Sokal RR, Michener CD. 1958. A statistical method for evaluating systematic relationships. *University of Kansas Science Bulletin* 38: 1,409–1,438.
- Soto-Huerta KA, Clause AG. 2017. Distribution and range extension of the Elegant Coralsnake, *Micruurus elegans*. *The Southwestern Naturalist* 62: 303–308.
- Terán-Juárez SA, García-Padilla E, Mata-Silva V, Johnson JD, Wilson LD. 2016. The herpetofauna of Tamaulipas, Mexico: composition, distribution, and conservation. *Mesoamerican Herpetology* 3: 42–113.
- Torres-Hernández LA, Ramírez-Bautista A, Cruz-Elizalde R, Hernández-Salinas U, Berriozabal-Islas C, DeSantis DL, Johnson JD, Rocha A, García-Padilla E, Mata-Silva V, et al. 2021. The herpetofauna of Veracruz, Mexico: composition, distribution, and conservation status. *Amphibian & Reptile Conservation* 15(2) [General Section]: 72–155 (e285).
- Torres-Masuera G. 2021. La “modernización forzada” del sureste mexicano: déjà vu de la polarización socioambiental en nombre del desarrollo. *DOSSIER: Socioenvironmental Destruction, Extractivism, and Dependency* 52(4): 28–33.
- Townsend JH, Wilson LD. 2010. Conservation of the Honduran herpetofauna: Issues and imperatives. Pp. 460–487 In: *Conservation of Mesoamerican Amphibians and Reptiles*. Editors, Wilson LD, Townsend JH, Johnson JD. Eagle Mountain Publishing, LC, Eagle Mountain, Utah, USA. i–xviii + 1–812 p.
- Trombulak SC, Frissell CA. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14: 18–30.
- Tudela F. 1989. *La Modernización Forzada del Trópico: el Caso de Tabasco*. El Colegio de México, Ciudad de México, México.
- Vidal-García M, Negrete MMM. 2019. Infraestructura. En: *La Biodiversidad en Tabasco. Estudio de Estado*. Volumen 1. CONABIO, México, DF, México. 117 p.
- West R, Psuty NP, Thom BG. 1985. *Las Tierras Bajas de Tabasco: en el Sureste de México*. 2<sup>nd</sup> Edition. Gobierno del Estado de Tabasco, Villahermosa, Tabasco, Mexico. 409 p.
- Wilson LD, Mata-Silva V, Johnson JD. 2013a. A conservation reassessment of the reptiles of Mexico based on the EVS measure. Contribution to Special Mexico Issue. *Amphibian & Reptile Conservation* 7(1): 1–47 (e61).
- Wilson LD, Johnson JD, Mata-Silva V. 2013b. A conservation reassessment of the amphibians of Mexico based on the EVS measure. Contribution to Special Mexico Issue. *Amphibian & Reptile Conservation* 7(1): 97–127 (e69).
- Wilson LD, Johnson JD, Porras LW, Mata-Silva V, García-Padilla E. 2017. A system for categorizing the distribution of the Mesoamerican herpetofauna. *Mesoamerican Herpetology* 4: 901–913.
- Wilson LD, McCranie JR. 2004. The conservation status of the herpetofauna of Honduras. *Amphibian & Reptile Conservation* 3(1): 6–33 (e12).
- Woolrich-Piña GA, Ramírez-Silva JP, Loc-Barragán J, Ponce Campos P, Mata-Silva V, Johnson JD, García-Padilla E, Wilson LD. 2016. The herpetofauna of Nayarit, Mexico: composition, distribution, and conservation status. *Mesoamerican Herpetology* 3: 375–448.
- Woolrich-Piña GA, García-Padilla E, DeSantis DL, Johnson JD, Mata-Silva V, Wilson LD. 2017. The

- herpetofauna of Puebla, Mexico: composition, distribution, and conservation status. *Mesoamerican Herpetology* 4: 790–884.
- Zavala-Cruz J, Castillo AO. 2003. Uso del suelo y manejo en los cordones litorales de la Reserva de la Biósfera Pantanos de Centla, Tabasco. *Universidad y Ciencia* 19: 17–33.
- Zavala-Cruz J, Gavi-Reyes F, Adams-Schroeder RH, Ferrera-Cerrato R, Palma-López DJ, Vaquera-Huerta H, Domínguez-Ezquivel JM. 2005. Derrames de petróleo en suelos y adaptación de pastos tropicales en el activo cinco presidentes, Tabasco, México. *Terra Latinoamericana* 23: 293–302.
- Zavala-Cruz J, Ortiz-Pérez MA. 2019. Geomorfología. Pp. 29–36 In: *La Biodiversidad en Tabasco. Estudio de Estado*. Volumen 1. CONABIO, México, DF, México. 117 p.
- Zenteno-Ruiz CE, Zamora LF, Cabrera S, Marsella D. 2004. Captura y uso de fuego en el aprovechamiento de las tortugas dulceacuícolas en la Reserva de la Biosfera Pantanos de Centla. Pp. 106–116 In: *Etnopaisaje, Trabajo Comunitario, Manejo y Conservación de Recursos Naturales*. Editors, Gama L, Ochoa-Gaona S, Chiappy C. Universidad Juárez Autónoma de Tabasco, Villahermosa, Tabasco, México. 116 p.



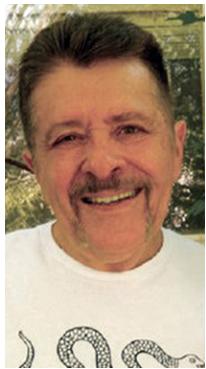
**Ma. Del Rosario Barragán-Vázquez** graduated with a Master's degree in Environmental Sciences from the Universidad Juárez Autónoma de Tabasco (UJAT) in Villahermosa, Tabasco, Mexico. She is a full-time Research Professor at UJAT in the Biology and Environmental Management degree programs. She is interested in the study of amphibians and reptiles at the community level, and from ecological, taxonomic, and management and utilization points of view. She has undertaken academic appointments at CINVESTAV-Mérida, Faculty of Sciences, UNAM, and at the Universidad Veracruzana, with work on amphibian cultivation, taxonomy, and behavior. She has participated in research projects on the herpetofauna in the municipalities of the Sierra de Tabasco, and has authored or co-authored various articles, notes, and book chapters, primarily on the community level biodiversity and population genetics in turtles. She is in charge of the Colección de Anfibios y Reptiles de Tabasco (CART), curated within the División Académica de Ciencias Biológicas de la UJAT.



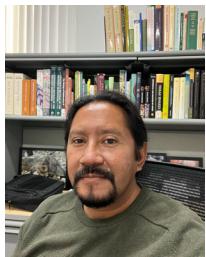
**Liliana Ríos-Rodas** has a degree in Biology from the Universidad Juárez Autónoma de Tabasco (UJAT), a Master's degree in Agricultural Sciences and Natural Resources from the Universidad Autónoma de México, and a Ph.D. in Ecology and Management of Tropical Systems from UJAT. Her main research topics involve the ecology of communities and populations of amphibians and reptiles of Tabasco, focusing on riparian ecosystems of tropical environments. She has worked on the ecomorphology of the genus *Sceloporus*, geometric morphometry in *Dryophytes plicatus*, and trophic ecology in *Craugastor berkenbuschii*. Liliana has participated in genetic conservation projects for *Dermatemys mawii* and *Trachemys venusta*, and in updating the Tabasco Amphibian and Reptile Collection (CART). She is the author or co-author of several articles on the distribution, diversity, and conservation of the herpetofauna of Tabasco.



**Lydia Allison Fucsko**, who resides in Melbourne, Australia, is an environmental activist and amphibian conservationist. As a photographer with international publications, she has taken countless amphibian photographs, including photo galleries of frogs mostly from southeastern Australia. Dr. Fucsko has a Bachelor of Humanities from La Trobe University (Bundoora, Victoria, Australia) and a Diploma in Education from the University of Melbourne (Parkville, Victoria, Australia). She has postgraduate diplomas in computer education and in vocational education and training from the University of Melbourne (Parkville). Additionally, Dr. Fucsko has a Master's degree in Counseling from Monash University (Clayton, Victoria, Australia). She received her Ph.D. in Environmental Education, which promoted habitat conservation, species perpetuation, and global sustainable management, from Swinburne University of Technology (Hawthorn, Victoria, Australia), while being mentored by the late Australian herpetologist and scholar Dr. Michael James Tyler (Order of Australia recipient). As a sought-after educational consultant, Dr. Fucsko has academic interests that include: clinical psychology, focusing on psychopathology; neuroscience and empathy; environmental education for sustainable development; sentient ecology; academic writing; and creative writing, which includes poetry and creative non-fiction books for children and young adults. Dr. Fucsko also is the senior author (with Boria Sax) of a chapter in the 2019 *Springer Encyclopedia of Sustainability in Higher Education* entitled "Learning activities for environmental education for sustainable development." Recently, Dr. Fucsko has co-authored an obituary of Jaime D. Villa, a study of the introduced Mesoamerican herpetofauna, a treatment of the conservation prospects of the Mesoamerican salamander fauna, papers on the herpetofauna of Veracruz and Querétaro, Mexico, a review of the book *Advances in Coralsnake Biology*, and a study on the biological and cultural diversity of Oaxaca, Mexico, among several other academic papers. In 2020, the species *Tantilla lydia*, with the suggested common name of Lydia's Little Snake, was named in her honor.



**Louis W. Porras** graduated in 1971 with a degree in Biology from what today is known as Miami-Dade College in Miami, Florida, USA. Over his career he has authored or co-authored over 60 academic publications, including the descriptions of two new species, and two taxa have been named in his honor. Louis developed an interest in herpetology at an early age in his native Costa Rica. His passion for the field led him to travel to many remote areas, including throughout the Bahamas, the United States, Mesoamerica, and parts of South America. In 1968, he worked at the Houston Zoological Gardens, and from 1982 to 1984 at Utah's Hogle Zoo. In 1976, he attended the inaugural meeting of the International Herpetological Symposium (IHS), and later served the group as Vice-President and President. In 1993, along with Gordon W. Schuett, he helped launch the journal *Herpetological Natural History*, and for IHS' 20<sup>th</sup> anniversary, in recognition of his contributions, three former Presidents dedicated the book *Advances in Herpetoculture* in his honor. Louis' career in publishing began in 1995, when as a member of Canyonlands Publishing Group he helped publish *Fauna* magazine. In 2002 he founded Eagle Mountain Publishing, LC, which has published such herpetological titles as *Biology of the Vipers* (2002), *Biology of the Boas and Pythons* (2007), *Amphibians, Reptiles, and Turtles in Kansas* (2010), *Conservation of Mesoamerican Amphibians and Reptiles* (2010), and *Amphibians and Reptiles of San Luis Potosí* (2013). From 2014 to 2018 he was the Publisher and Managing Editor of the journal *Mesoamerican Herpetology*, and recently he was the Publisher and Co-editor of the book *Advances in Coralsnake Biology: with an Emphasis on South America*.



**Vicente Mata-Silva** is a herpetologist originally from Río Grande, Oaxaca, Mexico. His interests include ecology, conservation, natural history, and biogeography of the herpetofaunas of Mexico, Central America, and the southwestern United States. He received a B.S. degree from the Universidad Nacional Autónoma de México (UNAM), and M.S. and Ph.D. degrees from the University of Texas at El Paso (UTEP). Vicente is an Assistant Professor of Biological Sciences at UTEP, in the Ecology and Evolutionary Biology Program, and Co-Director of UTEP's Indio Mountains Research Station, located in the Chihuahuan Desert of Trans-Pecos, Texas, USA. To date, Vicente has authored or co-authored over 100 peer-reviewed scientific publications. He also was the Distribution Notes Section Editor for the journal *Mesoamerican Herpetology*, and is currently Associate Editor for the journal *Herpetological Review*.



**Arturo Rocha** is a Ph.D. student in the Ecology and Evolutionary Biology program at the University of Texas at El Paso. His interests include the study of the biogeography, physiology, and ecology of amphibians and reptiles in the southwestern United States and Mexico. A graduate of the University of Texas at El Paso, his thesis centered on the spatial ecology of the Trans-Pecos Rat Snake (*Bogertophis subocularis*) in the northern Chihuahuan Desert. To date, he has authored or co-authored over 20 peer-reviewed scientific publications.



**Dominic L. DeSantis** is an Assistant Professor of Biology at Georgia College and State University, Milledgeville, Georgia, USA, in the Department of Biological and Environmental Sciences. Dominic's research interests broadly include the behavioral ecology, conservation biology, and natural history of herpetofauna. In addition to ongoing collaborative projects associated with the Mesoamerican Research Group, much of Dominic's current research focuses on using novel animal-borne sensor technologies to study the behavior of snakes in the field. While completing his Ph.D. at the University of Texas at El Paso, Dominic accompanied Vicente Mata-Silva, Eli García-Padilla, and Larry David Wilson on survey and collecting expeditions to Oaxaca in 2015, 2016, and 2017, and is a co-author on numerous natural history publications produced from those visits, including an invited book chapter on the conservation outlook for herpetofauna in the Sierra Madre del Sur of Oaxaca.



**Eli García-Padilla** is a Social Biologist and Professional Photographer with more than 12 years of experience in the formal study and photo documentation of the biological and cultural diversity of Mexico. He has published one book, entitled *Mexican Biodiversity: the Snake, the Jaguar and the Quetzal*, and more than 100 formal contributions on knowledge, the communication of science and the conservation of Mesoamerican biodiversity. Since 2006, he has been exploring Oaxaca and Chiapas, which are the most biodiverse and multicultural states in Mexico. In 2017, he began to enter the mythical region of Los Chimalapas in the Isthmus of Tehuantepec, which is the most biologically rich region in all of Mexico, under a community social conservation scheme. Eli has published his photographic work in prestigious magazines such as *National Geographic* in Spanish and *Cuartoscuro*. In 2020, he co-founded the *Mesoamerican Biodiversity* initiative with the aim of creating a community around the dissemination of the most important wealth of Mexico, which is its biodiversity and its culture. His writings are published regularly in *Oaxaca Media*, the *Jornada Ecológica* and the *Ojarasca Supplement of La Jornada*.



**Jerry D. Johnson** is Professor of Biological Sciences at The University of Texas at El Paso, and has extensive experience studying the herpetofauna of Mesoamerica, especially that of southern Mexico. Jerry is the Director of the 40,000-acre Indio Mountains Research Station, and was a co-editor on the book *Conservation of Mesoamerican Amphibians and Reptiles* and co-author of four of its chapters. He was also the senior author of the recent paper “A conservation reassessment of the Central American herpetofauna based on the EVS measure” and is Mesoamerica/Caribbean editor for the Geographic Distribution section of *Herpetological Review*. Jerry has authored or co-authored over 130 peer-reviewed papers, including two 2010 articles, “Geographic distribution and conservation of the herpetofauna of southeastern Mexico” and “Distributional patterns of the herpetofauna of Mesoamerica, a Biodiversity Hotspot.” One species, *Tantilla johnsoni*, has been named in his honor. Presently, he is an Associate Editor and Co-chair of the Taxonomic Board for the journal *Mesoamerican Herpetology*.



**Larry David Wilson** is a herpetologist with lengthy experience in Mesoamerica. He was born in Taylorville, Illinois, USA, and received his university education at the University of Illinois at Champaign-Urbana (B.S. degree) and at Louisiana State University in Baton Rouge (M.S. and Ph.D. degrees). He has authored or co-authored more than 460 peer-reviewed papers and books on herpetology. Larry was the senior editor of *Conservation of Mesoamerican Amphibians and Reptiles* and a co-author of seven of its chapters. His other books include *The Snakes of Honduras, Middle American Herpetology, The Amphibians of Honduras, Amphibians & Reptiles of the Bay Islands and Cayos Cochinos, Honduras, The Amphibians and Reptiles of the Honduran Mosquitia, and Guide to the Amphibians & Reptiles of Cusuco National Park, Honduras*. To date, he has authored or co-authored the descriptions of 75 currently-recognized herpetofaunal species, and seven species have been named in his honor, including the anuran *Craugastor lauraster*, the lizard *Norops wilsoni*, and the snakes *Oxybelis wilsoni*, *Myriopholis wilsoni*, and *Cerrophidion wilsoni*. In 2005, he was designated a Distinguished Scholar in the Field of Herpetology at the Kendall Campus of Miami-Dade College in Miami, Florida, USA. Currently, Larry is a Co-chair of the Taxonomic Board for the website *Mesoamerican Herpetology*.