Cerrophidion tzotzilorum (Campbell, 1985). The Tzotzil Montane Pitviper is endemic to Chiapas, where it is restricted to humid pine oak forest in the Central Plateau physiographic region at elevations from 2,050 to 2,500 m. Its EVS has been established at 19, placing it in the upper portion of the high vulnerability category; this value is the highest for any herpetofaunal species in the state. Interestingly enough, this species has been allocated as Least Concern by the IUCN, but is considered a species of special protection by SEMARNAT. This pitviper is part of a clade of five snake species distributed in the highlands of Mesoamerica from west central Veracruz, Mexico, to central Costa Rica. Its sister species appears to be *C. petlalcalensis*, the most northerly occurring member of the clade. This individual was found in the vicinity of San Cristóbal de las Casas, in the municipality of San Cristóbal de las Casas, and was photographed at the Zoológico Regional Miguel Álvarez del Toro.

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The herpetofauna of Chiapas, Mexico: composition, distribution, and conservation

Jerry D. Johnson[1], Vicente Mata-Silva[1], Elí García Padilla[2], and Larry David Wilson[3]

[1]*Department of Biological Sciences, The University of Texas at El Paso, El Paso, Texas 79968-0500, United States. E-mail*: jjohnson@utep.edu and vmata@utep.edu (JDJ, Corresponding author)

[2]*Oaxaca de Juárez, Oaxaca 68023, Mexico. E-mail*: eligarcia_18@hotmail.com

[3]*Centro Zamorano de Biodiversidad, Escuela Agrícola Panamericana Zamorano, Departamento de Francisco Morazán, Honduras. E-mail*: bufodoc@aol.com

Abstract: The herpetofauna of Chiapas, the second largest of any state in Mexico (after that of Oaxaca), consists of 79 anurans, 25 salamanders, three caecilians, three crocodylians, 203 squamates, and 17 turtles (total 330 species). We tabulated the distribution of these species among the seven physiographic regions in the state. The number of species in these regions ranges from 96 in the Central Depression to 171 in the Sierra Madre de Chiapas. The species inhabit from one to seven of the regions ($\bar{x}$ = 2.5). The greatest number of species found only in a single region is 109, and of these the largest number (47) occurs in the Sierra Madre de Chiapas. We built a Coefficient of Biogeographic Resemblance (CBR) matrix that shows the number of shared species ranging from 33 to 112. We used these data to construct a UPGMA diagram, for which the data demonstrate similar clustering to that for southeastern Mexico as a whole, although that area contains two additional physiographic regions (Los Tuxtlas, Yucatan Peninsula). In Chiapas, the most distinctive herpetofauna is that of the Central Plateau (Atlantic versant). Of the three regions that cluster together on the humid northern Atlantic versant, the Eastern Highlands and Gulf Coastal Plain regions are the most similar, and the Northern Higlands groups with them. In the southern cluster, the Sierra Madre de Chiapas (Atlantic and Pacific versants) and Pacific Coastal Plain (Pacific versant) regions are the most similar, and the Central Depression (Atlantic versant) groups with them. We listed the members of the Chiapan herpetofauna in four distributional categories, of which the greatest number consists of non-endemics (268), followed by country endemics (33), state endemics (25), and non-natives (4). We examined the conservation status of the native species by using the SEMARNAT, IUCN, and EVS systems. Of these three systems, the EVS allows for the most useful conservation assessment for the state's herpetofauna. The number of species in the three EVS categories increases from low (97) to medium (135), and then decreases somewhat to high (88). In addition, we used the EVS ratings to evaluate how species in the IUCN categories of DD, NE, and LC might be assessed more accurately. Finally, we devised a scheme for determining relative herpetofaunal priority (RHP), a simple measure of the rank order of a regional herpetofauna dependent on the absolute and relative numbers of the state and national endemic species. We found the RHP highest in the Northern Highlands and second highest in the Sierra Madre de Chiapas regions. Based on our analyses we provide a set of conclusions, as well as recommendations for the future protection of the Chiapan herpetofauna.

Key Words: Anurans, caecilians, conservation status, crocodylians, physiographic regions, protection recommendations, salamanders, squamates, turtles

Resumen: La herpetofauna de Chiapas, la segunda más grande a nivel estatal en México (después de la de Oaxaca), consiste de 79 anuros, 25 salamandras, tres cecilias, tres cocodrílidos, 203 squamatos y 17 tortugas (total 330 especies). Tabulamos la distribución de estas especies entre las siete regiones fisiográficas del estado. El número de especies en estas regiones va de 96 en la Depresión Central a 171 en la Sierra Madre de Chiapas. Las especies habitan de una a siete regiones ($\bar{x}$ = 2.5). El mayor número de especies encontrado en una sola región es de 109, y de estos el número más grande (47) ocurre en la Sierra Madre de Chiapas. Construimos una matriz de Coeficiente de Similitud Biogeográfica (CBR) que muestra que el número de especies compartidas va de 33 a 112. Usamos estos datos para construir un diagrama UPGMA, en el que los datos demuestran un agrupamiento similar encontrado para el sureste de México en su totalidad, aunque este último contiene dos regiones fisiográficas adicionales (Los Tuxtlas, Península de Yucatán). En Chiapas, la herpetofauna más distintiva es la de la Planicie Central (vertiente del atlántico). De las tres regiones que se agrupan en la vertiente norte del atlántico húmedo, la Tierras Altas de Este y la Planicie Costera del Golfo son las más similares; y las Tierras Altas del Norte se agrupan con estas dos. En el agrupamiento del sur, la Sierra Madre de Chiapas (vertientes del pacífico y atlántico) y la Planicie Costera del Pacífico (vertiente del pacífico) son las más similares; y la Depresión Central (vertiente del atlántico) se agrupa con estas dos últimas. Hicimos un listado de los miembros de la herpetofauna chiapaneca en cuatro categorías distribucionales, y encontramos que el mayor número consiste de especies no endémicas (268), seguidas de especies endémicas al país (33), endémicas al estado (25) y especies no nativas (4). Examinamos el estatus de conservación de las especies nativas usando los sistemas de SEMARNAT, UICN y el EVS. De estos tres sistemas, el EVS permite la evaluación de conservación más útil para la herpetofauna del estado. El número de especies en las tres categorías del EVS se incrementa de la baja (97) a la media (135) y después decrece ligeramente en la categoría alta (88). Adicionalmente, usamos las clasificaciones del EVS para evaluar como las especies en las categorías Datos Insuficientes, de Preocupación Menor y No Evaluadas de la UICN podrían ser estimadas de una forma más precisa. Finalmente, elaboramos un esquema para determinar la herpetofauna prioritaria relativa (HPR), una medida simple del orden de rango de una herpetofauna regional dependiente de los números absolutos y relativos de las especies endémicas estatales y nacionales. Encontramos que el valor más alto de HPR está en la región fisiográfica de las Tierras Altas del Norte y en el segundo más alto está en la región de la Sierra Madre de Chiapas. Basados en nuestros análisis proveemos una serie de conclusiones así como de recomendaciones para la futura protección de la herpetofauna chiapaneca.

Palabras Claves: Anuros, cecilias, cocodrílidos, estatus de conservación, recomendaciones para protección, regiones fisiográficas, salamandras, squamatos, tortugas

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Life was everywhere, and wherever you looked the animals were very tame; the enemy of everything, however, had not arrived: humans! (English Translation) — Miguel Álvarez del Toro. 1985. *Así Era Chiapas*, p. 172.

INTRODUCTION

Chiapas is one of four states in Mexico that borders the northern limit of Central America, along with Tabasco, Campeche, and Quintana Roo. Of these states, Chiapas shares the lengthiest border with Guatemala (962 km; World Factbook; www.cia.gov/library/publications/the-world-factbook/geos/mx; accessed 24 April 2015). With an area of 73,311 km^2, Chiapas is the 10th largest state in Mexico (wikipedia.org/wiki/Chiapas; accessed 24 April 2015). To the west the state is bounded by Oaxaca, to the northwest by Veracruz, to the north by Tabasco, and to the south by the Pacific Ocean.

Chiapas is an ethnically diverse state that ranks third (after Oaxaca and Yucatán) in the percentage of indigenous-speaking peoples (27.2%; wikipedia.org/wiki/List_of_Mexican_states_by_indigenous-speaking_population; accessed 24 April 2015). Thus, slightly over one-fourth of this segment of approximately one million people does not speak Spanish, Mexico's official language. The languages spoken within this segment are organized into an estimated 56 linguistic groups (wikipedia.org/wiki/Chiapas; accessed 24 April 2015). The representation of indigenous people in the state has been decreasing, however, and thus cultural endangerment is as much of a problem on a social scale as biotic endangerment is on a natural scale.

From a biotic perspective, Chiapas is a principal area of transition between the herpetofauna of Mexico and that of Central America, along with that of the Yucatan Peninsula (Lee, 1996). Most of Chiapas is part of the northwestern segment (Johnson, 1989) of the geological unit referred to as Nuclear Central America (Schuchert, 1935), which shares many herpetological species with other regions of that highland block, especially Guatemala. Even though Chiapas is a political and not a biogeographic entity, a major distinction can be made between the composition of its herpetofauna and that of its neighbor to the west, Oaxaca. The herpetofauna of Chiapas is composed of a significantly higher percentage of non-endemic species (see below), as opposed to those endemic to Mexico, than that of the herpetofauna of Oaxaca (Mata-Silva et al., 2015).

Plectrohyla lacertosa Bumzahem and Smith, 1954. The so-called Pop-eyed Spikethumb Frog is endemic to Chiapas, where it has been reported from only two localities in the Sierra Madre de Chiapas physiographic region at elevations from 1,000 to 2,134 m. Its EVS has been determined as 14, placing it in the low end of the high vulnerability category. This frog has been judged as Endangered by the IUCN and as a species of special protection by SEMARNAT. This individual was found 15.3 km NW of Hwy 211 at El Porvenir, in the municipality of Motozintla de Mendoza. © Sean Rovito

Even given the overarching transitional nature of the herpetofauna of Chiapas, the distribution of its component species among the physiographic regions is complex. The physiographic makeup of the state consists of a curious set of layered regions oriented in a SW–NE direction, which extend from the Pacific Coastal Plain through the Sierra Madre de Chiapas, Central Depression, and Northern Highlands-Central Plateau-Eastern Highlands to the limited terrain of the Gulf Coastal Plain (Fig. 1).

Within the social and natural megadiverse characteristic of Mexico, herein we detail the composition, physiographic distribution, and conservation status of the herpetofauna of Chiapas.

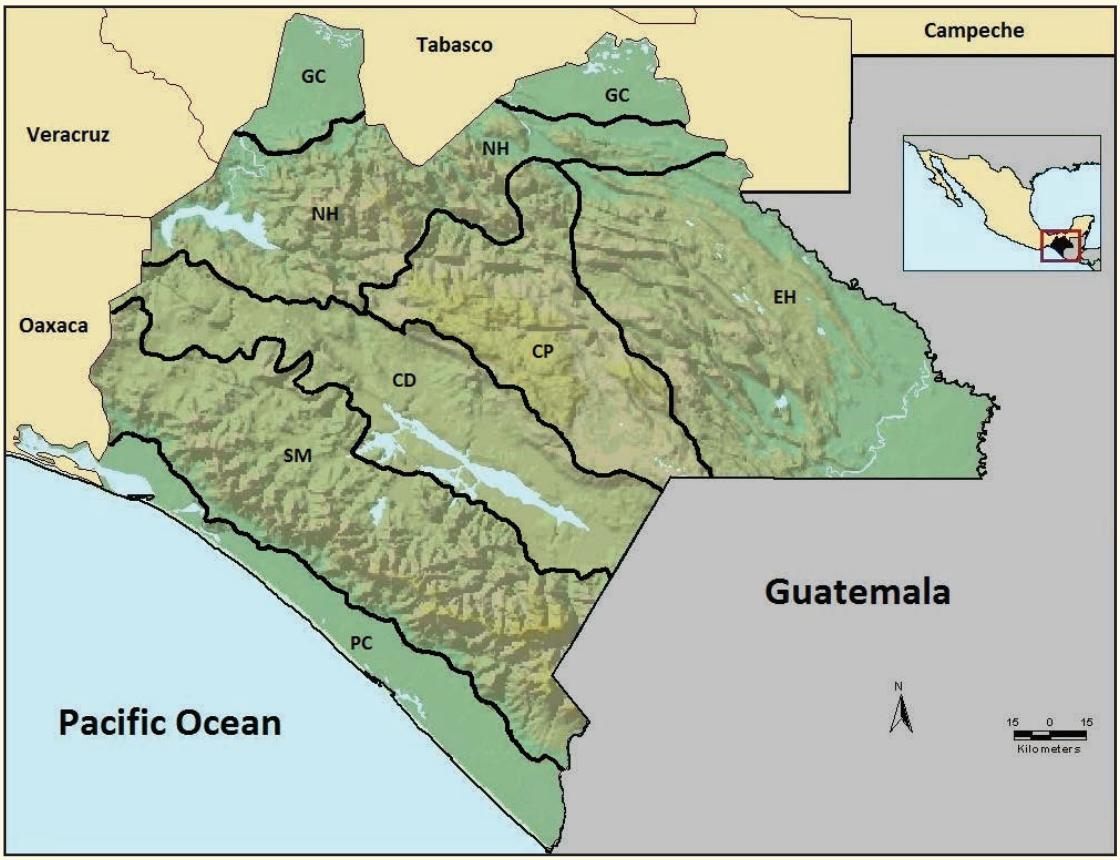

Fig. 1. Physiographic regions of Chiapas, Mexico, slightly modified from Breedlove (1981) and Johnson et al. (2010). Abbreviations are as follows: GC = Gulf Coastal Plain; NH = Northern Highlands; EH = Eastern Highlands; CP = Central Plateau; CD = Central Depression; SM = Sierra Madre de Chiapas; and PC = Pacific Coastal Plain.

MATERIALS AND METHODS

Our Taxonomic Position

Three of us (JDJ, VMS, and LDW) detailed our taxonomic position in Johnson et al. (2015); Porras et al. (2013) essentially adopted the same position. We present a brief summary of the position taken by these two sets of authors, especially as it refers to the concept of subspecies. During the last several decades, herpetological systematics has undergone revolutionary changes. The older two among us (JDJ, LDW) began their careers at a time when taxonomy bore relatively little resemblance to a science. This condition largely was due to the inability of the methodology used at the time (the late 1960s and early 1970s) to construct testable hypotheses. Thus, taxonomic decision-making essentially relied on the observation of physical attributes and the derivation of opinionated conclusions. Back then, the Biological Species Concept and the recognition of subspecies held sway. These concepts

still are favored by some practitioners, but gradually are falling by the wayside as they are replaced by theories and techniques applicable to all forms of life, including those that do not reproduce sexually, and depend on molecular methodology or a combination of morphological and molecular methodologies. So, herpetological taxonomy (and taxonomy in general) is in a state of transition, which will not be complete until the deficits of prior systematic theory and problems that characterize modern phylogenetic theory are suitably addressed and corrected. Johnson et al. (2015: 9) provided a lengthy discussion of these issues, concluding that, "...the subspecies category no longer is useful in systematics as a formal taxon, because by definition it does not constitute a separate evolutionary lineage, nor is it a stage of speciation." Nevertheless, given that for decades the subspecies category has been used by many herpetologists to generate a voluminous amount of literature, subspecies will continue to have historical value in providing avenues of research toward understanding phylogenetic relationships and, in some cases, providing names for species that might come to be recognized when subspecies-to-species elevations result. Given our above-stated taxonomic position, we regard species as genetically separate evolutionary lineages at the lowest level of the classification hierarchy.

Updating the Herpetofaunal List

We constructed a herpetofaunal list for Chiapas based primarily on the work of Johnson et al. (2010) and Reynoso et al. (2011). We also reviewed the principal literature appearing since that time and updated the relevant taxa based on the Taxonomic List available on the *Mesoamerican Herpetology* website (www.mesoamericanherpetology.com; accessed 24 August 2015).

System for Determining Distributional Status

To ascertain the distributional status of members of the Chiapan herpetofauna, we utilized the system developed by Alvarado Díaz et al. (2013) for the herpetofauna of Michoacán, which also was used by Mata-Silva et al. (2015) for the herpetofauna of Oaxaca. This system comprises the following four categories: SE = endemic to Chiapas; CE = endemic to Mexico; NE = not endemic to Mexico; NN = non-native in Mexico.

Cryptotriton alvarezdeltoroi (Papenfuss and Wake, 1987). Álvarez del Toro's Salamander is a Chiapan endemic known from the Northern Highlands and Central Plateau physiographic regions at elevations from 1,200 to 1,550 m. Its EVS has been established at 18, placing it in the upper portion of the high vulnerability category. This species has been placed in the Endangered category by the IUCN, and considered a species of special protection by SEMARNAT. This individual was found 1.7 km N of the highway from Tapalapa to Pantepec on the road to Maxono, in the municipality of Tapalapa. © Sean Rovito

Systems for Determining Conservation Status

To assess the conservation status of the herpetofauna of Chiapas, we used the same systems (i.e., SEMARNAT, IUCN, and EVS) as Alvarado Díaz et al. (2013) and Mata-Silva et al. (2015). We quote the descriptions employed by Mata-Silva et al. (2015: 8) below.

"The Norma Oficial Mexicana NOM-059-SEMARNAT is a set of official regulations developed by the Secretaría de Medio Ambiente y Recursos Naturales, an arm of the Mexican federal government that deals with the environmental protection of native species of wildlife (flora and fauna), categories of risk that apply to them, with specifications for their inclusion, exclusion, or change in status, along with a list of species at risk. The current version of these regulations was published 30 December 2010.

"The IUCN system was developed and is administered by the International Union for the Conservation of Nature, a global organization headquartered in Gland, Switzerland (www.iucn.org; accessed 24 April 2015). The IUCN system is used by biologists worldwide for conservation assessments, and frequently is employed to ascertain the conservation status of a broad range of organisms. The categories in this system are widely recognized and described in the Guidelines for Using the IUCN Red List Categories and Criteria (2010), and include the following: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD), and Not Evaluated (NE). Collectively, the Critically Endangered, Endangered, and Vulnerable categories are termed the 'threat categories,' to distinguish them from the others.

"The EVS system initially was developed for use with the herpetofauna of Honduras, first with the amphibians (Wilson and McCranie, 1992; McCranie and Wilson, 2002) and then with the remainder of the herpetofauna (Wilson and McCranie, 2004). Subsequently, it was used in several chapters of Wilson et al. (2010), and Wilson et al. (2013a, b) modified the system for use in Mexico, [as did Johnson et al. (2015) for Central America]. Herein, we follow the modifications made by Wilson et al. (2013a, b), after applying the taxonomic changes occurring since that time. As noted by Alvarado Díaz et al. (2013: 133), 'the EVS measure is not designed for use with marine species (e.g., marine turtles and sea snakes), and generally is not applied to non-native species'."

PHYSIOGRAPHY AND CLIMATE

Physiographic Regions

To analyze the distribution of the Chiapan herpetofauna, we used the system of classification of physiographic regions (or provinces) of the state employed by Johnson et al. (2010), which they modified from those of Breedlove (1981), Johnson (1989), and Campbell (1999). This system is composed of seven regions (Fig. 1), and we used the names in Johnson et al. (2010) and characterize them briefly based on the more detailed descriptions in this reference, as follows:

Gulf Coastal Plain (GC).—Only a small portion of the Gulf Coastal Plain of Mexico is present in Chiapas. In general, this coastal plain extends from the Mexico–United States border in northeastern Tamaulipas to the western periphery of the Yucatan Platform, and is defined by Johnson et al. (2010) as the course of the Río Usumacinta, and from the southern coast of the Gulf of Mexico to the beginning of the Northern Highlands in northern Chiapas at an approximate elevation of 200 m. Johnson et al. (2010: 334) noted that "topographic relief in this region is low, although a few small mounts rise from the Coastal Plain, especially near the border with the Northern Highlands."

Northern Highlands (NH).—This montane region is bordered to the north by the Gulf Coastal Plain, and to the south by the Central Depression, Central Plateau, and the Eastern Highlands (Johnson et al., 2010). Johnson et al. (2010: 333) indicated that, "elevations generally are higher on the southern margin, especially where the region abuts the Central Plateau. The maximum elevation of this area approaches 2,000 m, but the highest elevation of most ranges is about 1,500 m. To the west, the Northern Highlands region adjoins an extension of the northwestern Sierra Madre de Chiapas (the Chimalapas Highlands; mostly in Oaxaca). To the north, the elevation of this region gradually decreases to about 200 m, from where it grades into the Gulf Coastal Plain."

Dendrotriton megarhinus (Rabb, 1960). The Long-nosed Bromeliad Salamander is endemic to Chiapas, where it is known only from the Sierra Madre de Chiapas physiographic region at an elevation of ca. 2,000 m. Its EVS has been assessed as 17, placing it in the middle portion of the high vulnerability category. This salamander has been judged as a Vulnerable species by the IUCN, and as a species of special protection by SEMARNAT. This individual was found at Cerro Tres Picos, in the municipality of Villaflores. © Sean Rovito

Eastern Highlands (EH).—Located to the north and east of the Central Plateau is a range of highlands that "slope gradually from west to east into the lowlands bordering the Río Usumacinta…The elevation ranges from about 200 to 1,500 m, although the lowlands adjacent to the Río Usumacinta [can] be as low as 100 m in the northeastern sector where the river passes through a lower segment of the Northern Highlands before entering the Gulf Coastal Plain" (Johnson et al., 2010: 332–333).

Central Plateau (CP).—Johnson et al. (2010: 332) noted that "the Central Plateau is a highland block situated east and northeast of the Central Depression, south of the Northern Highlands and west of the Eastern Highlands," and also indicated that "its exact boundary with the Northern Highlands is obscured somewhat because these highland masses adjoin each other between the towns of Pueblo Nuevo Solistahuacán (Central Plateau) and Rayón Mescalapa (Northern Highlands)," where the maximum elevation is about 2,000 m. The highest portion of the Central Plateau is in the middle segment near the city of San Cristóbel de las Casas, where the maximum elevation is about 2,900 m (Johnson, et al., 2010).

Central Depression (CD).—Johnson et al. (2010: 331) described this physiographic region, in which lies the Río Grijalva, as follows: "The Central Depression is a large basin that extends from northwest to southeast for approximately 250 km, from near the Oaxaca-Chiapas boundary to the border of Guatemala. This graben valley, which is up to 70 km wide, is surrounded by the Sierra Madre de Chiapas to the southwest and northwest, the Northern Highlands to the north, and the Central Plateau to the northeast and east. The elevation of the Central Depression ranges from about 1,200 m near the Guatemalan and 750 m near the Oaxacan borders, respectively, to about 500 m where the Río Grijalva enters Sumidero Canyon near Chiapa de Corzo, Chiapas." Johnson (1990) discussed the herpetofauna of the Central Depression and surrounding regions.

Sierra Madre de Chiapas (SM).—The Sierra Madre de Chiapas, the largest elevated region in the state, is situated between the Central Depression to the north and the Pacific Costal Plain to the south. This range arises at its lowest point in the central ridges of the Isthmus of Tehuantepec in Oaxaca, and extends in a southeasterly direction to Volcán Tacaná, its highest point (ca. 4,000 m) located on the border of Chiapas and Guatemala (Johnson et al., 2010). Johnson et al. (2010: 330) noted that "from the isthmian ridge, the Sierra Madre climbs rather abruptly north of Zanatepec, Oaxaca, forming the northwestern Sierra Madre de Chiapas, or the Chimalapas Highlands (maximum elevation ca. 2,500 m), which to some degree is separated from the southeastern Sierra Madre de Chiapas by an elevational depression…on the slopes north of Arriaga, Chiapas (minimum elevation ca. 750 m)."

Pacific Coastal Plain (PC).—This lowland plain extends the length of the Pacific coast in Chiapas, and inland to an elevation of about 200 m where it grades into the foothills of the Sierra Madre de Chiapas (Johnson et al., 2010). This lowland area is a small portion of the coastal plain that extends from the Sonora–Sinaloa border in Mexico to the Panama–Colombia border (Campbell, 1999). The relatively narrow portion in Chiapas is about 267 km long and usually around 16 km wide (Villalobos Sánchez, 2013). The northwestern portion of this region is relatively flat, but in the southeastern portion the terrain is a little broader and somewhat hilly (Johnson et al., 2010).

Climate

Temperature.—We constructed a table with the monthly minimum, mean, and maximum temperatures for one locality in each of the seven physiographic regions in the state (Table 1). The elevation of these localities ranges from 52 m on the Pacific Coastal Plain to 1,659 m on the Central Plateau.

Table 1. Monthly minimum, mean (in parentheses), maximum, and annual temperature data (in °C) for the physiographic regions of Chiapas, Mexico. Localities and their elevations for each of the regions are as follows: Gulf Coastal Plain—Palenque (59 m); Northern Highlands—Jitotol (1,651 m); Eastern Highlands—Ocosingo (907 m); Central Plateau—Comitán de Dominguez (1,659 m); Central Depression—Tuxtla Gutiérrez (526 m); Sierra Madre de Chiapas—Siltepec (1,603 m); Pacific Coastal Plain—Tonalá (52 m). Data taken from www.climate-data.org (accessed 24 April 2015).

Physiographic Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Gulf Coastal Plain	17.6 (22.6) 27.6	19.6 (25.3) 31.0	20.4 (26.4) 32.4	21.3 (27.7) 34.1	23.4 (29.5) 35.7	23.2 (28.8) 34.5	22.5 (28.0) 33.5	22.4 (28.0) 33.6	22.4 (27.5) 32.7	21.7 (26.4) 31.1	20.2 (25.1) 30.1	19.0 (23.9) 28.9	21.1 (26.6) 32.1
Northern Highlands	9.9 (16.4) 22.9	10.1 (16.9) 23.8	11.4 (18.5) 25.6	12.7 (19.6) 26.6	13.7 (19.9) 26.1	14.4 (19.7) 25.0	14.1 (19.6) 25.1	13.9 (19.5) 25.2	14.0 (19.3) 24.7	13.3 (18.5) 23.8	11.5 (17.4) 23.3	10.1 (16.5) 22.9	12.4 (18.5) 24.6
Eastern Highlands	14.6 (20.8) 27.0	14.4 (21.4) 28.5	16.0 (23.3) 30.6	17.1 (24.6) 32.2	18.7 (25.4) 32.2	18.8 (24.9) 31.1	18.8 (24.7) 30.6	18.5 (24.6) 30.8	19.4 (25.1) 30.8	18.7 (24.1) 29.6	16.4 (22.3) 28.2	15.6 (21.5) 27.4	17.3 (24.0) 30.0
Central Plateau	8.7 (16.1) 23.6	9.1 (16.9) 24.7	10.5 (18.5) 26.6	11.7 (19.5) 27.4	12.4 (19.7) 27.0	13.0 (19.1) 25.3	12.6 (18.7) 24.8	12.5 (18.9) 25.4	12.6 (18.6) 24.7	11.8 (17.9) 24.0	10.1 (16.9) 23.8	9.3 (16.3) 23.4	11.2 (18.1) 25.1
Central Depression	14.3 (21.5) 28.7	15.0 (22.7) 30.5	16.4 (24.4) 32.5	18.1 (25.9) 33.8	19.0 (26.3) 33.7	18.7 (25.1) 31.5	18.4 (24.6) 30.8	18.6 (24.9) 31.2	18.3 (24.1) 29.9	17.3 (23.0) 28.7	15.8 (22.3) 28.8	14.4 (21.4) 28.4	17.0 (24.0) 31.0
Sierra Madre de Chiapas	9.9 (17.6) 25.4	10.5 (18.5) 26.5	11.9 (19.9) 28.0	13.4 (21.0) 28.7	14.3 (21.2) 28.2	14.9 (20.7) 26.6	14.2 (20.2) 26.3	14.0 (20.3) 26.6	14.4 (20.1) 25.9	13.9 (19.7) 25.6	12.0 (18.7) 25.5	10.6 (17.9) 25.3	13.0 (20.0) 27.0
Pacific Coastal Plain	19.0 (25.7) 32.4	19.6 (26.6) 33.7	20.6 (27.7) 34.9	21.9 (28.5) 35.2	22.5 (28.8) 35.2	21.8 (27.2) 32.7	21.7 (27.3) 32.9	21.7 (27.3) 32.9	21.4 (26.5) 31.7	21.6 (27.0) 32.4	20.6 (26.4) 32.3	19.8 (25.8) 31.9	21.0 (27.0) 33.2

As is well known, the mean annual temperature (MAT) decreases with increased elevation. On the Pacific Coastal Plain at Tonalá (elev. 52 m), the MAT is 27.0°C. At the other elevational extreme, at Comitán de Dominguez (elev. 1,659 m), the MAT is 18.1°C. On the Gulf Coastal Plain at Palenque (elev. 59 m), the MAT is 26.6°C. In the Central Depression at Tuxtla Gutiérrez (elev. 526 m), the MAT decreases to 24.0°C. Interestingly, in the Eastern Highlands at Ocosingo (elev. 907 m), the MAT, is the same (24°C) as in Tuxtla Gutiérrez. The remaining three localities all lie at an elevation above 1,600 m. In the Sierra Madre de Chiapas at Siltepec (elev. 1,603 m), the MAT is 20.0°C; in the Northern Highlands at Jitotol (elev. 1,651 m) it is 18.5°C; and on the Central Plateau at Comitán de Dominguez (elev. 1,659 m) it is 18.1°C. The annual monthly minimum temperature ranges from 11.0 to 14.0°C lower than the annual monthly maximum temperature. Through the year, mean monthly temperatures peak in May and generally decrease gradually to their lowest level in January, with only a single departure from the latter pattern (only one-tenth of a degree) in the Central Depression.

Precipitation.—Precipitation in Chiapas is highest from May to October, a period referred to as the rainy season, and lowest from November to April, a corresponding period called the dry season (Table 2). The data in this table demonstrate that 71.1–96.3% of the annual rainfall occurs during the rainy season. Depending on the locality, the month with the lowest amount of precipitation is December, January, February, March, or April, and that with the highest is June or, more commonly, September. The annual precipitation ranges from 893 mm in the Central Depression, a rain shadow valley, to 2,394 mm on the Gulf Coastal Plain, with the higher value 2.7 times greater than the lower one. Precipitation is relatively low on the Central Plateau (982 mm). Intermediate values are found in the Sierra Madre de Chiapas (1,378 mm), the Pacific Coastal Plain (1,653 mm), and the Eastern Highlands (1,750 mm). The highest values are in the Northern Highlands (2,017 mm) and the Gulf Coastal Plain (2,394 mm).

Table 2. Monthly and annual precipitation data (in mm.) for the physiographic regions of Chiapas, Mexico. Localities and their elevation for each of the regions are as follows: Gulf Coastal Plain—Palenque (59 m); Northern Highlands—Jitotol (1,651 m); Eastern Highlands—Ocosingo (907 m); Central Plateau—Comitán de Dominguez (1,659 m); Central Depression—Tuxtla Gutiérrez (526 m); Sierra Madre de Chiapas—Siltepec (1,603 m); Pacific Coastal Plain—Tonalá (52 m). The shaded area indicates the months of the rainy season. Data taken from www.climate-data.org; (accessed 24 April 2015).

Physiographic Region	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Gulf Coastal Plain	127	89	76	72	148	270	217	302	444	322	183	144	2394
Northern Highlands	78	72	52	71	128	286	240	283	309	252	143	103	2017
Eastern Highlands	46	37	43	69	147	263	234	220	325	225	87	54	1750
Central Plateau	9	12	15	40	106	200	122	132	200	110	24	12	982
Central Depression	1	2	4	13	75	200	167	167	186	65	12	1	893
Sierra Madre de Chiapas	21	9	14	40	146	247	196	209	256	172	48	20	1378
Pacific Coastal Plain	2	6	11	31	148	321	284	288	403	130	25	4	1653

COMPOSITION OF THE HERPETOFAUNA

The herpetofauna of Chiapas is the second largest of any state in Mexico (Parra-Olea et al., 2014; Flores-Villela and García-Vázquez, 2014), after that of Oaxaca (Mata-Silva et al., 2015). Parra-Olea et al. (2014) reported 100 species of amphibians from Chiapas, and Flores-Villela and García-Vázquez et al. (2014) 220 species of crocodylians,

squamates, and turtles. Reynoso et al. (2011) recorded a herpetofaunal size of 324 species, four more than the combined totals reported by Parra-Olea et al. (2014) and Flores-Villela (2014). Here, we report a total of 330 species (Table 3), six more (1.9%) than reported by Reynoso et al. (2011).

Like Mata-Silva et al. (2015), our use of the term "herpetofauna" includes the amphibians (anurans, salamanders, and caecilians), the crocodylians (alligators and crocodiles, *sensu lato*), turtles, and squamates (amphisbaenians, lizards, and snakes). We avoided using the term "reptile," inasmuch as its use to describe a class of vertebrates has become increasingly outmoded because of its relatively recently exposed paraphyletic nature (www.iflscience.com/plants-and-animals/there-s-no-such-thing-reptiles-any-more-and-here-s-why; accessed 24 April 2015). Thus, we continue to use the term "amphibian" and refer to the other animals as crocodylians, squamates, and turtles, or collectively as "the remainder of the herpetofauna."

Table 3. Composition of the native and non-native herpetofauna of Chiapas, Mexico.

Orders	Families	Genera	Species
Anura	9	27	79
Caudata	1	8	25
Gymnophiona	1	2	3
Subtotals	**11**	**37**	**107**
Crocodylia	2	2	3
Squamata	28	91	203
Testudines	8	11	17
Subtotals	**38**	**104**	**223**
Totals	**49**	**141**	**330**

Families

The herpetofauna of Chiapas contains representatives of 49 families, including nine species of anurans, one of salamanders, one of caecilians, two of crocodylians, 28 of squamates, and eight of turtles (Table 3). By way of comparison, 50 families were reported from Oaxaca (Mata-Silva et al., 2015). The Scaphiopodidae, with a single species in Oaxaca, is the only family not represented in Chiapas. About seven-tenths of the amphibians in Chiapas are allocated to three families (Craugastoridae, Hylidae, and Plethodontidae), and about six-tenths of the remainder of the herpetofauna to five families (Dactyloidae, Phrynosomatidae, Colubridae, Dipsadidae, and Viperidae) (Table 4); these values are comparable to the situation in Oaxaca (Mata-Silva et al., 2015).

Genera

The amphibians of Chiapas have been allocated to 37 genera, of which 27 are anurans (Table 3). The remainder of the herpetofauna is composed of 104 genera, of which 91 are squamates (Table 3). Compared to the herpetofauna of Oaxaca, 13 fewer genera are found in Chiapas (Mata-Silva et al., 2015). The total number of genera in Chiapas (141) is 67.1% of the 210 known from Mexico (Wilson et al., 2013a, b). Among the amphibians, the most speciose genera in Chiapas are *Incilius* (10 species), *Craugastor* (18), *Plectrohyla* (9), and *Bolitoglossa* (15), and *Norops* (22) and *Sceloporus* (13) among the squamates.

Table 4. Distribution of the herpetofauna of Chiapas, Mexico, by physiographic region. Abbreviations are as follows: GC = Gulf Coastal Plain; NH = Northern Highlands; EH = Eastern Highlands; CP = Central Plateau; CD = Central Depression; SM = Sierra Madre de Chiapas; PC = Pacific Coastal Plain. * = species endemic to Mexico; ** = species endemic to Chiapas; *** = non-native species; and [ms] = marine species.

Taxa	Physiographic Regions of Chiapas							Number of Regions Occupied
	GC	NH	EH	CP	CD	SM	PC	
Anura (79 species)								
Bufonidae (11 species)								
Incilius bocourti				x		x		2
Incilius campbelli			x					1
Incilius canaliferus					x	x	x	3
Incilius coccifer						x	x	2
Incilius luetkenii						x	x	2
Incilius macrocristatus		x	x	x	x	x		5
*Incilius marmoreus**					x	x	x	3
Incilius tacanensis						x		1
Incilius tutelarius						x		1
Incilius valliceps	x	x	x		x		x	5
Rhinella marina	x	x	x		x	x	x	6
Centrolenidae (1 species)								
Hyalinobatrachium fleischmanni	x	x	x			x		4
Craugastoridae (18 species)								
Craugastor alfredi	x	x	x					3
Craugastor amniscola				x	x			2
Craugastor brocchi				x				1
*Craugastor glaucus***				x				1
Craugastor greggi						x		1
Craugastor laticeps	x	x	x					3
Craugastor lineatus		x		x		x		3
Craugastor loki	x	x	x	x	x	x	x	7
Craugastor matudai						x		1
*Craugastor montanus***						x		1
Craugastor palenque		x	x					2
*Craugastor pelorus***		x	x	x				3
*Craugastor pozo***		x						1
Craugastor pygmaeus						x		1
*Craugastor rugulosus**						x	x	2
Craugastor rupinius						x	x	2
Craugastor stuarti				x		x		2
*Craugastor taylori***				x				1
Eleutherodactylidae (3 species)								
Eleutherodactylus leprus	x	x	x					3
Eleutherodactylus pipilans		x		x	x	x	x	5
Eleutherodactylus rubrimaculatus						x	x	2
Hylidae (33 species)								
Agalychnis callidryas	x	x	x					3
Agalychnis moreletii	x	x	x			x		4
Anotheca spinosa		x						1
Bromeliohyla bromeliacia		x	x	x				3
*Charadrahyla chaneque**		x		x				2
Dendropsophus ebraccatus	x	x	x					3

Dendropsophus microcephalus	x	x	x					3
Dendropsophus robertmertensi					x	x	x	3
Duellmanohyla chamulae *		x		x				2
Duellmanohyla schmidtorum						x		1
*Ecnomiohyla miotympanum**	x	x		x				3
*Exerodonta bivocata***		x		x				2
*Exerodonta chimalapa**						x		1
*Exerodonta sumichrasti**		x		x	x	x		4
Hyla walkeri				x				1
Plectrohyla acanthodes				x				1
Plectrohyla avia						x		1
Plectrohyla guatemalensis						x		1
Plectrohyla hartwegi						x		1
Plectrohyla ixil		x		x				2
*Plectrohyla lacertosa***						x		1
Plectrohyla matudai						x		1
*Plectrohyla pycnochila***				x				1
Plectrohyla sagorum						x		1
Ptychohyla euthysanota						x		1
Ptychohyla macrotympanum		x	x	x				3
Scinax staufferi	x	x	x	x	x	x	x	7
Smilisca baudinii	x	x	x	x	x	x	x	7
Smilisca cyanosticta	x	x	x					3
Tlalocohyla loquax	x	x	x					3
Tlalocohyla picta	x	x	x	x				4
Trachycephalus typhonius	x	x	x	x	x	x	x	7
Triprion petasatus			x					1
Leptodactylidae (3 species)								
Engystomops pustulosus	x		x			x	x	4
Leptodactylus fragilis	x	x	x	x	x	x	x	7
Leptodactylus melanonotus	x	x	x		x		x	5
Microhylidae (4 species)								
Gastrophryne elegans	x	x	x					3
Hypopachus barberi				x				1
Hypopachus ustus					x	x	x	3
Hypopachus variolosus	x		x	x	x	x	x	6
Ranidae (5 species)								
Lithobates brownorum	x	x	x		x			4
Lithobates forreri						x	x	2
Lithobates macroglossa				x				1
Lithobates maculatus		x	x	x		x	x	5
Lithobates vaillanti	x	x	x	x	x	x	x	7
Rhinophrynidae (1 species)								
Rhinophrynus dorsalis	x		x		x		x	4
Caudata (25 species)								
Plethodontidae (25 species)								
*Bolitoglossa alberchi**	x	x						2
Bolitoglossa engelhardti						x		1
Bolitoglossa flavimembris						x		1
Bolitoglossa flaviventris						x	x	2
Bolitoglossa franklini						x		1
Bolitoglossa hartwegi				x				1
Bolitoglossa lincolni				x				1
Bolitoglossa mexicana		x	x	x				3
Bolitoglossa mulleri			x					1
Bolitoglossa occidentalis		x		x		x	x	4

*Bolitoglossa platydactyla**	x	x						2
Bolitoglossa rostrata				x				1
Bolitoglossa rufescens	x	x	x					3
Bolitoglossa stuarti				x				1
*Bolitoglossa veracrucis**		x						1
Bradytriton silus		x						1
*Cryptotriton alvarezdeltoroi***				x				1
*Dendrotriton megarhinus***						x		1
*Dendrotriton xolocalcae***						x		1
*Ixalotriton niger**		x						1
Nyctanolis pernix				x				1
Oedipina elongata		x	x					2
Pseudoeurycea brunnata						x		1
Pseudoeurycea goebeli						x		1
Pseudoeurycea rex						x		1
Gymnophiona (3 species)								
Dermophiidae (3 species)								
Dermophis mexicanus	x	x	x		x	x	x	6
*Dermophis oaxacae**						x	x	2
Gymnopis syntrema			x					1
Crocodylia (3 species)								
Alligatoridae (1 species)								
Caiman crocodilus							x	1
Crocodylidae (2 species)								
Crocodylus acutus	x	x	x		x		x	5
Crocodylus moreletii	x	x	x					3
Squamata (203 species)								
Anguidae (10 species)								
*Abronia leurolepis***				x				1
Abronia lythrochila				x				1
Abronia matudai						x		1
Abronia ochoterenai				x				1
*Abronia ramirezi***						x		1
*Abronia smithi***						x		1
*Celestus ennegrammus**		x						1
Celestus rozellae	x	x	x					3
Gerrhonotus liocephalus		x		x	x	x		4
Mesaspis moreleti				x		x		2
Corytophanidae (6 species)								
Basiliscus vittatus	x	x	x	x	x	x	x	7
Corytophanes cristatus	x	x	x					3
Corytophanes hernandesii	x	x	x					3
Corytophanes percarinatus						x		1
Laemanctus longipes	x	x	x					3
Laemanctus serratus		x		x	x			3
Dactyloidae (22 species)								
*Norops alvarezdeltoroi **		x						1
*Norops anisolepis***				x				1
*Norops barkeri**		x						1
Norops beckeri	x	x	x					3
Norops biporcatus	x	x	x	x				4
Norops capito	x	x	x					3
*Norops compressicauda**		x						1
Norops crassulus						x		1
Norops cristifer						x	x	2
Norops dollfusianus						x	x	2

*Norops hobartsmithi***		x		x				2
Norops laeviventris		x		x	x			3
Norops lemurinus	x	x	x					3
Norops matudai						x		1
*Norops parvicirculatus***		x						1
Norops petersii		x	x	x		x		4
*Norops pygmaeus**		x						1
Norops rodriguezii	x	x	x					3
Norops serranoi						x	x	2
Norops tropidonotus	x	x	x	x	x			5
Norops uniformis	x	x	x					3
Norops unilobatus	x	x	x	x	x	x	x	7
Eublepharidae (1 species)								
Coleonyx elegans	x	x	x		x	x	x	6
Gekkonidae (3 species)								
*Gehyra mutilata****					x		x	2
*Hemidactylus frenatus****		x	x		x		x	4
*Hemidactylus turcicus****					x			1
Gymnophthalmidae (1 species)								
Gymnophthalmus speciosus					x	x	x	3
Helodermatidae (2 species)								
Heloderma alvarezi					x			1
Heloderma horridum						x	x	2
Iguanidae (4 species)								
Ctenosaura acanthura		x			x			2
*Ctenosaura pectinata**					x	x		2
Ctenosaura similis			x			x	x	3
Iguana iguana	x	x	x		x	x	x	6
Mabuyidae (1 species)								
Marisora brachypoda	x	x	x	x	x	x	x	7
Phrynosomatidae (15 species)								
Phrynosoma asio					x	x		2
Sceloporus acanthinus						x		1
Sceloporus carinatus		x		x	x	x		4
Sceloporus internasalis		x		x				2
Sceloporus melanorhinus		x			x	x	x	4
Sceloporus prezygous			x	x				2
Sceloporus serrifer			x					1
Sceloporus siniferus					x	x	x	3
Sceloporus smaragdinus						x		1
*Sceloporus smithi**						x	x	2
Sceloporus squamosus						x	x	2
Sceloporus taeniocnemis				x				1
Sceloporus teapensis	x	x	x					3
Sceloporus variabilis	x	x		x	x	x		5
*Urosaurus bicarinatus**					x	x	x	3
Phyllodactylidae (2 species)								
Phyllodactylus tuberculosus		x			x	x	x	4
Thecadactylus rapicauda		x	x					2
Scincidae (2 species)								
Mesoscincus schwartzei			x					1
Plestiodon sumichrasti	x	x	x					3
Sphaerodactylidae (3 species)								
Gonatodes albogularis						x	x	2
Sphaerodactylus continentalis	x	x	x					3
Sphaerodactylus glaucus	x	x	x		x	x	x	6

Sphenomorphidae (3 species)								
*Scincella gemmingeri**		x				x		2
Sphenomorphus assatus		x		x	x	x	x	5
Sphenomorphus cherriei	x	x	x					3
Teiidae (9 species)								
Aspidoscelis deppii	x	x			x	x	x	5
*Aspidoscelis guttata**	x				x	x	x	4
Aspidoscelis motaguae					x	x		2
Holcosus chaitzami				x	x			2
Holcosus festivus		x	x					2
Holcosus hartwegi			x					1
Holcosus parvus						x	x	2
*Holcosus stuarti**	x	x			x			3
Holcosus thomasi				x	x	x		3
Xantusiidae (5 species)								
*Lepidophyma chicoasensis***		x			x			2
Lepidophyma flavimaculatum	x	x	x					3
*Lepidophyma lipetzi***		x						1
Lepidophyma smithii						x	x	2
*Lepidophyma tuxtlae**		x						1
Xenosauridae (1 species)								
Xenosaurus rackhami	x	x	x	x				4
Boidae (1 species)								
Boa imperator	x	x	x	x	x	x	x	7
Charinidae (1 species)								
Ungaliophis continentalis				x		x	x	3
Colubridae (33 species)								
Coluber constrictor				x	x			2
Dendrophidion vinitor	x	x						2
Drymarchon melanurus	x	x	x	x	x	x	x	7
Drymobius chloroticus						x		1
Drymobius margaritiferus	x	x	x	x	x	x	x	7
Ficimia publia	x	x	x		x	x	x	6
Lampropeltis abnorma	x	x	x		x	x	x	6
Leptophis ahaetulla	x	x	x					3
*Leptophis diplotropis**		x			x	x	x	4
Leptophis mexicanus	x	x	x			x	x	5
Leptophis modestus				x		x		2
Masticophis mentovarius	x	x	x	x	x	x	x	7
Mastigodryas melanolomus	x	x	x	x	x	x	x	7
Oxybelis aeneus	x	x	x		x	x	x	6
Oxybelis fulgidus	x	x	x		x	x	x	6
Phrynonax poecilonotus	x	x	x					3
Pituophis lineaticollis				x		x		2
Pseudelaphe flavirufa	x	x	x			x	x	5
*Salvadora lemniscata**		x			x	x	x	4
Senticolis triaspis	x	x	x	x	x	x	x	7
Spilotes pullatus	x	x	x		x	x	x	6
Stenorrhina degenhardtii		x	x					2
Stenorrhina freminvillii			x	x	x	x	x	5
*Symphimus leucostomus**						x		1
Tantilla impensa			x	x				2
*Tantilla johnsoni***						x		1
Tantilla rubra					x	x	x	3
Tantilla schistosa			x	x		x	x	4
*Tantilla tayrae***						x		1

Tantilla vulcani						x		1
Tantillita brevissima						x	x	2
Tantillita lintoni			x					1
Trimorphodon biscutatus				x	x	x	x	4
Dipsadidae (46 species)								
*Adelphicos nigrilatum***				x				1
Adelphicos quadrivirgatum	x	x	x	x	x			5
Adelphicos sargii						x	x	2
Amastridium sapperi	x	x	x			x	x	5
Clelia scytalina		x	x		x	x	x	5
*Coniophanes alvarezi***				x				1
Coniophanes bipunctatus	x	x	x					3
Coniophanes fissidens	x	x	x			x	x	5
Coniophanes imperialis	x	x	x	x	x			5
Coniophanes piceivittis	x	x			x	x	x	5
Coniophanes quinquevittatus	x		x					2
Coniophanes schmidti		x	x	x				3
Conophis lineatus					x	x	x	3
Conophis vittatus					x	x	x	3
Enulius flavitorques					x	x	x	3
Geophis cancellatus						x		1
Geophis carinosus		x	x	x				3
Geophis immaculatus						x		1
*Geophis laticinctus**		x		x				2
Geophis nasalis						x		1
Geophis rhodogaster						x		1
Imantodes cenchoa	x	x	x	x	x	x	x	7
Imantodes gemmistratus	x	x	x		x	x	x	6
Leptodeira frenata	x	x	x					3
Leptodeira maculata					x	x	x	3
Leptodeira nigrofasciata					x		x	2
Leptodeira septentrionalis	x	x	x	x	x	x	x	7
*Manolepis putnami**						x		1
Ninia diademata	x	x	x	x		x		5
Ninia sebae	x	x	x	x		x		5
Oxyrhopus petolarius	x	x	x					3
Pliocercus elapoides	x	x	x	x		x	x	6
Rhadinaea decorata	x	x	x					3
Rhadinella godmani						x		1
Rhadinella hannsteini						x		1
*Rhadinella kanalchutchan***				x				1
Rhadinella kinkelini			x	x				2
Rhadinella lachrymans						x		1
Rhadinella posadasi						x		1
Sibon dimidiatus	x	x	x					3
Sibon nebulatus	x	x	x			x		4
Tretanorhinus nigroluteus	x		x					2
Tropidodipsas fasciata		x		x	x	x		4
Tropidodipsas fischeri				x		x		2
Tropidodipsas sartorii	x	x	x	x		x	x	6
Xenodon rabdocephalus	x	x	x		x	x	x	6
Elapidae (8 species)								
Hydrophis platurus[ms]							x	1
Laticauda colubrina[ms]							x	1
*Micrurus bogerti**							x	1
Micrurus browni				x	x	x		3

Micrurus diastema	x	x	x					3
Micrurus elegans	x	x	x					3
Micrurus latifasciatus						x	x	2
Micrurus nigrocinctus						x	x	2
Leptotyphlopidae (1 species)								
Epictia phenops		x		x	x	x	x	5
Loxocemidae (1 species)								
Loxocemus bicolor		x			x	x	x	4
Natricidae (6 species)								
Nerodia rhombifer	x	x	x					3
Storeria dekayi				x				1
Thamnophis cyrtopsis				x		x		2
Thamnophis fulvus				x		x		2
Thamnophis marcianus	x	x	x					3
Thamnophis proximus	x			x	x		x	4
Sibynophiidae (1 species)								
Scaphiodontophis annulatus	x	x	x		x	x		5
Typhlopidae (1 species)								
*Indotyphlops braminus***			x					1
Viperidae (14 species)								
Agkistrodon bilineatus	x				x		x	3
Atropoides mexicanus		x	x	x	x			4
Atropoides occiduus						x		1
Atropoides olmec		x						1
Bothriechis aurifer				x				1
Bothriechis bicolor						x		1
*Bothriechis rowleyi**		x						1
Bothriechis schlegelii	x	x	x					3
Bothrops asper	x	x	x			x		4
Cerrophidion godmani				x		x		2
*Cerrophidion tzotzilorum***				x				1
Crotalus simus	x	x	x	x	x	x	x	7
*Porthidium dunni**						x	x	2
Porthidium nasutum	x	x	x					3
Testudines (17 species)								
Cheloniidae (3 species)								
Chelonia mydas[ms]							x	1
Eretmochelys imbricata[ms]							x	1
Lepidochelys olivacea[ms]							x	1
Chelydridae (1 species)								
Chelydra rossignonii	x		x					2
Dermatemydidae (1 species)								
Dermatemys mawii	x	x	x					3
Dermochelyidae (1 species)								
Dermochelys coriacea[ms]							x	1
Emydidae (2 species)								
Trachemys grayi							x	1
Trachemys ornata	x	x	x		x			4
Geoemydidae (3 species)								
Rhinoclemmys areolata	x	x	x					3
Rhinoclemmys pulcherrima						x	x	2
*Rhinoclemmys rubida**					x	x	x	3
Kinosternidae (3 species)								
Kinosternon acutum	x		x					2
Kinosternon leucostomum	x	x	x	x				4
Kinosternon scorpioides		x		x	x	x	x	5

Staurotypidae (3 species)								
Claudius angustatus	x							1
Staurotypus salvinii							x	1
Staurotypus triporcatus	x		x					2

Species

The herpetofauna of Chiapas currently is composed of 330 species, including 107 of amphibians, three of crocodylians, 203 of squamates, and 17 of turtles (Table 3). The comparable species numbers for Oaxaca (Mata-Silva et al., 2015) are as follows: 149 amphibians, three crocodylians, 271 squamates, and 19 turtles. Wilson et al. (2013b) reported 378 amphibian species for all of Mexico; the current number is 384 (J. Johnson, unpublished). Therefore, 27.9% of this fauna is found in Chiapas. Wilson (2013a) recorded 849 species of crocodylians, squamates, and turtles from all of Mexico; the current number is 869 (J. Johnson, unpublished), so presently 25.7% of these species are known from Chiapas. In total, the herpetofauna of Chiapas comprises 26.3% of that of Mexico.

Dendrotriton xolocalcae (Taylor, 1941). The Xolocalco Bromeliad Salamander is a Chiapan endemic known only from its type locality in the Sierra Madre de Chiapas physiographic region at an elevation of 2,000 m. Its EVS has been calculated as 18, placing it in the upper portion of the high vulnerability category. This salamander has been placed in the Vulnerable category by the IUCN, and judged as a species of special protection by SEMARNAT. This individual was found at Campamento El Triunfo, Reserva de la Biósfera El Triunfo, in the municipality of Ángel Albino Corzo. © Sean Rovito

PATTERNS OF PHYSIOGRAPHIC DISTRIBUTION

We used the system of seven regions employed by Johnson et al. (2010; see Fig. 1) to elucidate the physiographic distribution of members of the Chiapan herpetofauna. We indicate the distribution of species among these regions (Table 4) and present a summary in Table 5.

Table 5. Summary of distribution occurrence of herpetofaunal families in Chiapas, Mexico, by physiographic province. See Table 4 for explanation of abbreviations.

Families	Number of Species	Distributional Occurrence						
		GC	NH	EH	CP	CD	SM	PC
Bufonidae	11	2	3	4	2	5	9	6
Centrolenidae	1	1	1	1	—	—	1	—
Craugastoridae	18	3	7	5	8	2	9	3
Eleutherodactylidae	3	1	2	1	1	1	2	2
Hylidae	33	11	19	13	15	5	15	4
Leptodactylidae	3	3	2	3	1	2	2	3
Microhylidae	4	2	1	2	2	2	2	2
Ranidae	5	2	3	3	3	2	3	3
Rhinophrynidae	1	1	—	1	—	1	—	1
Subtotals	**79**	**26**	**38**	**33**	**32**	**20**	**43**	**24**
Plethodontidae	25	3	9	4	8	—	10	2
Subtotals	**25**	**3**	**9**	**4**	**8**	**—**	**10**	**2**
Dermophiidae	3	1	1	2	—	1	2	2
Subtotals	**3**	**1**	**1**	**2**	**—**	**1**	**2**	**2**
Totals	**107**	**30**	**48**	**39**	**40**	**21**	**55**	**28**
Alligatoridae	1	—	—	—	—	—	—	1
Crocodylidae	2	2	2	2	—	1	—	1
Subtotals	**3**	**2**	**2**	**2**	**—**	**1**	**—**	**2**
Anguidae	10	1	3	1	5	1	5	—
Corytophanidae	6	4	5	4	2	2	2	1
Dactyloidae	22	8	16	9	7	3	7	4
Eublepharidae	1	1	1	1	—	1	1	1
Gekkonidae	3	—	1	1	—	3	—	2
Gymnophthalmidae	1	—	—	—	—	1	1	1
Helodermatidae	2	—	—	—	—	1	1	1
Iguanidae	4	1	2	2	—	3	3	2
Mabuyidae	1	1	1	1	1	1	1	1
Phrynosomatidae	15	2	5	3	5	6	10	5
Phyllodactylidae	2	—	2	1	—	1	1	1
Scincidae	2	1	1	2	—	—	—	—
Sphaerodactylidae	3	2	2	2	—	1	2	2
Sphenomorphidae	3	1	3	1	1	1	2	1
Teiidae	9	3	3	2	2	6	5	3
Xantusiidae	5	1	4	1	—	1	1	1
Xenosauridae	1	1	1	1	1	—	—	—
Subtotals	**90**	**27**	**50**	**33**	**24**	**32**	**42**	**26**
Boidae	1	1	1	1	1	1	1	1
Charinidae	1	—	—	—	1	—	1	1
Colubridae	33	15	18	19	12	16	26	19
Dipsadidae	46	21	24	24	17	14	29	16
Elapidae	8	2	2	2	1	1	3	5
Leptotyphlopidae	1	—	1	—	1	1	1	1
Loxocemidae	1	—	1	—	—	1	1	1
Natricidae	6	3	2	2	4	1	2	1

Sibynophiidae	1	1	1	1	—	1	1	—
Typhlopidae	1	—	—	1	—	—	—	—
Viperidae	14	5	7	5	5	3	6	3
Subtotals	**113**	**48**	**57**	**55**	**42**	**39**	**71**	**48**
Cheloniidae	3	—	—	—	—	—	—	3
Chelydridae	1	1	—	1	—	—	—	—
Dermatemydidae	1	1	1	1	—	—	—	—
Dermochelyidae	1	—	—	—	—	—	—	1
Emydidae	2	1	1	1	—	1	—	1
Geoemydidae	3	1	1	1	—	1	2	2
Kinosternidae	3	2	2	2	2	1	1	1
Staurotypidae	3	2	—	1	—	—	—	1
Subtotals	**17**	**8**	**5**	**7**	**2**	**3**	**3**	**9**
Totals	**223**	**85**	**114**	**97**	**68**	**75**	**116**	**85**
Sum Totals	**330**	**115**	**162**	**136**	**108**	**96**	**171**	**113**

The total number of species among the seven regions ranges from a low of 96 in the Central Depression to a high of 171 in the Sierra Madre de Chiapas. The species numbers for the other five regions are, in ascending order, 108 (Central Plateau), 113 (Pacific Coastal Plain), 115 (Gulf Coastal Plain), 136 (Eastern Highlands), and 162 (Northern Highlands). The lowest species number of 96 in the Central Depression is slightly more than one-half (56.1%) of that in the most speciose region, i.e., the Sierra Madre de Chiapas, with 171 species. The edge effect between adjoining regions sometimes positions species into one of the regions that is more ecologically related to the other, which is most pronounced in adjacent regions with different ecosystems. A good example exists between the Northern Highlands and Central Depression, along the river basin of the Río Grijalva after it passes through Sumidero Canyon. In that area of the Northern Highlands, which normally contains humid conditions, the herpetofaunal community includes several species normally found in the subhumid Central Depression (Pereino-Daniel et al., 2013). Subhumid conditions also ascend from the Central Depression onto the Sierra Madre de Chiapas and Central Plateau. Another example is the border between the Northern Highlands and the Central Plateau, but in this case, the humid environments are similar (see Johnson et al., 2010).

The highest numbers for many of the component herpetofaunal groups are in the Sierra Madre de Chiapas. These groups are the anurans (43 of 79 species, 54.4%), salamanders (10 of 25 species, 40.0%), caecilians (2 of 3 species, 66.7%), and snakes (71 of 113 species, 62.8%). As expected in a montane area, none of the three crocodylian species is found in this region; the highest number of these three species found in any region is two, in four of the seven areas. In addition, the number of lizards in this region (42, 46.7%) is the second highest in the state, with the highest number (50, 55.5%) in the Northern Highlands. The number of turtle species is not expected to be high in a montane area like the Sierra Madre de Chiapas, given that many of those in the state are marine turtles found only on the Pacific Coastal Plain (the Gulf Coastal Plain in Chiapas does not reach the Gulf coastline) or species typically or exclusively found in lowland regions on both versants. Thus, only three turtle species are found in the Sierra Madre de Chiapas. The highest number of turtle species (9, 52.9%) occurs in the Pacific Coastal Plain, with the next highest (8, 47.1%) in the Gulf Coastal Plain.

Members of the herpetofauna of Chiapas inhabit from one to seven physiographic regions (Table 4), as follows: one (109 of 330 species, 33.0%); two (66, 20.0%); three (69, 20.9%); four (29, 8.8%); five (24, 7.3%); six (15, 4.5%); and seven (18, 5.5%). The most broadly distributed species include the anurans *Craugastor loki*, *Leptodactylus fragilis*, *Lithobates vaillanti*, *Scinax staufferi*, *Smilisca baudinii*, and *Trachycephalus typhonius*, and the lizards *Basiliscus vittatus*, *Marisora brachypoda*, and *Norops unilobatus*, and the snakes *Boa imperator*, *Crotalus simus*, *Drymarchon melanurus*, *Drymobius margaritiferus*, *Imantodes cenchoa*, *Leptodeira septentrionalis*, *Masticophis mentovarius*, *Mastigodryas melanolomus*, and *Senticolis triaspis*. These 18 species not only occur broadly in Chiapas, but also are distributed widely outside the state and outside Mexico.

Of conservation significance is that 53.0% of the herpetofaunal species in the state are restricted to one or two regions. Mata-Silva et al. (2015) reported a similar percentage (59.0%) for the herpetofauna of Oaxaca. The mean regional occupancy figure for the Chiapan herpetofauna is 2.7, the same as it is for the Oaxacan herpetofauna (Mata-Silva et al., 2015).

Ixalotriton niger Wake and Johnson, 1989. Until recently, the Black Jumping Salamander was known only from the vicinity of its type locality in the Northern Highlands of Chiapas at an elevation of 1,200 m. Lamoreux et a. (2015), however, reported it from Cerro Baúl in the Sierra Madre de Chiapas, in adjacent Oaxaca. Its EVS now is 16, placing it in the middle portion of the high vulnerability category. This salamander has been evaluated as Critically Endangered by the IUCN, and as an endangered species by SEMARNAT. This individual was found at El Pozo, the type locality, inside the Zona Protección Ecológica La Pera, in the municipality of Berriozabal.

The number of species occupying a single region ranges from one (in the Gulf Coast Plain) to 47 (in the Sierra Madre de Chiapas). The Gulf Coastal Plain, the Central Depression, and the Eastern Highlands are the only ones with single-digit numbers of single-region species; the numbers of two are between 10 and 20 (10, Pacific Costal Plain; 15, Northern Highlands), followed by 25 in the Central Plateau and 47 in the Sierra Madre de Chiapas.

The Sierra Madre de Chiapas is of great conservation significance, because it contains the highest total number of species (171, including 43 anurans, 10 salamanders, two caecilians, 42 lizards, 71 snakes, and three turtles; Table 5), the greatest number of single-region species (47, including 15 anurans, eight salamanders, eight lizards, and 16 snakes; Table 4), 16 country endemics (53.3% of total of 30; Table 4), and eight state endemics (28.6% of 28; Table 4). In the following lists, * = endemic to Mexico, ** = endemic to Chiapas, and *** = non-native to Chiapas.

The distribution of the following 47 species is restricted to the Sierra Madre de Chiapas:

Incilius tacanensis
Incilius tutelarius
Craugastor greggi
Craugastor matudai
*Craugastor montanus***
Craugastor pygmaeus
Duellmanohyla schmidtorum
*Exerodonta chimalapa**
Plectrohyla avia
Plectrohyla guatemalensis
Plectrohyla hartwegi
*Plectrohyla lacertosa***
Plectrohyla matudai
Plectrohyla sagorum
Ptychohyla euthysanota
Bolitoglossa engelhardtii
Bolitoglossa flavimembris
Bolitoglossa franklini
*Dendrotriton megarhinus***
*Dendrotriton xolocalcae***
Pseudoeurycea brunnata
Pseudoeurycea goebeli
Pseudoeurycea rex
Abronia matudai
*Abronia ramirezi***
*Abronia smithi***
Corytophanes percarinatus
Norops crassulus
Norops matudai
Sceloporus acanthinus
Sceloporus smaragdinus
Drymobius chloroticus
*Symphimus leucostomus**
*Tantilla johnsoni***
*Tantilla tayrae***
Tantilla vulcani
Geophis cancellatus
Geophis immaculatus
Geophis nasalis
Geophis rhodogaster
*Manolepis putnami**
Rhadinella godmani
Rhadinella hannsteini
Rhadinella lachrymans
Rhadinella posadasi
Atropoides occiduus
Bothriechis bicolor

The distribution of 25 species is limited to the Central Plateau, as follows:

Craugastor brocchi
*Craugastor glaucus***
*Craugastor taylori***
Hyla walkeri
Plectrohyla acanthodes
*Plectrohyla pycnochila***
Hypopachus barberi
Lithobates macroglossa
Bolitoglossa hartwegi
Bolitoglossa lincolni
Bolitoglossa rostrata
Bolitoglossa stuarti
*Cryptotriton alvarezdeltoroi***
Nyctanolis pernix
*Abronia leurolepis***
Abronia lythrochila
Abronia ochoterenai
*Norops aniosoleptis***
Sceloporus taeniocnemis
*Adelphicos nigrilatum***
*Coniophanes alvarezi***
*Rhadinella kanalchutchan***
Storeria dekayi
Bothriechis aurifer
*Cerrophidion tzotzilorum***

The distribution of the following 15 species is only in the Northern Highlands within Chiapas:

*Craugastor pozo***
Anotheca spinosa
*Bolitoglossa veracrucis**
*Norops compressicauda**
Norops parvicirculatus **
*Norops pygmaeus**

Bradytriton silus
*Ixalotriton niger**
*Celestus ennegrammus**
*Norops alvarezdeltoroi**
*Norops barkeri**
*Lepidophyma lipetzi***
*Lepidophyma tuxtlae**
Atropoides olmec
*Bothriechis rowleyi**

Abronia smithi Campbell and Frost, 1993. Smith's Arboreal Alligator Lizard is a Chiapan endemic known only from the vicinity of its type locality in the Sierra Madre de Chiapas at elevations from 1,800 to 2,800 m. Its EVS has been determined as 17, placing it in the middle portion of the high vulnerability category. This lizard was allocated to the Least Concern category by the IUCN, but provided no status by SEMARNAT. This individual was encountered in the Reserva de la Biósfera El Triunfo, in the municipality of Ángel Albino Corzo.

A controversy exists, however, as to the state in which Cerro Baúl (in the northwestern Sierra Madre de Chiapas) is located (see Lamoreux et al., 2015). Most literature (e.g., Johnson et al., 2010; Lynch and Wake, 1989) indicates the location of that mountain in Oaxaca, about 21 km west of Rizo de Oro, Chiapas. Lamoreux et al. (2015) reported a supposed population of *Ixalotriton niger* from Cerro Baúl. The only previous site from where this species was known to occur was in the vicinity of its type locality northwest of Berriozabal, Chiapas, in the Northern Highlands (Wake and Johnson, 1989). If Cerro Baúl actually were located in Chiapas, then the range of the species would expand onto the Sierra Madre de Chiapas. Until additional clarification is provided, however, we consider Cerro Baúl in Oaxaca. We also question if the population of *I. niger* in the Cerro Baúl region pertains to that species, because the two known populations are separated by about 95 airline km (Lamoreux et al., 2015), and thus might represent separate eolutionary lineages.

Wilson et al. (2013a) listed *Norops alvarezdeltoroi* as endemic to the Northern Highlands of Chiapas, but Scarpetta et al. (*This issue*) are reporting it from the Chimalapas region of Oaxaca and Veracruz (on the Gulf Coastal Plain).

The following 10 single-region species inhabit the Pacific Coastal Plain:

Caiman crocodilus
Hydrophis platurus
Laticauda colubrina
Micrurus bogerti
Chelonia mydas
Eretmochelys imbricata
Lepidochelys olivacea
Dermochelys coriacea
Rhinoclemmys pulcherrima
Staurotypus salvinii

The following nine species are restricted in distribution in Chiapas to the Eastern Highlands:

Incilius campbelli
Triprion petasatus
Bolitoglossa mulleri
Gymopis syntrema
Sceloporus serrifer
Mesoscincus schwartzei
Holcosus hartwegi
Tantillita lintoni
*Indotyphlops braminus****

The following two single-region species are found in Central Depression:

*Hemidactylus turcicus****
Heloderma alvarezi

Only a single species (*Claudius angustatus*) is restricted to the Gulf Coastal Plain.

We constructed a Coefficient of Biogeographic Resemblance (CBR) matrix to examine the herpetofaunal relationships among the seven physiographic regions (Table 6). The number of shared species ranges from 33 to 112, with the lower value between the Gulf Coastal Plain and Central Plateau and the higher one between the Northern Highlands and Eastern Highlands. The mean number of shared species is 61.3. One might expect that the higher the number of species in the two regions compared would result in a greater number of shared species, but those data did not support our expectation (Table 6). The number of species in the Northern Highlands (162) is the second highest (after the number in the Sierra Madre de Chiapas), which shares 112 species with the Eastern Highlands, the third highest region. Thus, the number shared apparently has more to do with the shared border between these two regions; the Northern Highlands, with 162 species, is separated completely from the Sierra Madre de Chiapas, with its 171 species, within the state of Chiapas (Fig. 1).

The CBR data in Table 6 indicate a range of values from 0.29 to 0.82. The highest value (0.82) is that between the Gulf Coastal Plain (115 species) and Eastern Highlands (136). These two regions do not share a common border in Chiapas, but we expected this resemblance because a similar pattern was shown in Johnson et al. (2010), where areas outside Chiapas also were included. The Eastern Highlands is directly or indirectly connected with the Gulf Coastal Plain through the lowlands of the Petén region of northern Guatemala, the Yucatan Peninsula of Mexico, and adjacent Tabasco and Veracruz. The greatest degree of resemblance for the other four regions, arranged from the highest to the lowest CBR value, is as follows (species numbers in parentheses):

Pacific Coastal Plain (113) — 0.66 — Sierra Madre de Chiapas (171)

Sierra Madre de Chiapas (171) — 0.66 — Pacific Coastal Plain (113)

Central Depression (96) — 0.65 — Pacific Coastal Plain (113)

Central Plateau (108) — 0.44 — Northern Highlands (162)

Table 6. Pair-wise comparison matrix of Coefficient of Biogeographic Resemblance (CBR) data of native herpetofaunal relationships for the seven physiographic regions in Chiapas, 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 algorithm is $CBR = 2C/N_1 + N_2$ (Duellman, 1990), where C is the number of species in 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 explanation of abbreviations, and Fig 3. for the UPGMA dendrogram produced from the CBR data.

	GC	NH	EH	CP	CD	SM	PC
GC	**115**	103	103	33	48	49	47
NH	0.74	**162**	112	60	64	65	54
EH	0.82	0.75	**136**	45	46	52	48
CP	0.30	0.44	0.37	**108**	43	51	32
CD	0.45	0.50	0.40	0.42	**96**	71	68
SM	0.34	0.39	0.34	0.37	0.53	**171**	94
PC	0.41	0.39	0.39	0.29	0.65	0.66	**113**

Norops alvarezdeltoroi (Nieto Montes de Oca, 1996). This cavernicolous anole now is known from the Chimalapas region of Oaxaca and Veracruz and the El Ocote region of Chiapas at elevations from 90 to 1,200 m, based on a report by Scarpetta et al. (*This Issue*). Its EVS is calculated as 16, which places it in the middle portion of the high vulnerability category. Its IUCN status has been determined as Data Deficient, and a status has not been provided by SEMARNAT. This individual was found 2–3 km NNE of Tierra y Libertad, in the municipality of Berriozabal, at an elevation of 1,117 m. © Eric Centenero-Alcalá

Norops parvicirculatus (Álvarez del Toro and Smith, 1956). The Berriozabal Anole is endemic to Chiapas, where it is known only from the vicinity of its type locality in the Northern Highlands physiographic region. Its EVS has been established at 16, placing it in the middle portion of the high vulnerability category. Its IUCN status has been evaluated as Least Concern, and its SEMARNAT status as threatened. This individual came from 3 km al NNE de Tierra y Libertad, in the municipality of Berriozabal, at an elevation of 1,180 m.

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Some of these regional pairs are situated contiguously (Sierra Madre de Chiapas and Pacific Coastal Plain, Central Depression and Northern Highlands, and Central Plateau and Northern Highlands), whereas others are not (Gulf Coastal Plain and Eastern Highlands, and Pacific Coastal Plain and Central Depression). In the case of the Gulf Coastal Plain and the Eastern Highlands, a northeastern arm of the Northern Highlands separates these regions. Nonetheless, the Gulf Coastal Plain and the Northern Highlands share a CBR value of 0.74, and the Eastern Highlands shares one of 0.75 with the Northern Highlands.

Based on the data in Table 6, we constructed a UPGMA dendrogram to easily depict the overall herpetofaunal resemblance patterns among the seven physiographic regions, in a hierarchical manner (Fig. 2). The patterns are comparable to those depicted in Johnson et al. (2010), although that study included two other biogeographic regions of Mexico, the Yucatan Peninsula and the Los Tuxlas area of Veracruz, both which clustered with the humid Atlantic versant group composed of the Gulf Coastal Plain, Northern Highlands, and Eastern Highlands; the Northern Highlands actually was the outgroup in the Johnson et al. (2010) study. The three southern regions (Pacific Coastal Plain, Sierra Madre de Chiapas, Central Depression) formed a group, with the Sierra Madre being most similar to the Pacific Coastal Plain. The similarity patterns probably were influenced by their shared subhumid areas, and in the case of the Central Depression by its position in the subhumid corridor originating on the Pacific lowlands of Mexico and then passing through a low subhumid portion of the Sierra Madre de Chiapas into the Depression and outward into Central America (see Johnson, 1990; Wilson and McCranie, 1998; García, 2006).

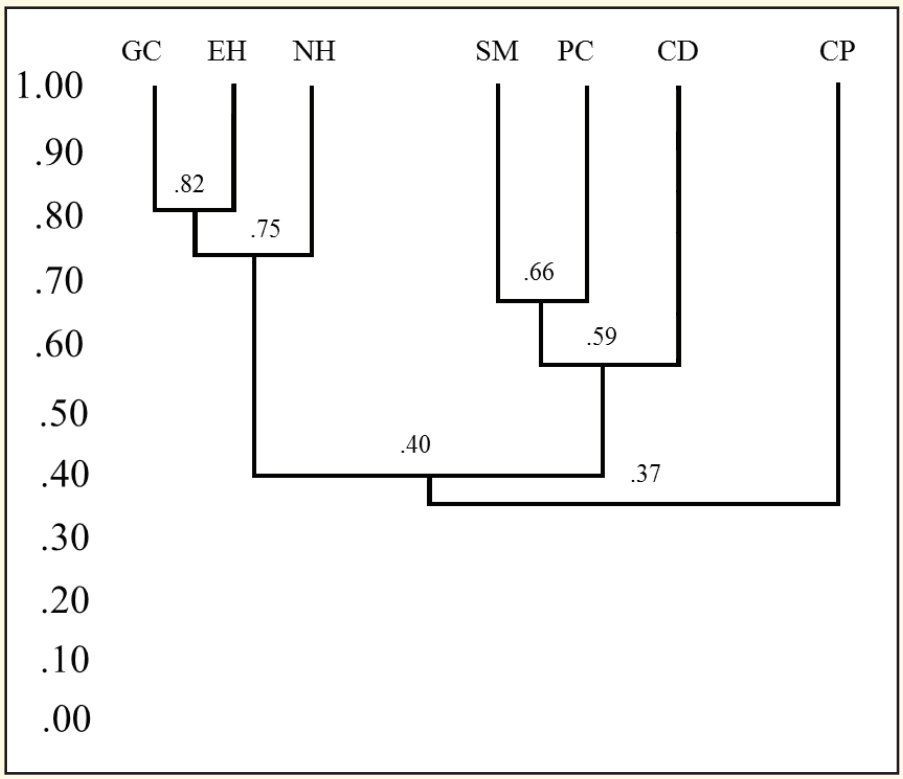

Fig. 2. A UPGMA generated dendrogram illustrating the similarity relationships of species richness among the herpetofaunas of the seven physiographic regions of Chiapas (based on data in Table 6). See Table 4 for explanation of abbreviations. We calculated the similarity values using Duellman's (1990) Coefficient of Biogeographic Resemblance (CBR).

DISTRIBUTIONAL STATUS CATEGORIZATIONS

We used the same scheme developed by Alvarado-Díaz et al. (2013) and utilized by Mata-Silva et al. (2015) to categorize the distributional status of members of the Chiapan herpetofauna. We placed these data in Table 7, and provide a summary in Table 8.

Considering the entire herpetofauna of the state (330 species), the greatest number (268, 81.2%) includes the non-endemic species (i.e., not endemic to Mexico). A significantly greater proportion (almost twice the amount) of non-endemic species are present in Chiapas than in its neighbor to the west, Oaxaca. Of the 442 herpetofaunal species Mata-Silva et al. (2015) reported from Oaxaca, 183 (41.4%) are not endemic to the state.

The next largest number consists of the country endemics (33, 10.0%), followed closely by the number of state endemics (25, 7.6%). Only four species (1.2%) are non-native to the state (Table 8).

The non-endemic species are comprised of 64 anurans (23.9% of 268), 18 salamanders (6.7%), two caecilians (0.7%), three crocodylians (1.1%), 67 lizards (25.0%), 98 snakes (36.6%), and 16 turtles (6.0%). The country endemics consist of seven anurans (21.2% of 33), four salamanders (12.1%), one caecilian (3.0%), 12 lizards (36.4%), eight snakes (24.2%), and one turtle (3.0%). The Chiapan endemics amount to eight anurans (32.0% of 25), three salamanders (12.0%), eight lizards (32.0%), and six snakes (24.0%). The four non-native species comprise three lizards in the family Gekkonidae and one snake in the family Typhlopidae.

Of the 330 members of the Chiapan herpetofauna, 58 (17.6%) are endemic to Mexico (including endemics at the state and country levels). The proportion of these species is significantly less than in Oaxaca (58.1%; Mata-Silva et al., 2015). The relatively low percentage for Chiapas attests to the much greater proportion of non-endemic species in this state (81.2%) as compared to Oaxaca (41.4%; Mata-Silva et al., 2015). The number of Chiapan endemics (58) is 7.7% of the 757 endemic herpetofaunal species presently recorded from Mexico (J. Johnson, unpublished).

Table 7. Distributional and conservation status measures for members of the herpetofauna of Chiapas, Mexico. Distributional Status: SE = endemic to state of Chiapas; CE = endemic to country of Mexico; NE = not endemic to state or country; and NN = non-native. 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 text for explanations of the EVS, IUCN, and SEMARNAT rating systems. * = species endemic to Mexico; ** = species endemic to Chiapas; *** non-native species; and ^{ms} = marine species.

Taxa	Distributional Status	Environmental Vulnerability Category (Score)	IUCN Categorization	SEMARNAT Status
Incilius bocourti	NE	M (11)	LC	NS
Incilius campbelli	NE	M (13)	NT	NS
Incilius canaliferus	NE	L (8)	LC	NS
Incilius coccifer	NE	L (9)	LC	Pr
Incilius luetkenii	NE	L (7)	LC	NS
Incilius macrocristatus	NE	M (11)	VU	NS
*Incilius marmoreus**	CE	M (11)	LC	NS
Incilius tacanensis	NE	L (9)	EN	NS
Incilius tutelarius	NE	M (10)	EN	NS
Incilius valliceps	NE	L (6)	LC	NS
Rhinella marina	NE	L (3)	LC	NS
Hyalinobatrachium fleischmanni	NE	M (10)	LC	NS
Craugastor alfredi	NE	M (11)	VU	NS
Craugastor amniscola	NE	H (14)	DD	NS
Craugastor brocchi	NE	H (14)	VU	NS
*Craugastor glaucus***	SE	H (18)	CR	Pr
Craugastor greggi	NE	H (15)	CR	Pr
Craugastor laticeps	NE	M (12)	NT	Pr
Craugastor lineatus	NE	H (15)	CR	Pr
Craugastor loki	NE	M (10)	LC	NS
Craugastor matudai	NE	H (15)	VU	Pr
*Craugastor montanus***	SE	H (18)	EN	NS
Craugastor palenque	NE	H (15)	DD	NS
*Craugastor pelorus***	SE	H (15)	DD	NS
*Craugastor pozo***	SE	H (17)	CR	NS
Craugastor pygmaeus	NE	L (9)	VU	NS
*Craugastor rugulosus**	CE	M (13)	LC	NS
Craugastor rupinius	NE	M (13)	LC	NS
Craugastor stuarti	NE	H (15)	EN	Pr
*Craugastor taylori***	SE	H (18)	DD	Pr
Eleutherodactylus leprus	NE	M (12)	VU	NS
Eleutherodactylus pipilans	NE	M (11)	LC	NS
Eleutherodactylus rubrimaculatus	NE	H (15)	VU	NS
Agalychnis callidryas	NE	M (11)	LC	NS
Agalychnis moreletii	NE	L (7)	CR	NS
Anotheca spinosa	NE	H (14)	LC	NS
Bromeliohyla bromeliacia	NE	H (16)	EN	NS
*Charadrahyla chaneque**	CE	M (13)	EN	Pr
Dendropsophus ebraccatus	NE	M (12)	LC	NS
Dendropsophus microcephalus	NE	L (7)	LC	NS
Dendropsophus robertmertensi	NE	L (9)	LC	NS
*Duellmanohyla chamulae**	SE	M (13)	EN	Pr
Duellmanohyla schmidtorum	NE	L (8)	VU	Pr

*Ecnomiohyla miotympanum**	CE	L (9)	NT	NS
*Exerodonta bivocata***	SE	H (15)	DD	NS
*Exerodonta chimalapa**	CE	M (12)	EN	NS
*Exerodonta sumichrasti**	CE	L (9)	LC	NS
Hyla walkeri	NE	M (11)	VU	NS
Plectrohyla acanthodes	NE	M (12)	CR	Pr
Plectrohyla avia	NE	M (13)	CR	Pr
Plectrohyla guatemalensis	NE	L (9)	CR	NS
Plectrohyla hartwegi	NE	M (10)	CR	Pr
Plectrohyla ixil	NE	M (12)	CR	NS
*Plectrohyla lacertosa***	SE	H (14)	EN	Pr
Plectrohyla matudai	NE	M (11)	VU	NS
*Plectrohyla pycnochila***	SE	H (15)	CR	A
Plectrohyla sagorum	NE	M (10)	EN	NS
Ptychohyla euthysanota	NE	L (8)	NT	A
Ptychohyla macrotympanum	NE	M (11)	CR	NS
Scinax staufferi	NE	L (4)	LC	NS
Smilisca baudinii	NE	L (3)	LC	NS
Smilisca cyanosticta	NE	M (12)	NT	NS
Tlalocohyla loquax	NE	L (7)	LC	NS
Tlalocohyla picta	NE	L (8)	LC	NS
Trachycephalus typhonius	NE	L (4)	LC	NS
Triprion petasatus	NE	M (10)	LC	Pr
Engystomops pustulosus	NE	L (7)	LC	NS
Leptodactylus fragilis	NE	L (5)	LC	NS
Leptodactylus melanonotus	NE	L (6)	LC	NS
Gastrophryne elegans	NE	L (8)	LC	Pr
Hypopachus barberi	NE	M (10)	VU	NS
Hypopachus ustus	NE	L (7)	LC	Pr
Hypopachus variolosus	NE	L (4)	LC	NS
Lithobates brownorum	NE	L (8)	NE	Pr
Lithobates forreri	NE	L (3)	LC	Pr
Lithobates macroglossa	NE	M (12)	VU	NS
Lithobates maculatus	NE	L (5)	LC	NS
Lithobates vaillanti	NE	L (9)	LC	NS
Rhinophrynus dorsalis	NE	L (8)	LC	NS
*Bolitoglossa alberchi**	CE	H (15)	LC	NS
Bolitoglossa engelhardti	NE	H (15)	EN	Pr
Bolitoglossa flavimembris	NE	H (15)	EN	Pr
Bolitoglossa flaviventris	NE	M (13)	EN	NS
Bolitoglossa franklini	NE	H (14)	EN	Pr
Bolitoglossa hartwegi	NE	M (12)	NT	NS
Bolitoglossa lincolni	NE	M (13)	NT	NS
Bolitoglossa mexicana	NE	M (11)	LC	Pr
Bolitoglossa mulleri	NE	H (15)	VU	NS
Bolitoglossa occidentalis	NE	M (11)	LC	Pr
*Bolitoglossa platydactyla**	CE	H (15)	NT	Pr
Bolitoglossa rostrata	NE	H (14)	VU	Pr
Bolitoglossa rufescens	NE	L (9)	LC	Pr
Bolitoglossa stuarti	NE	H (15)	DD	A
*Bolitoglossa veracrucis**	CE	H (17)	EN	Pr
Bradytriton silus	NE	H (16)	CR	NS
*Cryptotriton alvarezdeltoroi***	SE	H (18)	EN	Pr
*Dendrotriton megarhinus***	SE	H (17)	VU	Pr
*Dendrotriton xolocalcae***	SE	H (18)	VU	Pr
*Ixalotriton niger**	SE	H (16)	CR	P

Nyctanolis pernix	NE	H (15)	EN	Pr
Oedipina elongata	NE	H (15)	LC	Pr
Pseudoeurycea brunnata	NE	H (15)	CR	Pr
Pseudoeurycea goebeli	NE	H (15)	CR	A
Pseudoeurycea rex	NE	M (12)	CR	Pr
Dermophis mexicanus	NE	M (11)	VU	Pr
*Dermophis oaxacae**	CE	M (12)	DD	Pr
Gymnopis syntrema	NE	H (16)	DD	NS
Caiman crocodilus	NE	H (16)	LC	Pr
Crocodylus acutus	NE	H (14)	VU	Pr
Crocodylus moreletii	NE	M (13)	LC	Pr
*Abronia leurolepis***	SE	H (18)	DD	NS
Abronia lythrochila	NE	H (17)	LC	A
Abronia matudai	NE	H (15)	EN	A
Abronia ochoterenai	NE	H (16)	DD	P
*Abronia ramirezi***	SE	H (18)	DD	NS
*Abronia smithi***	SE	H (17)	LC	NS
*Celestus ennegrammus**	CE	H (14)	LC	Pr
Celestus rozellae	NE	M (13)	NT	Pr
Gerrhonotus liocephalus	NE	L (6)	LC	Pr
Mesaspis moreleti	NE	L (9)	LC	Pr
Basiliscus vittatus	NE	L (7)	NE	NS
Corytophanes cristatus	NE	M (11)	NE	Pr
Corytophanes hernandesii	NE	M (13)	NE	Pr
Corytophanes percarinatus	NE	M (11)	NE	A
Laemanctus longipes	NE	L (9)	NE	Pr
Laemanctus serratus	NE	L (8)	LC	Pr
*Norops alvarezdeltoroi**	SE	H (15)	DD	NS
*Norops anisolepis***	SE	H (15)	LC	Pr
*Norops barkeri**	CE	H (15)	VU	Pr
Norops beckeri	NE	M (12)	NE	Pr
Norops biporcatus	NE	M (10)	NE	Pr
Norops capito	NE	M (13)	NE	NS
*Norops compressicauda**	CE	H (15)	LC	NS
Norops crassulus	NE	M (10)	NE	NS
Norops cristifer	NE	M (13)	DD	NS
Norops dollfusianus	NE	M (13)	NE	NS
*Norops hobartsmithi***	SE	H (15)	EN	NS
Norops laeviventris	NE	L (9)	NE	NS
Norops lemurinus	NE	L (8)	NE	NS
Norops matudai	NE	M (13)	NE	A
*Norops parvicirculatus***	SE	H (16)	LC	A
Norops petersii	NE	L (9)	NE	NS
*Norops pygmaeus**	CE	H (16)	EN	Pr
Norops rodriguezii	NE	M (10)	NE	NS
Norops serranoi	NE	M (12)	NE	NS
Norops tropidonotus	NE	L (9)	NE	NS
Norops uniformis	NE	M (13)	NE	NS
Norops unilobatus	NE	L (7)	NE	NS
Coleonyx elegans	NE	L (9)	NE	A
Gehyra mutilata	NN	—	NE	—
Hemidactylus frenatus	NN	—	LC	—
Hemidactylus turcicus	NN	—	LC	—
Gymnophthalmus speciosus	NE	L (9)	NE	Pr
Heloderma alvarezi	NE	H (15)	NE	NS
Heloderma horridum	NE	H (14)	LC	A

Ctenosaura acanthura	NE	M (12)	NE	Pr
*Ctenosaura pectinata**	CE	H (15)	NE	A
Ctenosaura similis	NE	L (8)	LC	A
Iguana iguana	NE	M (12)	NE	Pr
Marisora brachypoda	NE	L (6)	NE	NS
Phrynosoma asio	NE	M (11)	NE	Pr
Sceloporus acanthinus	NE	M (13)	NE	NS
Sceloporus carinatus	NE	M (12)	LC	NS
Sceloporus internasalis	NE	M (11)	LC	NS
Sceloporus melanorhinus	NE	L (9)	LC	NS
Sceloporus prezygous	NE	H (15)	NE	A
Sceloporus serrifer	NE	L (6)	LC	NS
Sceloporus siniferus	NE	M (11)	LC	NS
Sceloporus smaragdinus	NE	M (12)	LC	NS
*Sceloporus smithi**	CE	H (15)	LC	NS
Sceloporus squamosus	NE	M (11)	NE	NS
Sceloporus taeniocnemis	NE	M (12)	LC	NS
Sceloporus teapensis	NE	M (13)	LC	NS
Sceloporus variabilis	NE	L (5)	NE	NS
*Urosaurus bicarinatus**	CE	M (12)	LC	NS
Phyllodactylus tuberculosus	NE	L (8)	NE	NS
Thecadactylus rapicauda	NE	M (10)	NE	Pr
Mesoscincus schwartzei	NE	M (11)	LC	NS
Plestiodon sumichrasti	NE	M (12)	NE	NS
Gonatodes albogularis	NE	M (11)	NE	Pr
Sphaerodactylus continentalis	NE	M (10)	NE	NS
Sphaerodactylus glaucus	NE	M (12)	NE	Pr
*Scincella gemmingeri**	CE	M (10)	LC	Pr
Sphenomorphus assatus	NE	M (10)	NE	NS
Sphenomorphus cherriei	NE	M (12)	NE	NS
Aspidoscelis deppii	NE	L (8)	LC	NS
*Aspidoscelis guttata**	CE	M (12)	LC	NS
Aspidoscelis motaguae	NE	M (12)	LC	NS
Holcosus chaitzami	NE	H (14)	DD	NS
Holcosus festivus	NE	M (11)	NE	NS
Holcosus hartwegi	NE	M (12)	NE	NS
Holcosus parvus	NE	M (13)	NE	NS
*Holcosus stuarti**	CE	M (13)	NE	NS
Holcosus thomasi	NE	M (13)	NE	NS
*Lepidophyma chicoasensis***	SE	H (16)	DD	A
Lepidophyma flavimaculatum	NE	L (8)	NE	Pr
*Lepidophyma lipetzi***	SE	H (16)	EN	A
Lepidophyma smithii	NE	L (8)	NE	Pr
*Lepidophyma tuxtlae**	CE	M (11)	DD	A
Xenosaurus rackhami	NE	M (11)	NE	NS
Boa imperator	NE	M (10)	NE	NS
Ungaliophis continentalis	NE	M (10)	NE	Pr
Coluber constrictor	NE	M (10)	LC	A
Dendrophidion vinitor	NE	M (13)	LC	NS
Drymarchon melanurus	NE	L (6)	LC	NS
Drymobius chloroticus	NE	L (8)	LC	NS
Drymobius margaritiferus	NE	L (6)	NE	NS
Ficimia publia	NE	L (9)	NE	NS
Lampropeltis abnorma	NE	L (9)	NE	NS
Leptophis ahaetulla	NE	M (10)	NE	A
*Leptophis diplotropis**	CE	H (14)	LC	A

Leptophis mexicanus	NE	L (6)	LC	A
Leptophis modestus	NE	H (14)	VU	Pr
Masticophis mentovarius	NE	L (6)	NE	A
Mastigodryas melanolomus	NE	L (6)	LC	NS
Oxybelis aeneus	NE	L (5)	NE	NS
Oxybelis fulgidus	NE	L (9)	NE	NS
Phrynonax poecilonotus	NE	M (10)	LC	NS
Pituophis lineaticollis	NE	L (8)	LC	NS
Pseudelaphe flavirufa	NE	M (10)	LC	NS
*Salvadora lemniscata**	CE	H (15)	LC	Pr
Senticolis triaspis	NE	L (6)	NE	NS
Spilotes pullatus	NE	L (6)	NE	NS
Stenorrhina degenhardtii	NE	L (9)	NE	NS
Stenorrhina freminvillii	NE	L (7)	NE	NS
*Symphimus leucostomus**	CE	H (14)	LC	Pr
Tantilla impensa	NE	M (10)	LC	NS
*Tantilla johnsoni***	SE	H (16)	DD	NS
Tantilla rubra	NE	L (5)	LC	Pr
Tantilla schistosa	NE	L (8)	LC	NS
*Tantilla tayrae***	SE	H (15)	DD	Pr
Tantilla vulcani	NE	M (12)	NE	NS
Tantillita brevissima	NE	L (9)	LC	Pr
Tantillita lintoni	NE	M (12)	LC	Pr
Trimorphodon biscutatus	NE	L (7)	NE	NS
*Adelphicos nigrilatum***	SE	H (14)	LC	Pr
Adelphicos quadrivirgatum	NE	M (10)	DD	Pr
Adelphicos sargii	NE	M (12)	LC	NS
Amastridium sapperi	NE	M (10)	NE	NS
Clelia scytalina	NE	M (13)	NE	NS
*Coniophanes alvarezi***	SE	H (17)	DD	NS
Coniophanes bipunctatus	NE	M (10)	NE	NS
Coniophanes fissidens	NE	L (7)	NE	NS
Coniophanes imperialis	NE	L (8)	LC	NS
Coniophanes piceivittis	NE	L (7)	LC	NS
Coniophanes quinquevittatus	NE	M (13)	LC	NS
Coniophanes schmidti	NE	M (13)	LC	NS
Conophis lineatus	NE	L (9)	LC	NS
Conophis vittatus	NE	M (11)	LC	NS
Enulius flavitorques	NE	L (5)	NE	NS
Geophis cancellatus	NE	M (12)	LC	Pr
Geophis carinosus	NE	L (8)	LC	NS
Geophis immaculatus	NE	H (14)	LC	NS
*Geophis laticinctus**	CE	M (11)	LC	Pr
Geophis nasalis	NE	L (9)	LC	Pr
Geophis rhodogaster	NE	M (12)	LC	NS
Imantodes cenchoa	NE	L (6)	NE	Pr
Imantodes gemmistratus	NE	L (6)	NE	Pr
Leptodeira frenata	NE	M (12)	LC	NS
Leptodeira maculata	NE	L (7)	LC	Pr
Leptodeira nigrofasciata	NE	L (8)	LC	NS
Leptodeira septentrionalis	NE	L (8)	NE	NS
*Manolepis putnami**	CE	M (13)	LC	NS
Ninia diademata	NE	L (9)	LC	NS
Ninia sebae	NE	L (5)	NE	NS
Oxyrhopus petolarius	NE	H (14)	NE	NS
Pliocercus elapoides	NE	M (10)	LC	NS

Rhadinaea decorata	NE	L (9)	NE	NS
Rhadinella godmani	NE	M (10)	NE	NS
Rhadinella hannsteini	NE	M (11)	DD	NS
*Rhadinella kanalchutchan***	SE	H (16)	DD	Pr
Rhadinella kinkelini	NE	M (12)	LC	NS
Rhadinella lachrymans	NE	L (8)	LC	NS
Rhadinella posadasi	NE	H (14)	NE	NS
Sibon dimidiatus	NE	M (10)	LC	NS
Sibon nebulatus	NE	L (5)	NE	NS
Tretanorhinus nigroluteus	NE	M (10)	NE	NS
Tropidodipsas fasciata	NE	M (13)	NE	NS
Tropidodipsas fischeri	NE	M (11)	NE	NS
Tropidodipsas sartorii	NE	L (9)	NE	Pr
Xenodon rabdocephalus	NE	M (13)	NE	NS
Hydrophis platurus	NE	—	LC	NS
Laticauda colubrina[ms]	NE	—	LC	NS
*Micrurus bogerti**	CE	H (17)	DD	Pr
Micrurus browni	NE	L (8)	LC	Pr
Micrurus diastema	NE	L (8)	LC	Pr
Micrurus elegans	NE	M (13)	LC	Pr
Micrurus latifasciatus	NE	M (13)	LC	NS
Micrurus nigrocinctus	NE	M (11)	NE	Pr
Epictia phenops	NE	L (4)	NE	NS
Loxocemus bicolor	NE	M (10)	NE	Pr
Nerodia rhombifer	NE	M (10)	LC	NS
Storeria dekayi	NE	L (7)	LC	NS
Thamnophis cyrtopsis	NE	L (7)	LC	A
Thamnophis fulvus	NE	M (13)	LC	NS
Thamnophis marcianus	NE	M (10)	NE	A
Thamnophis proximus	NE	L (7)	NE	A
Scaphiodontophis annulatus	NE	M (11)	NE	NS
*Indotyphlops braminus****	NE	—	NE	—
Agkistrodon bilineatus	NE	M (11)	NT	Pr
Atropoides mexicanus	NE	M (12)	NE	NS
Atropoides occiduus	NE	H (15)	NE	NS
Atropoides olmec	NE	H (15)	LC	A
Bothriechis aurifer	NE	H (14)	VU	A
Bothriechis bicolor	NE	H (14)	LC	A
*Bothriechis rowleyi**	CE	H (16)	VU	Pr
Bothriechis schlegelii	NE	M (12)	NE	NS
Bothrops asper	NE	M (12)	NE	NS
Cerrophidion godmani	NE	M (11)	NE	NS
*Cerrophidion tzotzilorum***	SE	H (19)	LC	Pr
Crotalus simus	NE	M (10)	NE	NS
*Porthidium dunni**	CE	H (16)	LC	A
Porthidium nasutum	NE	H (14)	LC	Pr
Chelonia mydas	NE	—	EN	P
Eretmochelys imbricata	NE	—	CR	P
Lepidochelys olivacea	NE	—	VU	P
Chelydra rossignonii	NE	H (17)	VU	NS
Dermatemys mawii	NE	H (17)	CR	P
Dermochelys coriacea	NE	—	CR	P
Trachemys grayi	NE	H (15)	NE	NS
Trachemys ornata	NE	M (13)	NE	NS
Rhinoclemmys areolata	NE	M (13)	NT	A
Rhinoclemmys pulcherrima	NE	L (8)	NE	A

*Rhinoclemmys rubida**	CE	H (14)	NT	Pr
Kinosternon acutum	NE	M (11)	NT	Pr
Kinosternon leucostomum	NE	M (10)	NE	Pr
Kinosternon scorpioides	NE	M (10)	NE	Pr
Claudius angustatus	NE	H (14)	NT	P
Staurotypus salvinii	NE	M (13)	NT	Pr
Staurotypus triporcatus	NE	H (14)	NT	A

Coniophanes alvarezi Campell, 1989. The Chiapan Stripeless Snake is a Chiapan endemic restricted to the Central Plateau physiographic region at elevations from 2,000 to 2,600 m. Its EVS has been assessed as 17, placing in the middle portion of the high vulnerability category. This species has been judged as Data Deficient by the IUCN, but given no status by SEMARNAT. This individual was found on the road between Teopisca and Comitán de Dominguez in the municipality of Comitán de Dominguez, at an elevation of 1,930 m.

Table 8. Summary of the distributional status of herpetofaunal families in Chiapas, Mexico.

Families	Number of Species	Distributional Status			
		Non-endemic (NE)	Country Endemic (CE)	State Endemic (SE)	Non-native (NN)
Bufonidae	11	10	1	—	—
Centrolenidae	1	1	—	—	—
Craugastoridae	18	12	1	5	—
Eleutherodactylidae	3	3	—	—	—
Hylidae	33	25	4	4	—
Leptodactylidae	3	3	—	—	—
Microhylidae	4	4	—	—	—
Ranidae	5	5	—	—	—
Rhinophrynidae	1	1	—	—	—
Subtotals	**79**	**64**	**6**	**9**	**—**
Plethodontidae	25	18	4	3	—
Subtotals	**25**	**18**	**4**	**3**	**—**
Dermophiidae	3	2	1	—	—
Subtotals	**3**	**2**	**1**	**—**	**—**
Totals	**107**	**84**	**11**	**12**	**—**
Alligatoridae	1	1	—	—	—
Crocodylidae	2	2	—	—	—
Subtotals	**3**	**3**	**—**	**—**	**—**
Anguidae	10	6	1	3	—
Corytophanidae	6	6	—	—	—
Dactyloidae	22	15	4	3	—
Eublepharidae	1	1	—	—	—
Gekkonidae	3	—	—	—	3
Gymnophthalmidae	1	1	—	—	—
Helodermatidae	2	2	—	—	—
Iguanidae	4	3	1	—	—
Mabuyidae	1	1	—	—	—
Phrynosomatidae	15	13	2	—	—
Phyllodactylidae	2	2	—	—	—
Scincidae	2	2	—	—	—
Sphaerodactylidae	3	3	—	—	—
Sphenomorphidae	3	2	1	—	—
Teiidae	9	7	2	—	—
Xantusiidae	5	2	1	2	—
Xenosauridae	1	1	—	—	—
Subtotals	**90**	**67**	**12**	**8**	**3**
Boidae	1	1	—	—	—
Charinidae	1	1	—	—	—
Colubridae	33	28	3	2	—
Dipsadidae	46	41	2	3	—
Elapidae	8	7	1	—	—
Leptotyphlopidae	1	1	—	—	—
Loxocemidae	1	1	—	—	—
Natricidae	6	6	—	—	—
Sibynophiidae	1	1	—	—	—
Typhlopidae	1	—	—	—	1
Viperidae	14	11	2	1	—
Subtotals	**113**	**98**	**8**	**6**	**1**
Cheloniidae	3	3	—	—	—
Chelydridae	1	1	—	—	—
Dermatemydidae	1	1	—	—	—
Dermochelyidae	1	1	—	—	—
Emydidae	2	2	—	—	—
Geoemydidae	3	2	1	—	—
Kinosternidae	3	3	—	—	—
Staurotypidae	3	3	—	—	—
Subtotals	**17**	**16**	**1**	**—**	**—**
Totals	**223**	**184**	**20**	**15**	**4**
Sum Totals	**330**	**268**	**32**	**26**	**4**

CONSERVATION STATUS

We used the same systems as Alvarado-Díaz et al. (2013) and Mata-Silva et al. (2015) to analyze the conservation status of members of the Chiapan herpetofauna. Except where updates were required, we obtained the data for the IUCN and EVS systems from Wilson et al. (2013a, b), and those for the SEMARNAT system from NOM-059 (2010).

The SEMARNAT System

The SEMARNAT system of for categorizing conservation status often is used in studies on the Mexican herpetofauna, especially by Mexican nationals. For the Chiapan species included in the NOM-059 (2010) document we indicate the ratings in Table 7, and summarize them in Table 9.

The SEMARNAT system consists of three categories, endangered (P), threatened (A), and of special protection (Pr), but many members of the Mexican herpetofauna are not listed. Alvarado-Díaz et al. (2013) and Mata-Silva et al. (2015) placed these species in a "no status" (NS) category, and here we did the same.

Of the 326 species that constitute the native herpetofauna of Chiapas, 189 (58.0%) have not been evaluated (i.e., NS species). Of the remaining 137 species, 97 (29.8%) are allocated to the Pr category, 32 (9.8%) to the A category, and eight (2.5%) to the P category. These proportions are similar to those calculated for the Oaxacan herpetofauna by Mata-Silva et al. (2015), i.e., 52.3%, 32.5%, 13.6%, and 1.6%, respectively.

As Alvarado-Díaz et al. (2013) and Mata-Silva et al. (2015) concluded, given these results for the Chiapan herpetofauna, especially since more than one-half of the species remain unassessed, the SEMARNAT system is of limited use in evaluating the conservation status of this herpetofauna. Of the eight endangered (P) species, one is a salamander, another is an anguid lizard, and the rest are marine (four) and freshwater (two) turtles. The majority of the threatened (A) species are lizards (13 species in eight families) and snakes (12 species in three families).

Table 9. SEMARNAT categorizations for herpetofaunal species in Chiapas, Mexico, arranged by families. Non-native species are not included.

Families	Number of species	SEMARNAT Categorizations			
		Endangered (P)	Threatened (A)	Special Protection (Pr)	No Status (NS)
Bufonidae	11	—	—	1	10
Centrolenidae	1	—	—	—	1
Craugastoridae	18	—	—	7	11
Eleutherodactylidae	3	—	—	—	3
Hylidae	33	—	2	8	23
Leptodactylidae	3	—	—	—	3
Microhylidae	4	—	—	2	2
Ranidae	5	—	—	2	3
Rhinophrynidae	1	—	—	—	1
Subtotals	**79**	**—**	**2**	**20**	**57**
Plethodontidae	25	1	2	16	6
Subtotals	**25**	**1**	**2**	**16**	**6**
Dermophiidae	3	—	—	2	1
Subtotals	**3**	**—**	**—**	**2**	**1**
Totals	**107**	**1**	**4**	**38**	**64**
Alligatoridae	1	—	—	1	—
Crocodylidae	2	—	—	2	—
Subtotals	**3**	**—**	**—**	**3**	**—**
Anguidae	10	1	2	4	3
Corytophanidae	6	—	1	4	1

Dactyloidae	22		2	5	15
Eublepharidae	1	—	1	—	—
Gymnophthalmidae	1	—	—	1	—
Helodermatidae	2	—	1	—	1
Iguanidae	4	—	2	2	—
Mabuyidae	1	—	—	—	1
Phrynosomatidae	15	—	1	1	13
Phyllodactylidae	2	—	—	1	1
Scincidae	2	—	—	—	2
Sphaerodactylidae	3	—	—	2	1
Sphenomorphidae	3	—	—	1	2
Teiidae	9	—	—	—	9
Xantusiidae	5	—	3	2	—
Xenosauridae	1	—	—	—	1
Subtotals	**87**	**1**	**13**	**23**	**50**
Boidae	1	—	—	—	1
Charinidae	1	—	—	1	—
Colubridae	33	—	5	7	21
Dipsadidae	46	—	—	10	36
Elapidae	8	—	—	5	3
Leptotyphlopidae	1	—	—	—	1
Loxocemidae	1	—	—	1	—
Natricidae	6	—	3	—	3
Sibynophiidae	1	—	—	—	1
Viperidae	14		4	4	6
Subtotals	**112**	**—**	**12**	**28**	**72**
Cheloniidae	3	3	—	—	—
Chelydridae	1	—	—	—	1
Dermatemydidae	1	1	—	—	—
Dermochelyidae	1	1	—	—	—
Emydidae	2	—	—	—	2
Geoemydidae	3	—	2	1	—
Kinosternidae	3	—	—	3	—
Staurotypidae	3	1	1	1	—
Subtotals	**17**	**6**	**3**	**5**	**3**
Totals	**219**	**7**	**28**	**59**	**125**
Sum Totals	**326**	**8**	**32**	**97**	**189**

The IUCN System

In a fashion similar to that used for the herpetofaunas of Michoacán (Alvarado-Díaz et al., 2013) and Oaxaca (Mata-Silva et al., 2015), we applied the IUCN categorizations to slightly more than seven-tenths of the members of the Chiapan herpetofauna (Tables 7, 10). This situation was made possible by the completion of the Global Amphibian Assessment in 2004 (Stuart et al., 2010) and the Mexican portion of the Global Reptile Assessment in 2007 (www.natureserve.org/sites/default/files/projects/files/reptile_assessment_fact- sheet_low1_0; accessed 24 April 2015).

A summary of these data (Table 10) demonstrates that 227 of 326 native species (69.6%) have been placed into one of the six IUCN categories, exempting the Extinct and Extinct in the Wild categories because they do not apply to members of the Chiapan herpetofauna. The absolute and relative values for the species placed in these six categories are as follows: CR = 20 (6.1%); EN = 22 (6.7%); VU = 24 (7.4%); NT = 16 (4.9%), LC = 122 (37.4%);

and DD = 23 (7.1%). The proportional values are similar to those for the Oaxacan herpetofauna (Mata-Silva, et al., 2015), as follows: CR = 36 (8.2%); EN = 33 (7.5%); VU = 33 (7.5%); NT = 17 (3.9%); LC = 173 (39.3%); and DD = 53 (12.0%). This resemblance was more apparent when we combined these categories with those for the NE species, and organized them into the three summary categories (see Table 10) as follows (data for Oaxaca follow those for Chiapas): CR + EN + VU = 66 (20.2%), 102 (23.2%); NT + LC = 138 (42.3%), 190 (43.2%); DD + NE = 122 (37.4%), 148 (33.6%). The reason(s) for these proportional resemblances are not immediately evident, but if due to coincidence they are not of much interest. If not, however, there might be something more interesting to consider. To examine this question further, we reviewed the data presented for the Michoacán herpetofauna by Alvarado-Díaz et al. (2013). These data are as follows: CR + EN + VU = 27 (12.7% of 212 species); NT + LC = 131 (61.8%); DD + NE = 54 (25.5%). These values are not especially close to those for Chiapas and Oaxaca, so perhaps the resemblance between these two is coincidental.

Table 10. IUCN Red List categorizations for herpetofaunal families in Chiapas, Mexico. Non-native species are excluded. The shaded columns to the left are the "threat categories," and those to the right 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.

Families	Number of Species	IUCN Red List Categorizations						
		Critically Endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data Deficient	Not Evaluated
Bufonidae	11	—	2	1	1	7	—	—
Centrolenidae	1	—	—	—	—	1	—	—
Craugastoridae	18	4	2	4	1	3	4	—
Eleutherodactylidae	3	—	—	2	—	1	—	—
Hylidae	33	8	6	3	3	12	1	—
Leptodactylidae	3	—	—	—	—	3	—	—
Microhylidae	4	—	—	1	—	3	—	—
Ranidae	5	—	—	1	—	3	—	1
Rhinophrynidae	1	—	—	—	—	1	—	—
Subtotals	**79**	**12**	**10**	**12**	**5**	**34**	**5**	**1**
Plethodontidae	25	5	7	4	3	5	1	—
Subtotals	**25**	**5**	**7**	**4**	**3**	**5**	**1**	**—**
Dermophiidae	3	—	—	1	—	—	2	—
Subtotals	**3**	**—**	**—**	**1**	**—**	**—**	**2**	**—**
Totals	**107**	**17**	**17**	**17**	**8**	**39**	**8**	**1**
Alligatoridae	1	—	—	—	—	1	—	—
Crocodylidae	2	—	—	1	—	1	—	—
Subtotals	**3**	**—**	**—**	**1**	**—**	**2**	**—**	**—**
Anguidae	10	—	1	—	1	5	3	—
Corytophanidae	6	—	—	—	—	1	—	5
Dactyloidae	22	—	2	1	—	3	2	14
Eublepharidae	1	—	—	—	—	—	—	1
Gymnophthalmidae	1	—	—	—	—	—	—	1
Helodermatidae	2	—	—	—	—	1	—	1
Iguanidae	4	—	—	—	—	1	—	3
Mabuyidae	1	—	—	—	—	—	—	1
Phrynosomatidae	15	—	—	—	—	10	—	5
Phyllodactylidae	2	—	—	—	—	—	—	2
Scincidae	2	—	—	—	—	1	—	1
Sphaerodactylidae	3	—	—	—	—	—	—	3
Sphenomorphidae	3	—	—	—	—	1	—	2
Teiidae	9	—	—	—	—	3	1	5
Xantusiidae	5	—	1	—	—	—	2	2
Xenosauridae	1	—	—	—	—	—	—	1

Subtotals	**87**	**—**	**4**	**1**	**1**	**26**	**8**	**47**
Boidae	1	—	—	—	—	—	—	1
Charinidae	1	—	—	—	—	—	—	1
Colubridae	33	—	—	1	—	17	2	13
Dipsadidae	46	—	—	—	—	23	4	19
Elapidae	8	—	—	—	—	6	1	1
Leptotyphlopidae	1	—	—	—	—	—	—	1
Loxocemidae	1	—	—	—	—	—	—	1
Natricidae	6	—	—	—	—	4	—	2
Sibynophiidae	1	—	—	—	—	—	—	1
Viperidae	14	—	—	2	1	5	—	6
Subtotals	**112**	**—**	**—**	**3**	**1**	**55**	**7**	**46**
Cheloniidae	3	1	1	1	—	—	—	—
Chelydridae	1	—	—	1	—	—	—	—
Dermatemydidae	1	1	—	—	—	—	—	—
Dermochelyidae	1	1	—	—	—	—	—	—
Emydidae	2	—	—	—	—	—	—	2
Geoemydidae	3	—	—	—	2	—	—	1
Kinosternidae	3	—	—	—	1	—	—	2
Staurotypidae	3	—	—	—	3	—	—	—
Subtotals	**17**	**3**	**1**	**2**	**6**	**—**	**—**	**5**
Totals	**219**	**3**	**5**	**7**	**8**	**83**	**15**	**98**
Sum Totals	**326**	**20**	**22**	**24**	**16**	**122**	**23**	**99**
Category Totals	**—**	**66**			**138**		**122**	

Rhadinella kanalchutchan (Mendelson and Kizirian, 1995). This dipsadid snake is endemic to Chiapas, where it is restricted to the Central Plateau physiographic region at elevations from 2,300 to 2,700 m. Its EVS has been calculated as 16, placing it in the middle portion of the high vulnerability category. This snake has been judged as Data Deficient by the IUCN, and as a species of special protection by SEMARNAT. This individual was encountered at Parque San José in Zinacantán, in the municipality of Zinacantán. © Daniel Pineda-Vera

Alvarado-Díaz et al. (2013), Wilson et al. (2013a, b), and Mata-Silva et al. (2015) demonstrated that those who employ the IUCN methodology allocate a large proportion of any group of herpetofaunal species in Mexico to the LC category. As indicated above, 122 of the 326 native species in Chiapas (37.4%) are placed in this category (Table 10). With regard to the DD category, compared to the situation in Oaxaca (with 53 species; Mata-Silva et al., 2015), only 23 species in Chiapas are assigned to this category; the proportion also is lower (7.1% vs. 12.9%). A critique of these categories was presented in the above-mentioned references, as well as in Howard and Bickford (2014).

A relatively large segment of the Chiapan herpetofauna (99 species; 30.4%) has not been evaluated by the IUCN. Given the lack of a conservation assessment for the native Chiapan herpetofauna, we examined these species more closely to ascertain their status using the IUCN criteria (see below).

The EVS System

Wilson and McCranie (1992) developed the Environmental Vulnerability Score (EVS) to provide a means for assessing the conservation status of amphibian species in Honduras. McCranie and Wilson (2002) revisited this measure, and Wilson and McCranie (2004) subsequently expanded it to deal with the entire herpetofauna of the country, except for the marine species.

The EVS measure was designed for use with the data available on herpetofaunal species when conducting general survey work. Due to the financial and temporal constraints under which this work occurred, at that time it was impossible to invest the necessary time and money to conduct the population analyses on which the IUCN system depends. The idea was to develop a means for providing information on conservation status, rather than reporting nothing at all about what was emerging to be a highly significant component of the Central American herpetofauna (Wilson and McCranie, 2004; Townsend and Wilson, 2010; Wilson et al., 2012). This level of significance has been increasing, primarily as a result of fieldwork in poorly known regions (Townsend et al., 2012), which has led to discovery of undescribed taxa (Townsend et al., 2013a, b) and the uncovering of cryptic species based on molecular systematic analyses (Townsend et al., 2011; Townsend et al., 2013b). These factors also pertain to studies on the herpetofauna of Mexico, especially the herpetofaunally rich but understudied southern portion of the country.

Atropoides occiduus (Hoge, 1966). The Guatemalan Jumping Pitviper is relatively broadly distributed in Mesoamerica, occurring from the state of Chiapas, Mexico, to western El Salvador. In Chiapas, this snake is known from only the Sierra Madre de Chiapas. Its EVS has been calculated as 15, placing it in the lower portion of the high vulnerability category. This species remains unevaluated by the IUCN, and has not been provided a status by SEMARNAT. This individual was found in the Reserva de la Biósfera El Triunfo, in the municipality of Mapastepec. © Elí García Padilla

The EVS measure has been applied to state-level portions of the herpetofauna of Mexico (Alvarado-Díaz et al., 2013; Mata-Silva et al., 2015), as well as to the entire herpetofauna of the country (Wilson et al., 2013a, b). Herein we employ it again to examine the conservation status of the Chiapan herpetofauna.

Wilson et al. (2013a, b) modified the EVS criteria for use in Mexico, and as with our work on the Oaxacan herpetofauna (Mata-Silva et al., 2015) we applied this measure to the Chiapan herpetofauna (Tables 7, 11). The EVS scores range from 3 to 19 (Table 11), which is one value shy of the total possible range (3–20). Thus, no species in Chiapas was assessed a score of 20. The most common EVS scores (for 30 or more species) are 10 (34), 11 (32), 12 (35), 13 (34), and 15 (33). We assigned these scores to a total of 168 species, 52.5% of the 320 species for which an EVS can be calculated (Table 11). At the lower extreme of the range, we determined an EVS of 3 for three species of anurans, one each in the families Bufonidae (*Rhinella marina*), Hylidae (*Smilisca baudinii*), and Ranidae (*Lithobates forreri*). At the upper end of the range, we provided a score of 19 for one species, *Cerrophidion tzotzilorum*, which is endemic to Chiapas (Table 7).

We divided the range of scores for members of the Chiapan herpetofauna into three categories (Table 11): low (3–9); medium (10–13); and high (14–18). Unlike similar studies (e.g., Alvarado-Díaz et al., 2013; Mata-Silva et al., 2015), the EVS did not increase from low through medium to high, but rather increased from low to medium (97 and 135, respectively), and then decreased to the lowest number at the high level (88; Table 11). This pattern differs from that reported for the Oaxacan herpetofauna (Mata-Silva et al., 2015), as well as for the entire Mexican herpetofauna (Wilson et al., 2013a, b). The scores for all of Mexico were as follows: low, 149 (12.3%), medium, 375 (30.9%); and high, 690 (56.8%); and, those for Oaxaca were: low, 103 (23.6%); medium 133 (30.6%); and high, 199 (45.7%). The reasons for this departure from an increasing pattern of EVS scores for the Chiapan herpetofauna are obvious, especially when comparing the results from Chiapas with those of neighboring Oaxaca. The herpetofauna of Chiapas contains fewer endemics, especially at the state level, and more non-endemic species, as a result of its lengthy shared border with Guatemala. The number of state-level endemics in Chiapas is 25 (7.6% of the total of 330; Table 8), whereas in Oaxaca the number is 93 (21.0% of the total of 442; Mata-Silva et al., 2015). The values for the country-level endemics, i.e., the species endemic to Mexico but not to the state in question, are 33 (10.0%) for Chiapas and 164 (37.1%) for Oaxaca. The additive figures for Chiapas and Oaxaca are, respectively, 58 (17.6% of the total) and 257 (58.1%). Thus, the respective figures for non-endemic species are 268 (81.2%) and 183 (41.4%).

Because of the relatively long border that Chiapas shares with Guatemala, we expected a greater resemblance between the herpetofaunas of these two areas as opposed to between Oaxaca and Guatemala. Acevedo et al. (2010) examined the composition and conservation status of the Guatemalan herpetofauna, and reported 387 species from the country. Since then 29 species have been described as new or added to the country's herpetofauna (Johnson, et al., 2015), bringing the total to 416. Of the 326 native species known from Chiapas, 256 (78.5%) are recorded from Guatemala (Acevedo et al., 2010; Johnson et al., 2015). The high degree of resemblance between these two faunas led to one of our recommendations in the following section (q.v.).

Table 11. Environmental Vulnerability Scores (EVS) for the herpetofauna of Chiapas, Mexico, arranged by family. Shaded area to the left encompasses low vulnerability scores, and the one to the right high vulnerability scores. Non-native and marine species are excluded.

Families	Number of Species	Environmental Vulnerability Scores																
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Bufonidae	11	1	—	—	1	1	1	2	1	3	—	1	—	—	—	—	—	—
Centrolenidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Craugastoridae	18	—	—	—	—	—	—	1	1	1	1	2	2	6	—	1	3	—
Eleutherodactylidae	3	—	—	—	—	—	—	—	—	1	1	—	—	1	—	—	—	—
Hylidae	33	1	2	—	—	3	3	4	3	4	5	3	2	2	1	—	—	—
Leptodactylidae	3	—	—	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—
Microhylidae	4	—	1	—	—	1	1	—	1	—	—	—	—	—	—	—	—	—
Ranidae	5	1	—	1	—	—	1	1	—	—	1	—	—	—	—	—	—	—
Rhinophrynidae	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Subtotals	**79**	**3**	**3**	**2**	**2**	**6**	**7**	**8**	**7**	**9**	**8**	**6**	**4**	**9**	**1**	**1**	**3**	**—**

Plethodontidae	25	—	—	—	—	—	—	1	—	2	2	2	2	10	2	2	2	—
Subtotals	**25**	—	—	—	—	—	—	**1**	—	**2**	**2**	**2**	**2**	**10**	**2**	**2**	**2**	—
Dermophiidae	3	—	—	—	—	—	—	—	—	1	1	—	—	—	1	—	—	—
Subtotals	**3**	—	—	—	—	—	—	—	—	**1**	**1**	—	—	—	**1**	—	—	—
Totals	**107**	**3**	**3**	**2**	**2**	**6**	**7**	**9**	**7**	**12**	**11**	**8**	**6**	**19**	**4**	**3**	**5**	—
Alligatoridae	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
Crocodylidae	2	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—
Subtotals	**3**	—	—	—	—	—	—	—	—	—	—	**1**	**1**	—	**1**	—	—	—
Anguidae	10	—	—	—	1	—	—	1	—	—	—	1	1	1	1	2	2	—
Corytophanidae	6	—	—	—	—	1	1	1	—	2	—	1	—	—	—	—	—	—
Dactyloidae	22	—	—	—	—	1	1	3	3	—	2	5	—	5	2	1	—	—
Eublepharidae	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Gymnophthalmidae	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Helodermatidae	2	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
Iguanidae	4	—	—	—	—	—	1	—	—	—	2	—	—	1	—	—	—	—
Mabuyidae	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Phrynosomatidae	15	—	—	1	1	—	—	1	—	4	4	2	—	2	—	—	—	—
Phyllodactylidae	2	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—
Scincidae	2	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—
Sphaerodactylidae	3	—	—	—	—	—	—	—	1	1	1	—	—	—	—	—	—	—
Sphenomorphidae	3	—	—	—	—	—	—	—	2	—	1	—	—	—	—	—	—	—
Teiidae	9	—	—	—	—	—	1	—	—	1	3	3	1	—	—	—	—	—
Xantusiidae	5	—	—	—	—	—	2	—	—	1	—	—	—	—	2	—	—	—
Xenosauridae	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Subtotals	**87**	—	—	**1**	**3**	**2**	**7**	**8**	**7**	**11**	**14**	**12**	**3**	**9**	**5**	**3**	**2**	—
Boidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Charinidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Colubridae	33	—	—	2	7	2	3	5	5	—	2	1	3	2	1	—	—	—
Dipsadidae	46	—	—	3	2	3	5	5	7	4	5	6	4	—	1	1	—	—
Elapidae	6	—	—	—	—	—	2	—	—	1	—	2	—	—	—	1	—	—
Leptotyphlopidae	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Loxocemidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Natricidae	6	—	—	—	—	3	—	—	2	—	—	1	—	—	—	—	—	—
Sibynophiidae	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Viperidae	14	—	—	—	—	—	—	—	1	2	3	—	3	2	2	—	—	1
Subtotals	**110**	—	**1**	**5**	**9**	**8**	**10**	**10**	**18**	**8**	**10**	**10**	**10**	**4**	**4**	**2**	—	**1**
Chelydridae	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Dermatemydidae	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
Emydidae	2	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—
Geoemydidae	3	—	—	—	—	—	1	—	—	—	—	1	1	—	—	—	—	—
Kinosternidae	3	—	—	—	—	—	—	—	2	1	—	—	—	—	—	—	—	—
Staurotypidae	3	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—	—
Subtotals	**13**	—	—	—	—	—	**1**	—	**2**	**1**	—	**3**	**3**	**1**	—	**2**	—	—
Totals	**213**	—	**1**	**6**	**12**	**10**	**18**	**18**	**27**	**20**	**24**	**26**	**17**	**14**	**10**	**7**	**2**	**1**
Sum Totals	**320**	**3**	**4**	**8**	**14**	**16**	**25**	**27**	**34**	**32**	**35**	**34**	**23**	**33**	**14**	**10**	**7**	**1**
Sum Totals%	—	**0.9**	**1.3**	**2.5**	**4.4**	**5.0**	**7.8**	**8.4**	**10.6**	**10.0**	**10.9**	**10.6**	**7.2**	**10.3**	**4.4**	**3.1**	**2.2**	**0.3**
Category Totals		**Low—97**							**Medium—135**				**High—88**					

Using the same method as Wilson et al. (2013a, b) and Mata-Silva et al. (2015), we compared the EVS and IUCN categorizations for the Chiapan herpetofauna (Table 12). The data in this table indicate that only 42.0% (37 of 88) of the high vulnerability species are placed in one of the three IUCN threat categories. This percentage is comparable to that of the Oaxacan herpetofauna (37.4%; Mata-Silva et al., 2015). At the other extreme of the fully assessed IUCN categories (the LC category), 120 species constitute 1.3 times the number of low vulnerability species (96). This value is less than the comparable one for the Oaxacan herpetofauna, which is 1.7 times (Mata-Silva et al., 2015).

The EVS for 23 DD species ranges from 10 to 18 (Table 12), as follows: 10, 1 species (4.3%); 11, 2 (8.7%); 12, 1 (4.3%); 13, 1 (4.3%); 14, 2 (8.7%); 15, 5 (21.7%); 16, 5 (21.7%); 17, 3 (13.0%); 18, 3 (13.0%). The EVS for 18 of these species (78.3%) indicates high vulnerability, and for the other five medium vulnerability (21.7%).

Table 12. Comparison of Environmental Vulnerability Scores (EVS) and IUCN categorizations for members of the herpetofauna of Chiapas, Mexico. Shaded area at the top encompasses low vulnerability category scores, and the one at the bottom high vulnerability category scores.

EVS	IUCN Categories							Totals
	Critically Endangered	Endangered	Vulnerable	Near Threatened	Least Concern	Data Deficient	Not Evaluated	
3	—	—	—	—	3	—	—	3
4	—	—	—	—	3	—	1	4
5	—	—	—	—	3	—	5	8
6	—	—	—	—	7	—	7	14
7	1	—	—	—	9	—	6	16
8	—	—	1	1	16	—	6	24
9	1	1	1	1	11	—	12	27
10	1	2	1	—	11	1	18	34
11	1	—	5	2	11	2	11	32
12	3	1	2	3	13	1	12	35
13	1	3	—	5	11	1	13	34
14	—	2	5	3	9	2	2	23
15	5	6	4	1	7	5	5	33
16	1	3	1	—	3	5	—	13
17	2	1	2	—	2	3	—	10
18	2	2	1	—	—	3	—	8
19	—	—	—	—	1	—	—	1
Totals	**18**	**21**	**23**	**16**	**120**	**23**	**98**	**319**

As with the Oaxacan species (Mata-Silva et al., 2015), we attempted to determine why the 23 Chiapan species involved (five anurans, one salamander, two caecilians, eight lizards, and seven snakes) are placed in the IUCN DD category by pulling the EVS calculations provided by Wilson et al. (2013a, b) and placing them in Table 13. Since the IUCN system is widely used, we tried to determine where these species might be allocated if they were removed from the DD category. Based on the data in Table 13, these species apparently were placed in this category because of their limited geographic and ecological distributions. The scores for the geographic component of the EVS range from 4 to 6, indicating that these are species that are limited in distribution both inside and outside of Mexico (with most of the range confined to areas close to the southern border of Mexico and Guatemala; a component score of 4), limited to an area within Mexico not confined to the type locality (component score of 5), or limited to the vicinity of the type locality (component score of 6). The relative numbers of species with these scores are as follows: 4 (9, 39.1%); 5 (4, 17.4%); and 6 (10, 43.5%). Considered in concert, the geographic distribution component scores for these species fall within the upper half of the entire range of scores (1–6), indicating their relatively limited occurrence. The scores for the ecological distribution component of the EVS range from 3 to 8, demonstrating that these species are known from as few as a single forest formation to as many as six (Wilson et al., 2013a, b). The relative numbers of species with these scores are as follows: 3 (1, 4.3%); 4 (2, 8.7%); 5 (1, 4.3%); 6 (3, 13.0%); 7 (6, 26.1%); and 8 (10, 43.5%). Most of these 23 species, therefore, are known from only one or two forest formations (16,

69.6%). Individually considered, almost any of these distributional features would be enough to place almost all of these species in one of the three threat categories or the NT category. In concert, these features should reinforce their position in one of the threat categories or the NT category. The combinations of these two features are as follows (with the relative numbers indicated in parentheses): 4/4 (1, 4.3%); 4/5 (1, 4.3%); 4/6 (2, 8.7%); 4/7 (4, 17.4%); 4/8 (1, 4.3%); 5/3 (1, 4.3%); 5/4 (1, 4.3%); 5/6 (1, 4.3%); 5,7 (1, 4.3%); 6/7 (1, 4.3%); and 6/8 (9, 39.1%). The most substantial number of these species (13, 56.5%), therefore, are distributed narrowly both inside and outside of Mexico and occupy two forest formations (the four 4/7 species), or are known only from the type locality and one forest formation (the nine 6/8 species). We suggest that the nine 6/8 species should be placed in the CR category, the one 5/7 species in the EN category, and the four 4/7 species in the VU category, and that the other nine species should be allocated to one of the three threat categories (e.g., *Tantilla tayrae*), the NT category (e.g., *Craugastor pelorus*), or the LC category (e.g., *Adelphicos quadrivirgatum*).

Bothriechis bicolor (Bocourt, 1868). Despite its common name, the Guatemalan Palm Pitviper also occurs in Mexico, ranging northwestward from Guatemala into the Sierra Madre de Chiapas physiographic region. Its EVS has been estimated as 14, placing it in the lower portion of the high vulnerability category. This snake has been allocated to the Least Concern category by the IUCN, but is judged as threatened by SEMARNAT. This individual was found in the Reserva de la Biósfera El Triunfo, in the municipality of Ángel Albino Corzo, and was photographed at the Zoológico Regional Miguel Álvarez del Toro. © Elí García Padilla, courtesy of Antonio Ramírez-Velázquez

Table 13. Environmental Vulnerability Scores for members of the herpetofauna of Chiapas, Mexico, allocated to the IUCN Data Deficient category.

Taxa	Environmental Vulnerability Score			
	Geographic Distribution	Ecological Distribution	Reproductive Mode/Degree of Persecution	Total Score
Craugastor amniscola	4	6	4	14
Craugastor palenque	4	7	4	15
*Craugastor pelorus***	5	6	4	15
*Craugastor taylori***	6	8	4	18
*Exerodonta bivocata***	6	8	1	15
Bolitoglossa stuarti	4	7	4	15
*Dermophis oaxacae**	5	3	4	12
Gymnopis syntrema	4	7	5	16
*Abronia leurolepis***	6	8	4	18
Abronia ochoterenai	4	8	4	16
*Abronia ramirezi***	6	8	4	18
*Norops alvarezdeltoroi***	6	8	3	17
Norops cristifer	4	6	3	13
Holcosus chaitzami	4	7	3	14
*Lepidophyma chicoasensis***	6	8	2	16
*Lepidophyma tuxtlae**	5	4	2	11
*Tantilla johnsoni***	6	8	2	16
*Tantilla tayrae***	6	7	2	15
Adelphicos quadrivirgatum	4	4	2	10
*Coniophanes alvarezi***	6	8	3	17
Rhadinella hannsteini	4	5	2	11
*Rhadinella kanalchutchan***	6	8	2	16
*Micrurus bogerti**	5	7	5	17

To ascertain why such a large proportion of the native herpetofauna of Chiapas remains unevaluated by the IUCN (99 species, 30.5% of total of 325) we used data from the EVS calculations provided by Wilson et al. (2013a, b; see Table 14). As with the DD species, we examined the geographic and ecological distributions of these 99 species. Only two of these species are endemic to Mexico (*Ctenosaura pectinata* and *Holcosus stuarti*), thus resulting in geographic distribution scores of 5. The rest of the component scores range from 1 to 4, as follows: 1 (26, 26.3%); 2 (13, 13.1%); 3 (33, 33.3%); and 4 (25, 25.3%). Most of these species are distributed widely outside or inside of Mexico, or both. With respect to ecological distribution, the component scores range from 1 to 8, as follows: 1 (11, 11.1%); 2 (12, 12.1%); 3 (19, 19.2%); 4 (18, 18.2%); 5 (20, 20.2%); 6 (15, 15.2%); 7 (1, 1.0%); and 8 (3, 3.0%). Only four of these 99 species are limited to one or two forest formations (4.0%); the remaining 95 are distributed in from three to eight, or more (96.0%). We found 27 combinations of these two features; the most common ones (in five or more species) are 1/1 (7), 1/3 (6), 1/5 (6), 3/3 (7), 3/4 (8), 3/5 (8), 4/3 (5), 4/5 (5), and 4/6 (9), which accounts for 61 of the 99 species. Based on the accounting of the data in Table 14, evidently almost all of these species (97 of 99, 98.0%) have not been evaluated by the IUCN because they also occur in Central America (or farther south) and their assessment must await the results of a workshop held in 2012 at Palo Verde, Costa Rica, as well as the outcome of other workshops. The total EVS scores for these NE species range from 4 to 19, close to the entire range (3–20). When organized into the three categories of vulnerability, the values are as follows: low, 41 (41.4%); medium, 50 (50.5%); high, 8 (8.1%). Based on these figures, we anticipate that most of these species, at least those in the low and medium EVS categories, eventually will be allocated to the LC category.

Table 14. Environmental Vulnerability Scores for members of the herpetofauna of Chiapas, Mexico, currently not evaluated (NE) by the IUCN. Non-native taxa are not included. * = species endemic to Mexico.

Taxa	Environmental Vulnerability Score			
	Geographic Distribution	Ecological Distribution	Reproductive Mode/Degree of Persecution	Total Score
Lithobates brownorum	4	3	1	8
Basiliscus vittatus	1	3	3	7
Corytophanes cristatus	3	5	3	11
Corytophanes hernandesii	4	6	3	13
Corytophanes percarinatus	4	4	3	11
Laemanctus longipes	1	5	3	9
Norops beckeri	3	6	3	12
Norops biporcatus	3	4	3	10
Norops capito	3	6	3	12
Norops crassulus	3	4	3	10
Norops dollfusianus	4	6	3	13
Norops laeviventris	3	3	3	9
Norops lemurinus	3	2	3	8
Norops matudai	4	6	3	13
Norops petersii	2	4	3	9
Norops rodriguezii	4	3	3	10
Norops serranoi	4	5	3	12
Norops tropidonotus	4	2	3	9
Norops uniformis	4	6	3	13
Norops unilobatus	1	3	3	7
Coleonyx elegans	2	3	4	9
Gymnophthalmus speciosus	3	3	3	9
Heloderma alvarezi	4	6	5	15
Ctenosaura acanthura	2	4	6	12
*Ctenosaura pectinata**	5	4	6	15
Iguana iguana	3	3	6	12
Marisora brachypoda	1	2	3	6
Phrynosoma asio	2	6	3	11
Sceloporus acanthinus	3	7	3	13
Sceloporus prezygous	4	8	3	15
Sceloporus squamosus	3	5	3	11
Sceloporus variabilis	1	1	3	5
Phyllodactylus tuberculosus	1	4	3	8
Thecadactylus rapicauda	3	4	3	10
Plestiodon sumichrasti	4	5	3	12
Gonatodes albogularis	3	5	3	11
Sphaerodactylus continentalis	4	3	3	10
Sphaerodactylus glaucus	4	5	3	12
Sphenomorphus assatus	2	2	3	7
Sphenomorphus cherriei	3	2	3	8
Holcosus festivus	3	5	3	11
Holcosus hartwegi	4	5	3	12
Holcosus parvus	4	6	3	13
*Holcosus stuarti**	5	5	3	13
Holcosus thomasi	4	6	3	13
Lepidophyma flavimaculatum	1	5	2	8
Lepidophyma smithii	2	4	2	8
Xenosaurus rackhami	4	4	3	11
Boa imperator	3	1	6	10

Ungaliophis continentalis	3	5	2	10
Drymobius margaritiferus	1	1	4	6
Ficimia publia	4	3	2	9
Lampropeltis abnorma	1	3	5	9
Leptophis ahaetulla	3	3	4	10
Masticophis mentovarius	1	1	4	6
Oxybelis aeneus	1	1	3	5
Oxybelis fulgidus	3	2	4	9
Senticolis triaspis	2	1	3	6
Spilotes pullatus	1	1	4	6
Stenorrhina degenhardtii	3	3	3	9
Stenorrhina freminvillii	1	2	4	7
Tantilla vulcani	4	6	2	12
Trimorphodon biscutatus	2	1	4	7
Amastridium sapperi	4	4	2	10
Clelia scytalina	4	5	4	13
Coniophanes bipunctatus	1	5	3	9
Coniophanes fissidens	1	3	3	7
Enulius flavitorques	1	1	3	5
Imantodes cenchoa	1	3	2	6
Imantodes gemmistratus	1	3	2	6
Leptodeira septentrionalis	2	2	4	8
Ninia sebae	1	1	2	4
Oxyrhopus petolarius	3	6	5	14
Rhadinaea decorata	1	6	2	9
Rhadinella godmani	3	5	2	10
Rhadinella posadasi	4	8	2	14
Sibon nebulatus	1	2	2	5
Tretanorhinus nigroluteus	3	5	2	10
Tropidodipsas fasciata	5	4	4	13
Tropidodipsas fischeri	4	3	4	11
Tropidodipsas sartorii	2	2	5	9
Xenodon rabdocephalus	3	5	5	13
Micrurus nigrocinctus	3	3	5	11
Epictia phenops	2	1	1	4
Loxocemus bicolor	1	5	4	10
Thamnophis marcianus	1	5	4	10
Thamnophis proximus	1	2	4	7
Scaphiodontophis annulatus	1	5	5	11
Atropoides mexicanus	3	4	5	12
Atropoides occiduus	4	6	5	15
Bothriechis schlegelii	3	4	5	12
Bothrops asper	3	4	5	12
Cerrophidion godmani	3	3	5	11
Crotalus simus	3	2	5	10
Trachemys grayi	3	6	6	15
Trachemys ornata	5	8	6	19
Rhinoclemmys pulcherrima	1	4	3	8
Kinosternon leucostomum	3	4	3	10
Kinosternon scorpioides	3	4	3	10

A sizable number of herpetofaunal species in Chiapas already have been allocated to the LC category (120, 36.9% of the 325 native species). Whether these species should be accorded the limited attention given to the LC species (according to the IUCN criteria, they are of *least* concern), we placed them in Table 15, along with the calculations for their EVS scores (except for *Hydrophis platurus*, for which an EVS cannot be calculated). The EVS

scores in this table range from 3 to 19, the entire range seen for members of the Chiapan herpetofauna (Table 7). The absolute and relative numbers of EVS values in the LC category are as follows: 3 (3, 2.5%); 4 (3, 2.5%); 5 (3, 2.5%); 6 (7, 5.8%); 7 (9, 7.5%); 8 (16, 13.3%); 9 (11, 9.2%); 10 (10; 8.3%); 11 (13, 10.8%); 12 (13, 10.8%); 13 (11, 9.2%); 14 (8, 6.7%); 15 (7, 5.8%); 16 (3, 2.5%); 17 (2, 1.7%); 18 (0, 0%); and 19 (1, 0.8%). We arranged the EVS scores into the following three categories of vulnerability: low, 52 (43.3%); medium, 47 (39.2%); high, 21 (17.5%). Based on the same supposition as in the previous paragraph, perhaps the 99 species in the low and medium categories should be allocated to the LC category, where they now reside, or to the NT category, but the 21 species falling into the high EVS category likely do not merit remaining in the LC category. These 21 species and their respective EVS calculations are as follows (* = endemic to Mexico; ** = endemic to Chiapas):

Anotheca spinosa (3 + 6 + 5 = 14)
*Bolitoglossa alberchi** (6 + 5 + 4 = 15)
Oedipina elongata (4 + 7 + 4 = 15)
Caiman crocodilus (3 + 7 + 6 = 16)
Abronia lythrochila (6 + 7 + 4 = 17)
*Abronia smithi*** (6 + 7 + 4 = 17)
*Celestus ennegrammus** (5 + 6 + 3 = 14)
*Norops anisolepis*** (5 + 7 + 3 = 15)
*Norops compressicauda** (5 + 7 + 3 = 15)
*Norops parvicirculatus*** (6 + 7 + 3 = 16)
*Sceloporus smithi** (5 + 7 + 3 = 15)
*Leptophis diplotropis** (5 + 5 + 4 = 14)
*Salvadora lemniscata** (5 + 6 + 4 = 15)
*Symphimus leucostomus** (5 + 6 + 3 = 14)
*Adelphicos nigrilatum*** (5 + 7 + 2 = 14)
Geophis immaculatus (4 + 8 + 2 = 14)
Atropoides olmec (4 + 6 + 5 = 15)
Bothriechis bicolor (4 + 5 + 5 = 14)
*Cerrophidion tzotzilorum*** (6 + 8 + 5 = 19)
*Porthidium dunni** (5 + 6 + 5 = 16)
Porthidium nasutum (3 + 6 + 5 = 14)

The most obvious features of these species are that most are limited in geographic distribution, ecological distribution, or both. Five of the 21 species are known only from the vicinity of their respective type localities, and 12 are endemic to Mexico (a total of 17, 80.9%; this number includes four that are endemic to Chiapas). Another four are restricted to areas near the border of Mexico and Guatemala. With respect to ecological distribution, two species are limited to a single forest formation, nine to two formations, and seven to three formations (a total of 18 species, 85.7%). In sum total, all 21 species are limited geographically, ecologically, or both. In our opinion, all of these species should be moved out of the LC category and placed into one of the three threat categories, as follows: CR (*Bolitoglossa alberchi*, *Abronia lythrochila*, *A. smithi*, *N. parvicirculatus*, and *Cerrophidion tzotzilorum*); EN (*Celestus ennegrammus*, *Norops anisolepis*, *N. compressicauda*, *Sceloporus smithi*, *Salvadora lemniscata*, *Symphimus leucostomus*, *Adelphicos nigrilatum*, *Geophis immaculatus*, and *Porthidium dunni*); VU (*Anotheca spinosa*, *Oedipina elongata*, *Caiman crocodilus*, *Leptophis diplotropis*, *Atropoides olmec*, *Bothriechis bicolor*, and *Porthidium nasutum*). Whether these shifts in status within the IUCN system will occur remains to be seen, but until that time the EVS system can be used to gauge the amount of attention that should be placed on these members of the Chiapan herpetofauna.

Table 15. Environmental Vulnerability Scores for members of the herpetofauna of Chiapas, Mexico, assigned to the IUCN Least Concern category. Non-native taxa are not included. * = species endemic to Mexico; and ** = species endemic to Chiapas.

Taxa	Environmental Vulnerability Score			
	Geographic Distribution	Ecological Distribution	Reproductive Mode/Degree of Persecution	Total Score
Incilius bocourti	4	6	1	11
Incilius canaliferus	4	3	1	8
Incilius coccifer	3	5	1	9
Incilius luetkenii	3	3	1	7
*Incilius marmoreus**	5	5	1	11
Incilius valliceps	3	2	1	6
Rhinella marina	1	1	1	3
Hyalinobatrachium fleischmanni	3	4	3	10

Craugastor loki	2	4	4	10
*Craugastor rugulosus**	5	4	4	13
Craugastor rupinius	4	5	4	13
Eleutherodactylus pipilans	2	5	4	11
Agalychnis callidryas	3	5	3	11
Anotheca spinosa	3	6	5	14
Dendropsophus ebraccatus	3	6	3	12
Dendropsophus microcephalus	3	3	1	7
Dendropsophus robertmertensi	4	4	1	9
*Exerodonta sumichrasti**	5	3	1	9
Scinax staufferi	2	1	1	4
Smilisca baudinii	1	1	1	3
Tlalocohyla loquax	3	3	1	7
Tlalocohyla picta	2	5	1	8
Trachycephalus typhonius	1	2	1	4
Triprion petasatus	4	5	1	10
Engystomops pustulosus	3	2	2	7
Leptodactylus fragilis	1	2	2	5
Leptodactylus melanonotus	1	3	2	6
Gastrophryne elegans	2	5	1	8
Hypopachus ustus	2	4	1	7
Hypopachus variolosus	2	1	1	4
Lithobates forreri	1	1	1	3
Lithobates maculatus	3	1	1	5
Lithobates vaillanti	3	5	1	9
Rhinophrynus dorsalis	2	5	1	8
*Bolitoglossa alberchi**	6	5	4	15
Bolitoglossa mexicana	4	3	4	11
Bolitoglossa occidentalis	4	3	4	11
Bolitoglossa rufescens	1	4	4	9
Oedipina elongata	4	7	4	15
Caiman crocodilus	3	7	6	16
Crocodylus moreletii	2	5	6	13
Abronia lythrochila	6	7	4	17
*Abronia smithi***	6	7	4	17
*Celestus ennegrammus**	5	6	3	14
Gerrhonotus liocephalus	2	1	3	6
Mesaspis moreletii	3	3	3	9
Laemanctus serratus	2	3	3	8
*Norops anisolepis***	5	7	3	15
*Norops compressicauda**	5	7	3	15
*Norops parvicirculatus***	6	7	3	16
Heloderma horridum	2	4	5	11
Ctenosaura similis	1	4	3	8
Sceloporus carinatus	4	5	3	12
Sceloporus internasalis	4	4	3	11
Sceloporus melanorhinus	2	4	3	9
Sceloporus serrifer	2	1	3	6
Sceloporus siniferus	2	6	3	11
Sceloporus smaragdinus	4	5	3	12
*Sceloporus smithi**	5	7	3	15
Sceloporus taeniocnemis	4	5	3	12
Sceloporus teapensis	4	6	3	13
*Urosaurus bicarinatus**	5	4	3	12
Mesoscincus schwartzei	2	6	3	11
*Scincella gemmingeri**	5	3	3	11

Aspidoscelis deppii	1	4	3	8
*Aspidoscelis guttata**	5	4	3	12
Aspidoscelis motaguae	4	5	3	12
Coluber constrictor	1	6	3	10
Dendrophidion vinitor	3	7	3	13
Drymarchon melanurus	1	1	4	6
Drymobius chloroticus	1	3	4	8
*Leptophis diplotropis**	5	5	4	14
Leptophis mexicanus	1	1	4	6
Mastigodryas melanolomus	1	1	4	6
Phrynonax poecilonotus	3	4	3	10
Pituophis lineaticollis	2	2	4	8
Pseudelaphe flavirufa	2	4	4	10
*Salvadora lemniscata**	5	6	4	15
*Symphimus leucostomus**	5	6	3	14
Tantilla impensa	3	5	2	10
Tantilla rubra	2	1	2	5
Tantilla schistosa	3	3	2	8
Tantillita brevissima	4	3	2	9
Tantillita lintoni	4	6	2	12
*Adelphicos nigrilatum***	5	7	2	14
Adelphicos sargii	4	6	2	12
Coniophanes imperialis	2	3	3	8
Coniophanes piceivittis	1	3	3	7
Coniophanes quinquevittatus	4	6	3	13
Coniophanes schmidti	4	6	3	13
Conophis lineatus	2	3	4	9
Conophis vittatus	2	5	4	11
Geophis cancellatus	4	6	2	12
Geophis carinosus	2	4	2	8
Geophis immaculatus	4	8	2	14
*Geophis laticinctus**	5	4	2	11
Geophis nasalis	4	3	2	9
Geophis rhodogaster	3	7	2	12
Leptodeira frenata	4	4	4	12
Leptodeira maculata	2	1	4	7
Leptodeira nigrofasciata	1	3	4	8
*Manolepis putnami**	5	5	3	13
Ninia diademata	4	3	2	9
Pliocercus elapoides	4	1	5	10
Rhadinella kinkelini	4	6	2	12
Rhadinella lachrymans	4	2	2	8
Sibon dimidiatus	1	5	4	10
Micrurus browni	2	1	5	8
Micrurus diastema	2	1	5	8
Micrurus elegans	4	4	5	13
Micrurus latifasciatus	4	4	5	13
Nerodia rhombifer	1	5	4	10
Storeria dekayi	1	4	2	7
Thamnophis cyrtopsis	2	1	4	7
Thamnophis fulvus	4	5	4	13
Atropoides olmec	4	6	5	15
Bothriechis bicolor	4	5	5	14
*Cerrophidion tzotzilorum***	6	8	5	19
*Porthidium dunni**	5	6	5	16
Porthidium nasutum	3	6	5	14

RELATIVE HERPETOFAUNAL PRIORITY

Although the Chiapan herpetofauna is characterized largely by species shared with neighboring Guatemala, it still contains a sizable number of state and country-level endemics. The number of country-level endemics is 33, and that for the state-level ones is 25 (Table 8). Thus, a total of 58 species are endemic at the state and country levels (17.6% of the total herpetofauna). In our opinion, these 58 species demonstrate the greatest conservation significance, and should be the focus of any fundamental conservation plan.

According to Villalobos Sánchez (2013), about 16.9% of the total area of Chiapas is protected at the state or federal levels, including 21 federal natural areas (and one archeological monument), amounting to 1,187, 432 ha, and 24 state protected natural areas, encompassing 273, 216 ha. As far as we are aware, however, the herpetofaunal composition of most of these areas has not been studied.

To provide initial direction for such studies, we constructed two tables that demonstrate the Relative Herpetofaunal Priority (RHP) of seven physiographic regions in Chiapas. The RHP measure simply provides the rank order of a regional herpetofauna dependent on the absolute and relative numbers of the state and national endemic species. In Table 16 we indicate the number of the species in each of the four distribution categories we established (see Tables 7, 8), into which we placed the members of the Chiapan herpetofauna. The data in Table 16 demonstrate that endemism at the state and country level is highest in the Northern Highlands (28 species, 48.3% of the total of 58 species). Thus, the RHP of this region is the greatest. The remaining regions (and the size of their respective endemic herpetofaunal components) in rank order, from highest to lowest, are as follows: Sierra Madre de Chiapas (24 species, 41.4%); Central Plateau (18 species, 31.0%); Pacific Coastal Plain (11 species, 19.0%); Central Depression (10 species, 17.2%); Gulf Coastal Plain (5 species, 8.6%); and Eastern Highlands (1 species, 1.7%).

Table 16. Number of species in four distributional categories among the seven physiographic regions of Chiapas, Mexico. Rank determined by adding the state and country endemics.

Physiographic Regions	Non-endemics	Country Endemics	State Endemics	Non-natives	Totals	Rank Order
Gulf Coastal Plain	110	5	—	—	115	6
Northern Highlands	133	20	8	1	162	1
Eastern Highlands	131	—	1	2	134	7
Central Plateau	90	4	14	—	108	3
Central Depression	83	9	1	3	96	5
Sierra Madre de Chiapas	147	16	8	—	171	2
Pacific Coastal Plain	100	11	—	2	113	4

In Table 17 we summarize the absolute and relative numbers of the herpetofaunal species in the three EVS categories, i.e., low, medium, and high. Based on the total number of high category species, the most important region is the Sierra Madre de Chiapas, which contains the highest number (32, 18.9% of 169 species). The remaining regions (and the size of their respective high EVS species) in rank order, from highest to lowest, are as follows: Northern Highlands (30 species, 18.6% of 161 species); Central Plateau (26 species, 24.3% of 107 species); Eastern Highlands (13 species, 9.8% of 133 species); Pacific Costal Plain (11 species, 10.5% of 105 species); Gulf Coastal Plain (9 species, 7.8% of 115 species); and Central Depression (8 species, 8.6% of 93 species).

Table 17. Number of species in the three EVS categories among the seven physiographic regions of Chiapas, Mexico. Rank determined by the relative number of high EVS species. Marine and non-native species are excluded.

Physiographic Regions	Low	Medium	High	Totals	Rank Order
Gulf Coastal Plain	53	53	9	115	6
Northern Highlands	60	71	30	161	2
Eastern Highlands	56	64	13	133	4
Central Plateau	41	40	26	107	3
Central Depression	52	33	8	93	7
Sierra Madre de Chiapas	70	67	32	169	1
Pacific Coastal Plain	57	37	11	105	5

The rank orders indicated for the physiographic regions in Table 16 and those in Table 17 are similar but not the same, as indicated below (ranks for state and country endemics listed first, those for high EVS species second):

Gulf Coastal Plain (6, 6)
Northern Highlands (1, 2)
Eastern Highlands (7, 4)
Central Plateau (3, 3)
Central Depression (5, 7)
Sierra Madre de Chiapas (2, 1)
Pacific Coastal Plain (4, 5)

Based on these two simple measures, the RHP is greatest for the Northern Highlands and the Sierra Madre de Chiapas. The RHP is next highest for the Central Plateau, then the Pacific Coastal Plain and the Eastern Highlands, then lastly the Gulf Coastal Plain and the Central Depression. These measures, therefore, might provide a basic means of deciding how scarce conservation funds might best be utilized.

Recently, some efforts have been made to document herpetofaunal areas of significant conservation importance in Chiapas (Hernández-Ordóñez et al., 2015; Lamoreux et al., 2015). Hernández-Ordóñez et al. (2015) compiled a list of the herpetofauna of the Selva Lacandona, located primarily in the Eastern Highlands of the state (Fig. 1). These authors reported a total of 125 herpetofaunal species, 37.9% of the total for the state. Hernández-Ordóñez et al. (2015) also reported 40 range extensions into the previously understudied southeastern region of the rainforest. We organized the 125 reported species into the distributional categories used in this paper, indicating that 124 of these species are non-endemic (NE) and one (*Hemidactylus frenatus*) is a non-native. This categorization was expected, because the Lacandon rainforest borders Guatemala on its eastern front. The 125 species reported by Hernández-Ordóñez et al. (2015) also represents 91.9% of the 136 we record for all of the Eastern Highlands. We also applied the RHP measure, which indicates the lowest possible level because no state or country endemics were reported from Selva Lacandona.

Lamoreux et al. (2015: *xi*) pursued another approach for the conservation of the amphibian herpetofauna of Chiapas, focusing on the sites in Oaxaca and Chiapas that "hold the known range of one or more threatened species." Even though these authors admitted they were ill-equipped to carry out their planned survey of the identified Alliance for Zero Extinction (AZE) sites in these two states, their project was successful, as it allowed them to find 10 (possibly 11) of the 22 "highly threatened" species they sought, and provided them an opportunity to produce "well-informed overviews of the sites where they occur" (Lamoreux et al., 2015: *xii*). They also noted that (p. *xii*) "the potential for numerous amphibian species to go extinct in Oaxaca and Chiapas is high and worthy of being considered a major environmental problem in its own right…The montane forests of southern Mexico will never be the same if these species are allowed to disappear, and now is the time for someone or some group to take a chance on their survival." Of the eight sites surveyed by Lamoreux et al. (2015), only two major ones are located in Chiapas, at least in part; the remainder are in Oaxaca. These two regions are in the Chimalapas region and the region

around San Cristóbal de las Casas. The Chimalapas region contains portions held in dispute between communities in Oaxaca and Chiapas. Nonetheless, Lamoreux et al. (2015) found both species of *Ixalotriton* (*niger* and *parvus*) in the vicinity of Cerro Baúl, which we consider to be in Oaxaca (see above). Both taxa are AZE trigger species categorized as Critically Endangered by the IUCN. Both also were considered state endemics (*I. parvus* in Oaxaca, *I. niger* in Chiapas), but the latter species now has been reported from Oaxaca (Cerro Baúl), which changes its EVS because of the difference in distribution and occurrence within another vegetation formation. The EVS value for *I. niger* at this point is 5 (distribution in Mexico only, but not restricted to the type locality) + 7 (occurs in two vegetation formations) + 4 (eggs laid in moist situation on land or moist arboreal situations) = 16, which is two points lower than before (6 + 8 + 4 = 18; Wilson et al., 2013b), but still in the high vulnerability range (14–19).

Lamoreux et al. (2015) recommended, however, that the region around San Cristóbal de las Casas no longer be considered an amphibian AZE site because one of the trigger species, *Plectrohyla pycnochila*, could not be located and the other one, *Craugastor glaucus*, is too widespread to be considered a trigger species. Nonetheless, the authors encountered two other anurans of interest while surveying this area, i.e., *Plectrohyla acanthodes* and what they identified as a new species of the same genus. Apparently, the description of this new species is pending. The Lamoreux et al. (2015) study constitutes a limited start toward identifying present-day sites for species of conservation significance in Chiapas, but much more work is necessary for extending their approach to the remainder of the high-priority herpetofaunal species in Chiapas.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

A. The herpetofauna of Chiapas is the second largest of the states in Mexico, after that of Oaxaca. The 330 species comprise 26.4% of the 1,253 species now known from the country.

B. The level of herpetofaunal endemism in Chiapas also is fairly high. Of the 330 species, the distribution of 58 (17.6%) is limited to Mexico. Nonetheless, this percentage (60.4%, 757/1,253) still is only about one-third of that for the entire country, as a result of the considerable proportion of species shared with neighboring Guatemala and other areas of Nuclear Central America.

C. The number of herpetofaunal species among the seven physiographic regions we recognize ranges from 96 in the Central Depression to 171 in the Sierra Madre de Chiapas.

D. The species shared between pairs of physiographic regions ranges from 32 between the Central Plateau and the Pacific Coastal Plain to 112 between the Northern Highlands and the Eastern Highlands. The CBR values range from 0.29 between the Central Plateau and the Pacific Coastal Plain to 0.82 between the Gulf Coastal Plain and the Eastern Highlands.

E. The distributional status of the members of the Chiapan herpetofauna is as follows (in order of the size of the categories): non-endemic species (268, 81.2% of 330 species); country endemics (33, 10.0%); state endemics (25, 7.6%); and non-natives (4, 1.2%).

F. We employed the SEMARNAT, IUCN, and EVS systems to evaluate the conservation status of members of the Chiapan herpetofauna. The SEMARNAT system was of limited use in making such determinations, because only about 58% of the native members of the herpetofauna have been evaluated. Otherwise, only eight species are placed in the endangered category (P), 32 in the threatened category (A), and 97 in the special protection category (Pr).

G. Mata-Silva et al. (2015), Johnson et al. (2015), Howard and Bickford (2014), and Wilson et al. (2013a, b) have criticized the broadly implemented IUCN system for determining herpetofaunal conservation status. The principal reasons for this criticism are: (1) irrespective of the area in Mesoamerica examined, a sizable portion of the species involved have not been evaluated (we placed them in the NE category); (2) because the species are too poorly known to be placed into one of the fully-assessed categories, a considerable portion are allocated to the DD category; and (3) because the largest group of species is placed in the LC category, which generally includes a sizable number of species we believe should be placed in one of the three threat categories or the NT category. With the Chiapan herpetofauna, the category, number, and percentage of the 326 native species is as follows: NE (99, 30.4%); DD (23, 7.1%); and LC (122, 37.4%).

H. Wilson et al. (2013a, b) indicated that the EVS system adequately addresses the deficiencies of the SEMARNAT and IUCN systems. Once we assigned EVS scores to members of the Chiapan herpetofauna and partitioned them into low, medium, and high categories of vulnerability, the number of species in these categories increased from low (97, 30.3% of 320 species for which EVS scores can be calculated) to medium (135, 42.2%), and decreased to high (88, 27.5%). We believe the EVS system for analyzing conservation status can provide a usable and rapidly employable means for determining how generally scarce conservation funds should be allocated. We also believe this system is useful in areas where the significance of herpetofaunas is of interest and concern, especially where established or proposed protected areas are located but management plans have not been developed. Such activities should be carried out as soon as possible, given the rate that natural habitats in Chiapas are being anthropogenically transformed.

I. By using a simple measure called Relative Herpetofaunal Priority (RHP) that is based on the numbers of state and country endemics, we found the conservation importance of the herpetofaunas to be greatest for the Northern Highlands and the Sierra Madre de Chiapas, next greatest for the Central Plateau, then the Pacific Coastal Plain and the Eastern Highlands, and finally the Gulf Coastal Plain and the Central Depression.

Cerrophidion godmani (Günther, 1863). Godman's Montane Pitviper is distributed from southeastern Oaxaca, Mexico, to central Guatemala at elevations from 1,400 to 2,750 m. In Chiapas, this species is found in the Central Plateau and Sierra Madre de Chiapas physiographic regions. Its EVS has been determined as 11, placing it in the lower half of the medium vulnerability category. This species has not been evaluated by the IUCN, nor provided a status by SEMARNAT. This individual was found in the Reserva de la Biósfera El Triunfo, in the municipality of Ángel Albino Corzo. © Elí García Padilla

Recommendations

A. Given that more than three-quarters of the native species recorded from Chiapas are shared with Guatemala, conservation efforts for the Chiapan herpetofauna should be integrated extensively with those in Guatemala.

B. In view of the RHP of the seven physiographic regions of Chiapas, studies should be undertaken as quickly as possible to ascertain the herpetofaunal composition of all of the national and state level protected natural areas to determine the best allocation of limited conservation funds.

C. The principal reason why such work should be undertaken immediately is because habitat alteration in Chiapas is proceeding at an alarming rate, as a result of rising human population growth and the commensurate damage to natural systems it creates. Only effective human population control will allow for an alternative future.

Kanancax (a god of the Mayas-Lacandones from Nahá, Ocosingo, Chiapas) who is in charge of guarding the mountain, the trees, the nauyacas (vipers), and all the forest, lives near the Miramar lagoon. (English translation)

— Don Antonio Martínez Chan K´in (spiritual leader of the Maya-Lacandón de Nahá, Ocosingo, Chiapas)

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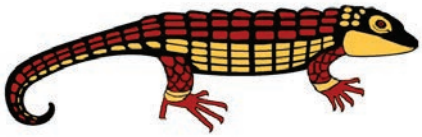

Jerry D. Johnson is Professor of Biological Sciences at The University of Texas at El Paso, and has extensive experience studying the herpetofauna of Mesoamerica, especially that of southern Mexico. Jerry is the Director of the 40,000-acre "Indio Mountians Research Station," was a co-editor on *Conservation of Mesoamerican Amphibians and Reptiles* and co-author of four of its chapters. He is 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 Geographic Distribution section of *Herpetological Review*. Johnson has authored or co-authored over 100 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*.

Vicente Mata-Silva is a herpetologist from Rio Grande, Oaxaca, Mexico. His interests include ecology, conservation, geographic distribution, and the monitoring of amphibians and reptiles in Mexico and the southwestern United States. His bachelor's thesis at the Universidad Nacional Autónoma de México (UNAM) compared herpetofaunal richness in Puebla, Mexico, in habitats with different degrees of human-related disturbance. Vicente's master's thesis focused primarily on the diet of two syntopic whiptail lizard species, one unisexual and the other bisexual, in the Trans-Pecos region of the Chihuahuan Desert. His dissertation was on the ecology of the rock rattlesnake, *Crotalus lepidus*, in the northern Chihuahuan Desert. To date, Vicente has authored or co-authored over 60 peer-reviewed scientific publications. Currently, he is a research fellow and lecturer at the University of Texas at El Paso, where his work focuses on the ecology of rattlesnake populations in a Chihuahuan Desert habitat, and also the Distribution Notes Section Editor for the journal *Mesoamerican Herpetology*.

Elí García Padilla is a herpetologist primarily focused on the study of the ecology and natural history of the Mexican herpetofauna. His research efforts have centered in the Mexican states of Baja California, Tamaulipas, Chiapas, and Oaxaca. His first experience in the field was researching the ecology of the insular endemic populations of the rattlesnakes *Crotalus catalinensis*, *C. muertensis*, and *C. tortugensis* in the Gulf of California. For his backelor's degree he presented a thesis on the ecology of *Crotalus muertensis* on Isla El Muerto, Baja California, Mexico. To date, he has authored or co-authored over 25 peer-reviewed scientific publications. Currently, he is employed as a formal Curator of Reptiles from Mexico in the electronic platform "Naturalista" of the Comisión Nacional para el Uso y Conocimiento de la Biodiversidad (CONABIO; www.naturalista.mx). One of his main passions is environmental education, and for several years he has been working on a variety of projects that include the use of audiovisual media as a powerful tool to reach large audiences and to promote the importance of the knowledge, protection, and conservation of the Mexican biodiversity. Elí's interests include wildlife and conservation photography, and his art has been published in several recognized scientific, artistic, and educational books, magazines, and websites.

Larry David Wilson is a herpetologist with lengthy experience in Mesoamerica. He has authored or co-authored over 315 peer-reviewed papers and books on herpetology, including two papers published in 2013 entitled "A conservation reassessment of the amphibians of Mexico based on the EVS measure" and "A conservation reassessment of the reptiles of Mexico based on the EVS measure" and one in 2015 entitled "A conservation reassessment of the Central American herpetofauna based on the EVS measure." Larry is the senior editor of *Conservation of Mesoamerican Amphibians and Reptiles* and the 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 70 currently recognized herpetofaunal species, and six species have been named in his honor, including the anuran *Craugastor lauraster* and the snakes *Oxybelis wilsoni*, *Myriopholis wilsoni*, and *Cerrophidion wilsoni*. Currently, Larry is an Associate Editor and Co-chair of the Taxonomic Board for the journal *Mesoamerican Herpetology*.