Aquiloeurycea scandens (Walker, 1955). The Tamaulipan False Brook Salamander is endemic to Mexico. Originally described from caves in the Reserva de la Biósfera El Cielo in southwestern Tamaulipas, this species later was reported from a locality in San Luis Potosí (Johnson et al., 1978) and another in Coahuila (Lemos-Espinal and Smith, 2007). Frost (2015) noted, however, that specimens from areas remote from the type locality might be unnamed species. This individual was found in an ecotone of cloud forest and pine-oak forest near Ejido La Gloria, in the municipality of Gómez Farías. Wilson et al. (2013b) determined its EVS as 17, placing it in the middle portion of the high vulnerability category. Its conservation status has been assessed as Vulnerable by IUCN, and as a species of special protection by SEMARNAT.

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The herpetofauna of Tamaulipas, Mexico: composition, distribution, and conservation status

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Abstract: The herpetofauna of Tamaulipas, the northeasternmost state in Mexico, is comprised of 184 species, including 31 anurans, 13 salamanders, one crocodylian, 124 squamates, and 15 turtles. We documented the distribution of these species among the seven physiographic regions we recognize. The number of species in these regions ranges from 30 in the Sierras y Llanuras Occidentales to 135 in the Gran Sierra Plegada. The species reside in from one to seven regions ($\bar{x}$ = 2.5). The greatest number of single-region species occurs in the Gran Sierra Plegada. About six out of every 10 species are restricted to one or two physiographic regions, which is of considerable conservation significance. We constructed a Coefficient of Biogeographic Resemblance (CBR) matrix in which the number of shared species is demonstrated as ranging from six to 73. We employed these data in building a UPGMA dendrogram, which illustrates that the low elevation regions cluster together, as well as the higher elevation regions, of which all of the latter abut portions of the former. The most distinctive but least speciose physiographic region is located in the southwestern corner of the state and abuts the most speciose region to the east. We allocated the members of the Tamaulipan herpetofauna to four distributional categories, of which the largest number is comprised of the non-endemics (120), followed by the country endemics (49), state endemics (10), and non-natives (five). We examined the conservations status of the native species by utilizing the SEMARNAT, IUCN, and EVS systems. Of these systems, the EVS proved to be the most useful for assessing the conservation status of the herpetofauna of the state. The number of species in the three EVS categories increased from low (53) to medium (72), and decreased to high (49). Additionally, we employed the EVS ratings to judge how the species in the IUCN categories of DD, NE, and LC might be evaluated more accurately. We also used a scheme for ascertaining Relative Herpetofaunal Priority (RHP), a simple means for determining the rank order of a regional herpetofauna dependent on the number of state and national endemic species, as well as the number of EVS species assessed with high vulnerability. Using these two measures, we found the Gran Sierra Plegada to occupy rank order one in both cases. We also discussed the ability of the state's protected areas, including a biosphere reserve, to protect the members of the herpetofauna. Based

on our analyses, we present our conclusions and provide recommendations for the future protection of the Tamaulipan herpetofauna.

Key words: Anurans, conservation status, crocodylians, physiographic regions, protected areas, protection recommendations, salamanders, squamates, turtles

Resumen: La herpetofauna de Tamaulipas, el estado que se localiza más hacia el noreste de México, consiste de 184 especies, las cuales incluye 31 anuros, 13 salamandras, un cocodrílido, 124 squamatos y 15 tortugas. Documentamos la distribución de estas especies entre las siete regiones fisiográficas reconocidas en este estudio. El número de especies en estas regiones varía de 30 en las Sierras y Llanuras Occidentales a 135 en la Gran Sierra Plegada. Las especies residen de una a siete regiones ($\bar{x}$ = 2.5). El mayor número de especies por región ocurre en la Gran Sierra Plegada. Aproximadamente seis de cada 10 especies están restringidas a una o dos regiones fisiográficas, las cuales son de importancia significativa para la conservación. Construimos una matriz de Coeficiente de Similitud Biogeográfica (CBR) que demuestra que el número de especies compartidas va de seis a 73. Usamos estos datos para construir un dendrograma de UPGMA, el cual ilustra la agrupación por un lado de las regiones de baja altitud, y por otro las regiones altas; estas últimas colindando con las primeras. La región fisiográfica más distintiva y a su vez con menos riqueza específica, está localizada al suroeste del estado, y colinda con la región de mayor riqueza específica, hacia el este. Ubicamos los miembros de la herpetofauna tamaulipeca en cuatro categorías distribucionales, y encontramos que el mayor número consiste de especies no endémicas (120), seguidas de especies endémicas al país (49), endémicas al estado (10) y especies no nativas (cinco). Examinamos el estatus de conservación de las especies nativas usando los sistemas de SEMARNAT, UICN y el EVS. De estos tres sistemas, el EVS resultó ser más eficiente para evaluar el estatus de conservación de la herpetofauna del estado. El número de especies en las tres categorías del EVS se incrementa de la baja (53) a la media (72) y después decrece en la categoría alta vulnerabilidad (49). Adicionalmente, utilizamos las clasificaciones del EVS para determinar cómo las especies en las categorías de la UICN de Datos Insuficientes, No Evaluadas, y de Preocupación Menor de la UICN podrían ser estimadas de una forma más precisa. También usamos un esquema para determinar la Herpetofauna Prioritaria Relativa (HPR), una medida simple para determinar el orden de rango de una herpetofauna regional que depende del número de especies endémicas estatales y nacionales, y de los números de las especies con un EVS de alta vulnerabilidad. De acuerdo con estas dos medidas, encontramos que la Gran Sierra Plegada ocupa el rango número uno en ambos casos. También discutimos la eficacia de las Áreas Naturales Protegidas (ANP) estatales, incluyendo una reserva de la biósfera, para proteger a los miembros de la herpetofauna. De acuerdo con nuestros análisis, establecemos nuestras conclusiones y presentamos recomendaciones para la futura protección de la herpetofauna tamaulipeca.

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

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Variety in Mexican topography, climate, and vegetation has given rise quite naturally to an equally varied animal life. Tropical and temperate faunas come together in unexpected combinations. For example, I recall sitting on a rimrock high in the Sierra de Tamaulipas one clear spring morning, with a level mesa of oak grassland at my back and a lush tropical barranca at my feet. Among the oaks a wild turkey gobbled, bobwhites were whistling and Montezuma quail "buzzing," and a pair of black-bellied tree ducks explored the more venerable trees for nesting hollows. A white-tailed doe slipped over the rim seeking her bed in the cool brush below. Down in the monte the monotonous whistles of tinamous and the soft cooing of red-billed pigeons and white-fronted doves echoed up to the rimrock. A handsome cock curassow sailed down the canyon on set wings, perhaps seeking his lady. And a gray fox slipped across a clearing. Where else in all North America could such an assortment of wildlife be observed from one rock?

—Aldo Starker Leopold (1959)

INTRODUCTION

Tamaulipas, the northeasternmost state in Mexico, shares borders with Nuevo León, San Luis Potosí, and Veracruz, and with the state of Texas, in the United States. The Tropic of Cancer crosses the southern portion of the state in the municipality of Victoria (INEGI, 2011), so technically Tamaulipas lies in the temperate and tropical portions of the Western Hemisphere. A coastal plain along the northwestern Gulf of Mexico extends along the eastern portion of the state, with mountainous regions to the west.

Tamaulipas is the sixth largest state in Mexico, with an area of 80,249 km^2, but its density of 40.7 people/km^2 ranks 21st for the country (INEGI, 2011). Compared with similar-sized states, one might expect the occurrence of a large herpetofauna in Tamaulipas. The fifth largest state in Mexico is Oaxaca, which with an area of 93,757 km^2 is 1.2 times as large as Tamaulipas. Inasmuch as herpetofaunal species richness generally increases from north to

Aquiloeurycea cephalica (Cope, 1865). The Chunky False Brook Salamander likely consists of a complex of cryptic species (*fide* Frost, 2015), but currently is considered to range at "high elevations of the Transverse Volcanic Range in the Distrito Federal and states of Veracruz, Hidalgo, México, Puebla, and Morelos; unnamed species associated with this complex are found in Tamaulipas in the Sierra Madre Oriental, Hidalgo, and Queretaro, Mexico." This individual came from cloud forest near Rancho El Cielo, in the municipality of Gómez Farías. Wilson et al. (2013b) calculated its EVS as 14, placing it at the lower end of the high vulnerability category. Its conservation status has been established as Near Threatened by IUCN, and as threatened by SEMARNAT. © Elí García-Padilla

south, not surprisingly the herpetofauna of Oaxaca, at 442 species (Mata-Silva et al., 2015), is 2.4 times greater than that of Tamaulipas (see section on herpetofaunal composition below). Consequently, it might be more reasonable to compare the size of the herpetofauna of Tamaulipas with that of another state bordering the United States. The herpetofaunas of three other states that share extensive borders with the United States (Coahuila, Chihuahua, and Sonora) has been surveyed recently (Lemos Espinal et al., 2015); all three states, however, lie north of the Tropic of Cancer. The herpetofauna of Coahuila, a state separated completely from Tamaulipas, at 131 species (Lemos Espinal et al., 2015), is 1.4 times smaller, although with an area of 151,595 km^2 Coahuila is almost twice the size of Tamaulipas (INEGI, 2011). Chihuahua, with an area of 247, 460 km^2 is the largest state in Mexico and contains substantially more species, at 173 (Lemos Espinal et al., 2015), than Coahuila, but fewer than Tamaulipas. Finally, Sonora, the second largest state in the country with an area of 179,355 km^2, has a known herpetofauna of 193 species (Lemos Espinal et al., 2015), which is closer to that of Tamaulipas than either that of Coahuila or Chihuahua, although Tamaulipas is less than one-half the size of Sonora (INEGI, 2011).

Lavín-Murcio et al. (2005) and Farr (2015) assessed the herpetofauna of Tamaulipas. The former authors included 169 taxa and the latter 179.

Aquiloeurycea galeanae (Taylor, 1941). The Galeana False Brook Salamander is a Mexican endemic distributed in the northern portion of the Sierra Madre Oriental, in southern Nuevo León, southeastern Coahuila, and southeastern Tamaulipas. This individual came from an ecotone of pine-oak forest and xerophytic vegetation near Ejido La Marcela, in the municipality of Miquihuana. Wilson et al. (2013b) ascertained its EVS as 18, placing it in the high portion of the high vulnerability category. Its conservation status has been determined as Near Threatened by IUCN, and as threatened by SEMARNAT. © Elí García-Padilla

MATERIALS AND METHODS

Our Taxonomic Position

Our taxonomic position is the same as some of us have explained in earlier papers (Johnson, et al., 2015a, b; Mata-Silva et al., 2015). Johnson, et al. (2015a: 275–276) presented a position statement, especially relating to the concept of subspecies.

Updating the Herpetofaunal List

Our herpetofaunal list is based on a checklist in preparation by E. García-Padilla and S. Terán-Juárez, as well as on the Taxonomic List appearing at the *Mesoamerican Herpetology* website (www.mesoamericanherpetology.com; accessed 24 February 2016).

System for Determining Distributional Status

In establishing the distributional status of the members of the Tamaulipan herpetofauna, we used the system developed for the herpetofauna of Michoacán by Alvarado-Diaz et al. (2013), which also was used by Mata-Silva et al. (2015) and Johnson et al. (2015a). For Tamaulipas, this system is composed of the following four categories: SE = endemic to Tamaulipas; CE = endemic to Mexico; NE = not endemic to Mexico; NN = non-native in Mexico.

Chiropterotriton cieloensis Rovito and Parra-Olea, 2015. The El Cielo Salamander is one of the most recently described amphibians in Tamaulipas. This species is a state endemic known only from the Reserva de la Biósfera El Cielo in the municipality of Gómez Farías, located in the extreme southwestern portion of the state. The salamander is known to occur at elevations from approximately 1,000 to 1,860 m in the Sierra de Guatemala, where it has been encountered in bromeliads and caves in broadleaf cloud forest. Pictured here is an individual from the vicinity of the species' type locality. In this paper we determined the EVS of this species as 17, placing it in the middle of the high vulnerability category. Due to its recent discovery, the conservation status of this species has not been assessed by IUCN or SEMARNAT.
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Systems for Determining Conservation Status

We used the same systems (i.e., SEMARNAT, IUCN, and EVS) as Alvarado-Díaz et al. (2013) and Mata-Silva et al. (2015) to assess the conservation status of the herpetofauna of Tamaulipas. For a detailed description of the three systems see Mata-Silva et al. (2015: 8).

PHYSIOGRAPHY AND CLIMATE

Physiographic Regions

To analyze the distribution of the herpetofauna of Tamaulipas, we used the classification system of physiographic regions (= subprovinces; INEGI, 1983). This system consists of seven regions (Fig. 1), which we briefly describe below (see INEGI, 1983):

Fig. 1. Physiographic regions of Tamaulipas, Mexico, slightly modified from INEGI (1983). Abbreviations are as follows: CN = Llanuras de Coahuila y Nuevo León; CT = Llanura Costera Tamaulipeca; SC = Sierra de San Carlos; LL = Llanuras y Lomerios; ST = Sierra de Tamaulipas; GS = Gran Sierra Plegada; and SO = Sierras y Llanuras Occidentales.

Llanuras de Coahuila y Nuevo León (CN).—Only a small part of this region is present in Tamaulipas, which covers the northwestern portion of the state, including the border area. Plains with hills dominate most of the landscape, which often are covered by Mezquital and Tamaulipan thornscrub, at elevations from 50 to 200 m. Plant communities in this area have been transformed by intensive agricultural and livestock activities. Other plant communities, like natural grassland and halophytic vegetation, are found in certain areas of the plains. The third most common vegetation type is submontane scrub, which is present in the foothills of the Sierra de San Carlos and in small sierras to the south, at elevations from 250 to 500 m.

Llanura Costera Tamaulipeca (CT).—This region extends from Reynosa, Tamaulipas, to the mouth of the Rio Grande, and to the south becomes narrower along the mouth of the Río Soto la Marina, where it only covers the coastal strip to Tuxpan, Veracruz. Plains are predominant in this area, which in the west are interrupted by extensive hills known as the Bordas Escarpment. To the north (the area between Reynosa, Matamoros, and San Fernando) and in smaller areas throughout, including the costal zones, crops have replaced the natural vegetation. To the west, along the border with Llanuras de Coahuila y Nuevo León, a strip of Mezquital and Tamaulipan thornscrub is interspersed with secondary vegetation. Areas of submontane scrub, tropical deciduous forest, and low thorny forest, along with secondary vegetation, are found in the central and southern parts of this region. Near the coast, grasslands and halophytic vegetation dominate the salt plains and floodplains. Coastal dune plant associations are evident on the beaches and coastal bars.

Sierra de San Carlos (SC).—This region represents a physiographic discontinuity of the Llanura Costera del Golfo Norte. To the east, the Sierra de San Carlos is wide and extensive, and to the west the steeper Sierra Chiquita reaches an elevation of 1,794 m. Small patches of Mezquital are present in the southwestern valleys and northward over the mountains, at elevations from 250 to 550 m. Submontane scrub is the predominant vegetation in the foothills, especially at elevations from 300 to 800 m. Oak forest grows in patches on the eastern and western slopes of the mountains, at elevations from 700 to 1,000 m. To a lesser degree, on the southwestern side of the mountains pine forest is found at an elevation of about 800 m, and pine-oak forest at 1,200 m.

Llanuras y Lomeríos (LL).—The general landscape of this region is characterized by extensive plains interrupted by hills and some plateaus below 450 m in elevation, although Cerro de Bernal reaches an elevation of just over 700 m. Tropical deciduous forest and large areas of secondary vegetation are abundant in the central and southern parts of this area, particularly around the Sierra de Tamaulipas. Submontane scrub is most abundant to the northwest, north of Ciudad Victoria, and Mezquital is present on the hills and plains. To the north, Tamaulipan thornscrub is found in patches on plateaus, hills, and plains, at elevations from 200 to 500 m. Low thorny forest and large areas of secondary vegetation extend to the east and west of the Sierra de Tamaulipas, on the slopes and plains. Tular vegetation occurs in floodplains to the south, along the border with Veracruz.

Chiropterotriton cracens Rabb, 1958. The Graceful Flat-footed Salamander is known only from the Reserva de la Biósfera El Cielo, and thus is endemic to Tamaulipas. This individual was photographed in cloud forest near Rancho El Cielo, in the municipality of Gómez Farías. Wilson et al. (2013b) determined its EVS as 17, placing it in the middle portion of the high vulnerability category. Its conservation status has been evaluated as Endangered by IUCN, but this species is not listed by SEMARNAT. © Elí García-Padilla

Sierra de Tamaulipas (ST).—Like the Sierra de San Carlos, this region represents a physiographic discontinuity of the Llanura Costera del Golfo Norte. The highest peaks are in the central portion of this area, Sierra Azul and Cerro Picacho, which reach elevations of 1,400 and 1,200 m, respectively. Tropical deciduous forest is predominant on the mountain slopes, and areas of secondary vegetation extend to the west, south, southeast, and northeast on portions of the Llanuras y Lomeríos. Submontane scrub is found above the tropical deciduous forest, especially on the western slopes. Oak forest and small patches of oak-pine forest are found at the higher elevations. In many parts of these mountains, grazing and logging have altered the forests.

Gran Sierra Plegada (GS).—The topography of this region predominantly is mountainous, but it also contains hills, plateaus, and valleys. This region is located parallel to the coast, and represents an orographic barrier that favors moisture on the eastern slopes that prevents the westward entry of moist winds. Heavy rainfall has led to the dissolution of limestone rocks in the area, resulting in a karst environment. At the foot of the mountains, these processes have had a considerable influence on the formation of vast cavern systems and springs. Moreover, a broad elevational gradient is present in this area. North of Ocampo the summits exceed 2,000 m in elevation, with heights up to 3,600 m on Peña Nevada. South of Ocampo the summits lie at elevations below 2,000 m and valleys and plains are more frequent and extensive, with a minimum elevation of 130 m. The exposure and elevational gradient have resulted in complex and diverse plant communities. Oak forest is abundant and found throughout, in the form of patches and discontinuous bands, at elevations from 380 to 2,320 m; the size of these forests, however, gradually has been decreasing. Oak-pine forest is found in small patches on hills and valleys; two types of this forest type are distinguished, a wet one on the windward side and a dry one on the leeward side. Pine-oak forest is present to the center and northwest, at elevations from 1,580 to 2,100 m. Oak chaparral occurs in small patches in the west-central part of the area, at elevations from 1,300 to 2,200 m. To the northwest, pine forest is found in scattered patches at elevations from 1,400 to 1,700 m. In the east-central part, cloud forest is present in closed areas and canyons that retain moisture. *Juniperus* forest develops in very small areas, usually as a transitional zone between oak and pine forest, and between grassland and desert scrub; a small patch of this forest is found to the west, at elevations from 1,580 to 1,900 m. In the north and central parts of this area, submontane scrub occurs continuously along the foothills of the mountains. Small patches of deciduous forest are found in some canyons north of Ciudad Victoria; this vegetation type is more common to the south, where it predominates in some mountains and valleys. Small patches of medium semi-evergreen forest and medium deciduous forest are found in the east-central part of the

Craugastor decoratus (Taylor, 1942). The Adorned Robber Frog is a Mexican endemic distributed from "southwestern Tamaulipas southward along the Atlantic versant of the Sierra Madre Oriental, to Querétaro, Hidalgo, and western Veracruz," as well as in southeastern San Luis Potosí (Lemos-Espinal and Dixon, 2013: 44). This individual is from Cueva del Oso, Ejido Altacimas, in the municipality of Gómez Farías. Wilson et al. (2013b) calculated its EVS as 15, placing it in the lower portion of the high vulnerability category. Its conservation status has been considered as Vulnerable by IUCN, and as a species of special protection by SEMARNAT. © Elí García-Padilla

Smilisca baudinii (Duméril & Bibron, 1841). Baudin's Treefrog is one of the most widely distributed anurans in Mesoamerica. Its geographic range extends from extreme southern Texas, United States, to southeastern Costa Rica (including the Islas de la Bahía, Honduras) on the Atlantic versant, and on the Pacific versant from southern Sonora and southwestern Chihuahua southward to southern Costa Rica (including Las Islas Marías, Mexico). This individual was found in cloud forest at Ejido El Julilo, in the municipality of Gómez Farías. Wilson et al. (2013b) ascertained its EVS as 3, the lowest possible value for this measure. Its conservation status has been judged as Least Concern by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

region. Rosetophilous desert scrub occurs to the center and north, on hills, plateaus, and mountains, extensively in the valley of Jaumave. To the west, rosetophilous desert scrub, submontane scrub, chaparral, pine, and oak-pine forest are found in some canyons.

Sierras y Llanuras Occidentales (SO).—This province covers the southwestern portion of Tamaulipas, and is dominated by mountains in the north and small plains and valleys in the south. The elevation ranges from 1,020 to 2,400 m, although plains rarely exceed 1,300 m. Rosetophilous desert scrub covers just over one-half of the surface of this region, as it extends throughout the north and south on plains, valleys, slopes, and hillocks at elevations from 1,250 to 2,000 m. Submontane scrub is found in the northeastern part, at elevations from 600 to 1,600 m. *Juniperus* forest, in the form of patches on foothills, occurs in the east at elevations up to 2,000 m, and a small patch of crasicaule scrub is present in the southern portion.

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 16 m on the Llanura Costera Tamaulipeca to 1,168 m in the Sierra y Llanuras Occidentales.

The mean annual temperature (MAT) declines with increased elevation. In the Provincia Llanura Costera Tamaulipeca, which lies in the northern portion the Gulf Coastal Plain in the state, at Valle Hermoso (elev. 16 m), the MAT is 23.3°C. In the Provincia Llanuras y Lomeríos, lying in the southern portion of the Gulf Coastal Plain in Tamaulipas, at Altamira (elev. 26 m), the MAT is 23.8°C. At the other elevational extreme, at Tula (elev. 1,168 m), in the Provincia Sierra y Llanuras Occidentales, the MAT is 20.5°C. The MAT decreases, more or less, with the increasing elevation of the following intermediate localities: Ciudad Mier (Llanuras de Coahuila y Nuevo León), 92 m (23.3°C); San Carlos (Sierra de San Carlos), 449 m (22.7°C); Jaumave (Gran Sierra Plegada), 750 m (21.5°C); and El Almagre (Sierra de Tamaulipas), 835 m (21.1°C). The annual monthly minimum temperature ranges from 11.0 to 14.6°C lower than the annual monthly maximum temperature. During the year, the mean monthly temperatures peak at some point from June to August.

Table 1. Monthly minimum, mean (in parentheses), maximum, and annual temperature data (in °C) for the physiographic regions of Tamaulipas, Mexico. Localities and their elevation for each of the regions are as follows: Gran Sierra Plegada—Jaumave (750 m); Llanura Costera Tamaulipeca—Valle Hermoso (16 m); Llanuras de Coahuila y Nuevo León—Ciudad Mier (92 m); Llanuras y Lomeríos—Altamira (26 m); Sierra de San Carlos—San Carlos (449 m); Sierra de Tamaulipas—El Almagre* (835 m); Sierras y Llanuras Occidentales—Tula (1,168 m). Data taken from www.climate-data.org (accessed 12 October 2015). * = Data taken from www.chinci.com (accessed 12 October 2015).

Physiographic Regions	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Gran Sierra Plegada	8.6 (15.8) 23.0	10.2 (17.7) 25.2	12.1 (20.0) 27.9	15.2 (23.0) 30.8	18.0 (25.1) 32.2	19.3 (25.8) 32.3	18.6 (24.9) 31.3	18.6 (25.1) 31.7	18.2 (24.2) 30.3	15.6 (21.7) 27.9	11.4 (18.0) 24.7	9.4 (16.1) 22.9	14.6 (21.5) 28.4
Llanura Costera Tamaulipeca	9.6 (15.4) 21.2	11.3 (17.3) 23.3	14.7 (20.4) 26.2	19.0 (24.3) 29.7	21.6 (26.7) 31.8	23.5 (28.6) 33.7	23.7 (29.2) 34.7	23.8 (29.4) 35.0	22.5 (27.9) 33.3	18.6 (24.4) 30.2	14.2 (19.8) 25.4	10.5 (16.2) 22.0	17.8 (23.3) 28.9
Llanuras de Coahuila y Nuevo León	7.5 (13.4) 19.4	9.7 (16.0) 22.3	13.2 (20.0) 26.9	18.1 (24.8) 31.5	21.4 (27.6) 33.8	23.5 (29.8) 36.2	24.0 (30.8) 37.7	24.0 (30.7) 37.5	22.3 (28.3) 34.3	17.9 (23.9) 29.9	13.0 (18.9) 24.8	8.9 (15.1) 21.3	17 (23.3) 29.6
Llanuras y Lomeríos	13.9 (18.4) 22.9	15.2 (19.7) 24.2	17.2 (21.6) 26.1	20.1 (24.3) 28.6	22.5 (26.7) 30.9	23.5 (27.5) 31.5	23.2 (27.3) 31.5	23.4 (27.5) 31.7	22.8 (26.9) 31.0	20.9 (25.2) 29.6	17.4 (21.8) 26.2	14.7 (19.2) 23.8	19.6 (23.8) 28.2
Sierra de San Carlos	7.5 (15.5) 23.5	8.9 (16.3) 23.8	12.1 (19.6) 27.2	17.5 (23.2) 29.0	19.2 (26.5) 33.9	21.3 (28.4) 35.5	21.5 (28.9) 36.3	21.5 (27.3) 33.1	20.0 (26.7) 33.4	16.7 (23.5) 30.3	12.8 (19.9) 27.0	9.4 (16.3) 23.2	15.7 (22.7) 29.7
Sierra de Tamaulipas	9.7 (15.4) 21.2	11.1 (16.9) 22.7	13.2 (19.3) 25.4	16.5 (22.4) 28.3	19.3 (24.4) 30.2	19.7 (25.0) 30.3	19.2 (24.5) 29.8	20.1 (24.5) 29.7	18.7 (23.7) 29.5	17.1 (21.7) 27.0	13.1 (18.6) 24.7	10.8 (16.4) 22.0	15.7 (21.1) 26.7
Sierras y Llanuras Occidentales	6.9 (14.8) 22.8	8.5 (16.8) 25.2	10.8 (19.5) 28.2	14.5 (22.9) 31.4	16.9 (24.4) 31.9	18.1 (24.6) 31.2	17.2 (23.4) 29.6	17.2 (23.6) 30.1	16.6 (22.7) 28.9	13.8 (20.5) 27.2	10.4 (17.8) 25.2	8.1 (15.5) 23.0	13.3 (20.5) 27.9

Precipitation.—In Tamaulipas, precipitation is highest from May to October, the so-called rainy season, and lowest from November to April, correspondingly referred to as the dry season (Table 2). The data in this table indicate that 71.5–85.1% of the annual precipitation occurs during the rainy season. Depending on the location, the month with the lowest amount of precipitation is February, March, or April (usually February or March), and that with the highest is September. The annual rainfall ranges from 491 mm in the Gran Sierra Plegada and the Sierras y Llanuras Occidentales to 1,237 in the Sierra de Tamaulipas, with the higher value 2.5 times greater than the lower one. Otherwise, the annual rainfall exceeds 1,000 mm only in one area, the Llanuras y Lomeríos; elsewhere it falls below this figure.

Table 2. Monthly and annual precipitation data (in mm.) for the physiographic regions of Tamaulipas, Mexico. Localities and their elevation for each of the regions are as follows: Gran Sierra Plegada—Jaumave (750 m); Llanura Costera Tamaulipeca—Valle Hermoso (16 m); Llanuras de Coahuila y Nuevo León—Ciudad Mier (62 m); Llanuras y Lomeríos—Altamira (26 m); Sierra de San Carlos—San Carlos (449 m); Sierra de Tamaulipas—El Almagre* (835 m); Sierras y Llanuras Occidentales—Tula (1,168 m). The shaded area indicates the months of the rainy season. Data taken from www.climate-data.org (accessed 12 October 2015). * = Data taken from www.chinci.com (accessed 12 October 2015).

Physiographic Regions	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Gran Sierra Plegada	15	10	16	30	56	77	72	63	88	39	12	13	491
Llanura Costera Tamaulipeca	39	29	18	40	75	85	55	67	138	69	33	36	684
Llanuras de Coahuila y Nuevo León	21	24	18	37	63	55	24	77	109	54	30	21	533
Llanuras y Lomeríos	25	22	13	13	49	172	93	185	255	102	46	31	1,006
Sierra de San Carlos	25	18	21	51	107	102	53	106	157	61	21	25	747
Sierra de Tamaulipas	34	30	26	38	122	221	161	185	212	121	58	29	1237
Sierras y Llanuras Occidentales	14	10	12	21	40	81	85	80	87	35	13	13	491

COMPOSITION OF THE HERPETOFAUNA

The herpetofauna of Tamaulipas, Mexico, is comprised of 184 species, including 31 anurans, 13 salamanders, one crocodylian, 124 squamates, and 15 turtles (Table 3). Thus, the herpetofauna consists of 44 amphibians (23.9% of the total) and 140 of the remainder (76.1%). Our figures compare with the 38 species of amphibians reported by Parra-Olea et al. (2014) and the 114 species in the remainder of the herpetofauna catalogued by Flores-Villela and García-Vázquez (2014). The discrepancy between our figures and those of Parra-Olea et al. (2014) and Flores-Villela and García-Vázquez (2014) is much more substantial than what was reported for the herpetofaunas of Oaxaca (Mata-Silva et al. 2015) and Chiapas (Johnson et al., 2015a).

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

Orders	Families	Genera	Species
Anura	9	18	31
Caudata	3	6	13
Subtotals	**12**	**24**	**44**
Crocodylia	1	1	1
Squamata	23	69	124
Testudines	7	12	15
Subtotals	**31**	**82**	**140**
Totals	**43**	**106**	**184**

Trachycephalus typhonius (Linnaeus, 1758). The Milky Treefrog is the most broadly distributed amphibian in Tamaulipas. It ranges from "central Tamaulipas, Mexico, to Nicaragua on the Atlantic versant and from southern Sinaloa, Mexico, to eastern Panama on the Pacific versant; widespread in South America east of the Andes to northern Argentina, also known from Ecuador on the Pacific versant and on the Caribbean Islands of Trinidad and Tobago" (McCranie and Wilson, 2002: 281). This individual was found in tropical deciduous forest near Gómez Farías, in the municipality of Gómez Farías. Wilson et al. (2013b) calculated its EVS as 4, one number above the lowest possible value. Its conservation status has been established as Least Concern by IUCN, and this species is not listed by SEMARNAT.

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Rhinophrynus dorsalis Duméril & Bibron, 1841. The Mesoamerican Burrowing Toad almost is confined to Mexico and Central America, as it ranges "from the mouth of the Río Balsas (Michoacán, Mexico) in the west and extreme southern Texas (USA) in the north along the coastal plains of Mexico and Guatemala to northern Honduras (Olancho Province), on the Caribbean versant, and through El Salvador and Nicaragua to northwestern Costa Rica on the Pacific versant; also in the Río Grijalva Valley of Chiapas (Mexico)" (research.amnh.org/vz/herpetology/amphibia/; accessed 31 December 2015). This individual was encountered at Rancho El Corral, in the municipality of Güémez. Wilson et al. (2013b) determined its EVS to be 8, placing it in the low vulnerability category. Its conservation status has been evaluated as Least Concern by IUCN, and as a species of special protection by SEMARNAT.

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Families

The herpetofauna of Tamaulipas contains representatives of 43 families, including 12 of amphibians (nine anuran and three caudate families) and 31 of the remainder of the herpetofauna (one crocodylian, 23 squamate, and seven turtle families). Among the amphibians, no caecilian families are represented, because no caecilians in Mexico occur north of the Balsas Depression or south-central Veracruz (Amphibian Species of the World website <www.research.amnh.org/vz/herpetology/amphibia/>; accessed 4 October 2015). About six-tenths of the amphibian species are classified in four families, i.e., Bufonidae, Eleutherodactylidae, Hylidae, and Plethodontidae, and about seven-tenths of the remainder of the herpetofauna is allocated to seven families, i.e., Anguidae, Phrynosomatidae, Teiidae, Colubridae, Dipsadidae, Natricidae, and Viperidae (Table 4); these values essentially are the reverse of those in Chiapas (Johnson et al., 2015a).

Table 4. Distribution of the amphibians, crocodylians, squamates, and turtles of Tamaulipas, Mexico, by physiographic region. Abbreviations are as follows: CN = Llanuras de Coahuila y Nuevo León; CT = Llanura Costera Tamaulipeca; SC = Sierra de San Carlos; LL = Llanuras y Lomerios; ST = Sierra de Tamaulipas; GS = Gran Sierra Plegada; SO = Sierras y Llanuras Occidentales. * = species endemic to Mexico; ** = species endemic to Tamaulipas; and *** = non-native species; and [ms] = marine species. See text for description of these regions.

Taxa	Physiographic Regions of Tamaulipas							Number of Regions Occupied
	CN	CT	SC	LL	ST	GS	SO	
Anura (31 species)								
Bufonidae (6 species)								
Anaxyrus cognatus							x	1
Anaxyrus debilis	x	x	x	x	x		x	6
Anaxyrus punctatus	x		x	x	x	x		5
Anaxyrus speciosus	x	x	x	x				4
Incilius nebulifer	x	x	x	x	x	x	x	7
Rhinella marina	x	x	x	x	x	x		6
Craugastoridae (3 species)								
Craugastor augusti					x	x		2
*Craugastor batrachylus***						x		1
*Craugastor decoratus**						x		1
Eleutherodactylidae (5 species)								
Eleutherodactylus cystignathoides	x	x	x	x	x	x		6
*Eleutherodactylus dennisi***						x		1
Eleutherodactylus guttilatus			x		x	x		3
*Eleutherodactylus longipes**						x	x	2
*Eleutherodactylus verrucipes**						x	x	2
Hylidae (6 species)								
*Ecnomiohyla miotympanum**					x	x		2
*Hyla eximia**						x		1
Pseudacris clarki		x						1
Scinax staufferi				x	x	x		3
Smilisca baudinii	x	x	x	x	x	x	x	7
Trachycephalus typhonius		x		x		x		3
Leptodactylidae (2 species)								
Leptodactylus fragilis		x		x		x		3

Leptodactylus melanonotus				x		x		2
Microhylidae (3 species)								
Gastrophryne elegans				x		x		2
Gastrophryne olivacea	x	x		x		x		4
Hypopachus variolosus	x	x		x	x	x		5
Ranidae (2 species)								
Lithobates berlandieri	x	x	x	x	x	x	x	7
Lithobates catesbeianus	x	x		x				3
Rhinophrynidae (1 species)								
Rhinophrynus dorsalis	x	x		x	x			4
Scaphiopodidae (3 species)								
Scaphiopus couchii	x	x	x	x	x	x		6
Spea bombifrons	x							1
Spea multiplicata						x	x	2
Caudata (13 species)								
Plethodontidae (10 species)								
*Aquiloeurycea cephalica**					x	x		2
*Aquiloeurycea galeanae**						x		1
*Aquiloeurycea scandens**						x		1
*Bolitoglossa platydactyla**				x		x		2
*Chiropterotriton cieloensis***						x		1
*Chiropterotriton cracens***						x		1
*Chiropterotriton infernalis***						x		1
*Chiropterotriton miquihuanus**						x		1
*Chiropterotriton multidentatus**						x		1
*Isthmura bellii**						x		1
Salamandridae (1 species)								
Notophthalmus meridionalis		x		x	x	x		4
Sirenidae (2 species)								
Siren intermedia		x						1
Siren lacertina		x						1
Crocodylia (1 species)								
Crocodylidae (1 species)								
Crocodylus moreletii		x		x		x		3
Squamata (124 species)								
Anguidae (6 species)								
*Abronia taeniata**						x		1
*Barisia ciliaris**						x		1
*Gerrhonotus farri***							x	1
Gerrhonotus infernalis			x		x	x		3
*Gerrhonotus ophiurus**						x		1
*Ophisaurus incomptus**				x		x		2
Corytophanidae (1 species)								
Laemanctus serratus				x	x	x		3

Crotaphytidae (2 species)								
Crotaphytus collaris						x	x	2
Crotaphytus reticulatus	x	x						2
Dactyloidae (3 species)								
*Anolis carolinensis****		x						1
*Norops sagrei****		x		x				2
Norops sericeus		x		x	x	x		4
Dibamidae (1 species)								
*Anelytropsis papillosus**						x	x	2
Eublepharidae (1 species)								
Coleonyx brevis	x							1
Gekkonidae (2 species)								
*Hemidactylus frenatus****				x		x		2
*Hemidactylus turcicus****	x	x		x			x	4
Iguanidae (2 species)								
Ctenosaura acanthura		x		x	x	x		4
Iguana iguana		x						1
Phrynosomatidae (18 species)								
Cophosaurus texanus			x	x		x	x	4
Holbrookia propinqua		x						1
Phrynosoma cornutum	x	x	x	x		x		5
Phrynosoma modestum				x			x	2
*Phrynosoma orbiculare**						x		1
*Sceloporus cautus**							x	1
*Sceloporus chaneyi**						x		1
Sceloporus cowlesi	x							1
Sceloporus cyanogenys	x	x	x	x	x	x		6
Sceloporus grammicus	x	x	x	x	x	x		6
*Sceloporus minor**						x		1
Sceloporus olivaceus	x	x	x	x	x	x		6
*Sceloporus parvus**						x		1
*Sceloporus scalaris**						x		1
*Sceloporus spinosus**						x		1
*Sceloporus torquatus**						x		1
Sceloporus variabilis	x	x	x	x	x	x		6
Urosaurus ornatus	x							1
Scincidae (4 species)								
*Plestiodon dicei**			x		x	x		3
*Plestiodon lynxe**						x		1
Plestiodon obsoletus	x	x		x			x	4
Plestiodon tetragrammus		x	x	x	x	x		5
Sphenomorphidae (1 species)								
*Scincella silvicola**				x		x	x	3

Teiidae (5 species)								
Aspidoscelis gularis	x	x	x	x	x	x		6
Aspidoscelis inornata							x	1
Aspidoscelis laredoensis	x	x						2
Aspidoscelis sexlineata		x						1
*Holcosus amphigrammus**		x		x	x	x		4
Xantusiidae (2 species)								
*Lepidophyma micropholis**						x		1
*Lepidophyma sylvaticum**					x	x		2
Xenosauridae (1 species)								
*Xenosaurus platyceps***						x		1
Boidae (1 species)								
Boa imperator		x		x		x		3
Colubridae (32 species)								
Arizona elegans	x	x	x	x				4
Coluber constrictor		x		x		x	x	4
Drymarchon melanurus		x	x	x	x	x		5
Drymobius margaritiferus		x	x	x	x	x		5
*Ficimia hardyi**						x		1
*Ficimia olivacea**					x	x		2
Ficimia streckeri	x	x	x	x		x		5
Lampropeltis annulata	x	x	x	x		x	x	6
*Lampropeltis mexicana**						x		1
Lampropeltis splendida	x	x						2
Leptophis mexicanus		x		x	x	x		4
Masticophis flagellum		x		x		x	x	4
Masticophis mentovarius				x		x	x	3
Masticophis schotti	x	x	x	x	x	x		6
Mastigodryas melanolomus				x		x		2
Opheodrys aestivus		x	x	x		x		4
Oxybelis aeneus				x	x	x		3
Pantherophis bairdi			x			x		2
Pantherophis emoryi		x		x		x		3
Pituophis catenifer	x	x						2
*Pituophis deppei**						x	x	2
Pseudelaphe flavirufa						x		1
Rhinocheilus lecontei	x	x		x				3
Salvadora grahamiae		x	x	x		x		4
Senticolis triaspis				x	x	x		3
Sonora semiannulata	x	x						2
Spilotes pullatus				x	x	x		3
Tantilla atriceps			x				x	2
Tantilla nigriceps	x			x		x		3
Tantilla rubra			x			x		2

Tantilla wilcoxi						x		1
*Trimorphodon tau**				x		x		2
Dipsadidae (15 species)								
*Adelphicos newmanorum**						x		1
Amastridium sapperi						x		1
Coniophanes fissidens						x		1
Coniophanes imperialis				x	x	x		3
Coniophanes piceivittis				x				1
*Geophis latifrontalis**						x		1
Heterodon kennerlyi		x		x				2
Hypsiglena jani		x		x		x	x	4
Imantodes cenchoa				x	x	x		3
Leptodeira maculata		x		x	x	x		4
Leptodeira septentrionalis		x	x	x	x	x		5
Pliocercus elapoides						x		1
*Rhadinaea gaigeae**				x	x	x		3
Tropidodipsas fasciata				x		x		2
Tropidodipsas sartorii				x		x		2
Elapidae (2 species)								
*Micrurus tamaulipensis***					x			1
Micrurus tener		x		x	x	x	x	5
Leptotyphlopidae (4 species)								
Epictia phenops						x		1
Rena dulcis		x		x	x	x	x	5
*Rena iversoni***				x		x		2
*Rena myopica**				x				1
Natricidae (10 species)								
Nerodia erythrogaster	x							1
Nerodia rhombifer	x	x		x		x		4
Storeria dekayi	x	x		x		x		4
*Storeria hidalgoensis**						x		1
Thamnophis cyrtopsis						x		1
*Thamnophis exsul**						x		1
Thamnophis marcianus		x		x		x		3
*Thamnophis mendax***						x		1
Thamnophis proximus		x	x	x	x	x		5
*Thamnophis pulchrilatus**						x		1
Sibynophiidae (1 species)								
Scaphiodontophis annulatus						x		1
Typhlopidae (1 species)								
*Indotyphlops braminus****				x		x		2
Viperidae (9 species)								
*Agkistrodon taylori**		x	x	x	x	x		5
Bothrops asper				x		x		2

Crotalus atrox	x	x	x	x			x	5
Crotalus molossus						x		1
*Crotalus morulus**						x		1
Crotalus pricei						x		1
Crotalus scutulatus						x	x	2
*Crotalus totonacus**			x	x	x	x		4
Sistrurus catenatus		x						1
Testudines (15 species)								
Cheloniidae (4 species)								
Caretta caretta[ms]		x						1
Chelonia mydas[ms]		x						1
Eretmochelys imbricata[ms]		x						1
Lepidochelys kempii[ms]		x						1
Dermochelyidae (1 species)								
Dermochelys coriacea[ms]		x						1
Emydidae (3 species)								
Pseudemys gorzugi	x	x						2
*Terrapene mexicana**		x		x	x	x		4
Trachemys venusta	x	x		x	x	x		5
Kinosternidae (4 species)								
Kinosternon flavescens	x	x		x				3
*Kinosternon herrerai**		x		x	x			3
*Kinosternon integrum**						x	x	2
Kinosternon scorpioides		x		x		x		3
Staurotypidae (1 species)								
Staurotypus triporcatus						x		1
Testudinidae (1 species)								
Gopherus berlandieri	x	x	x	x				4
Trionychidae (1 species)								
Apalone spinifera	x	x		x				3

Genera

Tamaulipan amphibians are classified in 24 genera, of which 18 are anurans (Table 3). The remainder of the herpetofauna is comprised of 82 genera, of which 69 contain squamates (Table 3). The total number of genera in Tamaulipas is 106, which is 50.5% of the total number (210) known from Mexico (Wilson et al., 2013a, b). The most speciose genera of amphibians are *Anaxyrus* (four species), *Eleutherodactylus* (five), and *Chiropterotriton* (five), and *Sceloporus* (12), *Plestiodon* (four), *Aspidoscelis* (four), *Tantilla* (four), *Thamnophis* (six), *Crotalus* (six), and *Kinosternon* (four) among the remainder of the herpetofauna.

Species

The herpetofauna of Tamaulipas presently is comprised of 184 species, including 44 amphibians, one crocodylian, 124 squamates, and 15 turtles (Table 3). Wilson et al. (2013b) recorded 378 native amphibian species for all of Mexico; that number currently is 387 (J. Johnson, unpublished). Thus, 11.4% of this fauna is found in Tamaulipas. Wilson (2013a) reported 849 native species of crocodylians, squamates, and turtles from Mexico; the current number is 873 (J. Johnson, unpublished), so presently 16.0% of these species are known from Tamaulipas. In total, the herpetofauna of Tamaulipas makes up 14.6% of that of Mexico.

Barisia ciliaris (Smith, 1942). The Sierra Alligator Lizard is a Mexican endemic distributed "along the Sierra Madre Oriental from Nuevo León and southeastern Coahuila southward to at least Guanajuato, and northward along the Sierra Madre Occidental to extreme southern Chihuahua (Lemos-Espinal and Dixon, 2013: 97). Pictured here is an individual encountered near Ejido La Marcela, in the municipality of Miquihuana. Wilson et al. (2013a) determined its EVS to be 15, placing it in the lower portion of the high vulnerability category. Its conservation status has not been assessed by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

Gerrhonotus infernalis Baird, 1859. The Texas Alligator Lizard ranges "from central Texas westward to the area of Big Bend, in the United States, and in Mexico east of the Sierra Madre Oriental to southern San Luis Potosí and perhaps extreme southeastern Durango" (Lemos-Espinal and Dixon, 2013: 98). This individual was found in dry pine-oak forest near Ejido 20 de Abril (La Joya de Salas), in the municipality of Jaumave. Wilson et al. (2013a) calculated its EVS as 13, placing it at the upper end of the medium vulnerability category. Its conservation status has been gauged as Least Concern by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

Gerrhonotus ophiurus Cope, 1867. The Snake-tailed Lizard is a Mexican endemic distributed "in central and southeastern San Luis Potosí, eastern Querétaro, northern Hidalgo, Tlaxcala, Puebla, and northern Veracruz" (Reaño-Hernández et al., 2015: 338). This individual came from Calamaco Canyon, in the municipality of Victoria. Wilson et al. (2013a) determined its EVS as 12, placing it in the middle of the medium vulnerability category. Its conservation status has been allocated as Least Concern by IUCN, and this species is not listed by SEMARNAT. © Sergio A. Terán-Juárez

PATTERNS OF PHYSIOGRAPHIC DISTRIBUTION

We used the system of seven regions recognized by INEGI (Instituto Nacional de Estadística y Geografía) to examine the physiographic distribution of the herpetofauna of Tamaulipas. We denote the distribution of the species among these regions in Table 4, and summarize this information in Table 5.

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

Families	Number of Species	Distributional Occurrence						
		CN	CT	SC	LL	ST	GS	SO
Bufonidae	6	5	4	5	5	4	3	3
Craugastoridae	3	—	—	—	—	1	3	—
Eleutherodactylidae	5	1	1	2	1	2	5	2
Hylidae	6	1	3	1	3	3	5	1
Leptodactylidae	2	—	1	—	2	—	2	—
Microhylidae	3	2	2	—	3	1	3	—

Ranidae	2	2	2	1	2	1	1	1
Rhinophrynidae	1	1	1	—	1	1	—	—
Scaphiopodidae	3	2	1	1	1	1	2	1
Subtotals	**31**	**14**	**15**	**10**	**18**	**14**	**24**	**8**
Plethodontidae	10	—	—	—	1	1	10	—
Salamandridae	1	—	1	—	1	1	1	—
Sirenidae	2	—	2	—	—	—	—	—
Subtotals	**13**	**—**	**3**	**—**	**2**	**2**	**11**	**—**
Totals	**44**	**14**	**18**	**10**	**20**	**16**	**35**	**8**
Crocodylidae	1	—	1	—	1	—	—	—
Subtotals	**1**	**—**	**1**	**—**	**1**	**—**	**—**	**—**
Anguidae	6	—	—	1	1	1	5	1
Corytophanidae	1	—	—	—	1	1	1	—
Crotaphytidae	2	1	1	—	—	—	1	1
Dactyloidae	3	—	3	—	2	1	1	—
Dibamidae	1	—	—	—	—	—	1	1
Eublepharidae	1	1	—	—	—	—	—	—
Gekkonidae	2	1	1	—	2	—	1	1
Iguanidae	2	—	2	—	1	1	1	—
Phrynosomatidae	18	7	6	6	7	4	13	3
Scincidae	4	1	2	2	2	2	3	1
Sphenomorphidae	1	—	—	—	1	—	1	1
Teiidae	5	2	4	1	2	2	2	1
Xantusiidae	2	—	—	—	—	1	2	—
Xenosauridae	1	—	—	—	—	—	1	—
Subtotals	**49**	**13**	**19**	**10**	**19**	**13**	**33**	**10**
Boidae	1	—	1	—	1	—	1	—
Colubridae	32	9	16	11	20	8	26	6
Dipsadidae	15	—	4	1	10	5	13	1
Elapidae	2	—	1	—	1	2	1	1
Leptotyphlopidae	4	—	1	—	3	1	3	1
Natricidae	10	3	4	1	4	1	9	—
Sibynophiidae	1	—	—	—	—	—	1	—
Typhlopidae	1	—	—	—	1	—	1	—
Viperidae	9	1	3	3	4	2	7	2
Subtotals	**75**	**13**	**30**	**16**	**44**	**19**	**62**	**11**
Cheloniidae	4	—	4	—	—	—	—	—
Dermochelyidae	1	—	1	—	—	—	—	—
Emydidae	3	2	3	—	2	2	2	—
Kinosternidae	4	1	3	—	3	1	2	1
Staurotypidae	1	—	—	—	—	—	1	—
Testudinidae	1	1	1	1	1	—	—	—
Trionychidae	1	1	1	—	1	—	—	—
Subtotals	**15**	**5**	**13**	**1**	**7**	**3**	**5**	**1**
Totals	**140**	**31**	**63**	**27**	**71**	**35**	**100**	**22**
Sum Totals	**184**	**45**	**81**	**37**	**91**	**51**	**135**	**30**

The total number of species among the seven regions ranges from a low of 30 in the Sierras y Llanuras Occidentales to a high of 135 in the Gran Sierra Plegada. The species numbers for the other five regions are, in ascending order, 37 (Sierra de San Carlos), 45 (Llanuras de Coahuila y Nuevo León), 51 (Sierra de Tamaulipas), 81 (Llanura Costera Tamaulipeca), and 91 (Llanuras y Lomeríos). The lowest species number of 30 in the Sierras y Llanuras Occidentales is slightly less than one-fourth (22.2%) of that in the most speciose area, the Gran Sierra Plegada, with 135 species. Interestingly, the regions with the lowest and highest numbers of species, respectively, are adjacent to one another and lie in the southwestern portion of the state (Fig. 1).

The greatest numbers for most of the component herpetofaunal groups, as expected, are in the Gran Sierra Plegada (Table 5). These groups are the anurans (24 of 31 species; 77.4%), salamanders (11 of 13; 84.6%), lizards (33 of 50; 66.0%), and snakes (62 of 75; 82.7%). We also expected that the single crocodylian species would not occur in a mountainous region, and that the largest number of turtles would be distributed in a region bounding the coast. Thus, 14 of the 15 turtle species (93.3%) are found in the Llanura Costera Tamaulipeca region, which extends the length of the Gulf coastal portion of the state.

Members of the Tamaulipan herpetofauna occur in from one to seven physiographic regions (Table 4), as follows: one (70 of 184 species; 38.0%); two (37; 20.1%); three (26; 14.1%); four (23; 12.5%); five (14; 7.6%); six (11; 6.0%); and seven (three; 1.6%). The most broadly occurring species (occupying six or seven regions) include the anurans *Anaxyrus debilis*, *Eleutherodactylus cystignathoides*, *Incilius nebulifer*, *Lithobates berlandieri*, *Rhinella marina*, *Scaphiopus couchii*, and *Smilisca baudinii*, the lizards *Aspidoscelis gularis*, *Sceloporus cyanogenys*, *S. grammicus*, *S. olivaceus*, and *S. variabilis*, and the snakes *Lampropeltis annulata* and *Masticophis schotti*. These 14 species not only range broadly in Tamaulipas, but also occur to the north in the United States, to varying degrees, and in some cases to the south, in Central America.

That 107 of 184 species (58.2%) are limited to one or two physiographic regions in the state is of considerable conservation significance. The percentage figure is about the same as the one for Oaxaca (59.0%), but higher than that for Chiapas (53.%), although in all three cases, more than one-half of the states' species are involved. The mean regional occupancy figure is 2.5, only slightly lower than the comparable figure (2.7) for both Chiapas and Oaxaca (Mata-Silva et al., 2015; Johnson et al., 2015a).

Ophisaurus incomptus McConkey, 1955. The Plain-necked Glass Lizard is a Mexican endemic known only from the type locality in San Luis Potosí and at two other localities in Tamaulipas (Lemos-Espinal and Dixon, 2013). This individual was found 2 km NW (airline distance) of Las Antenas (Microondas), Ejido Las Mulas, in the municipality of Victoria. Wilson et al. (2013a) calculated its EVS as 15, placing it in the lower portion of the high vulnerability category. Its conservation status has been gauged as Data Deficient by IUCN, and as endangered by SEMARNAT. © Carlos A. Luna-Aranguré, courtesy of Sergio A. Terán-Juárez

The number of species occurring in a single physiographic region in Tamaulipas ranges from one (in the Sierra de Tamaulipas) to 47 (in the Gran Sierra Plegada). Four of the seven regions have single-digit numbers of single-region species, including the Llanuras de Coahuila y Nuevo León (six), the Llanuras y Lomeríos (two), the Sierra de Tamaulipas (one), and the Sierras y Llanuras Occidentales (four). One region, the Llanura Costera Tamaulipeca, contains 13 such species and the Gran Sierra Plegada, as noted above, has far and away the largest number (47).

The Gran Sierra Plegada is the region in Tamaulipas of greatest conservation significance, because it contains the greatest total number of species (135; including 24 anurans, 11 salamanders, 33 lizards, 62 snakes, and five turtles), the greatest number of single-region species (47; including five anurans, eight salamanders, 13 lizards, 20 snakes, and one turtle), 46 country endemics (93.9% of a total of 49), and eight state endemics (80.0% of a total of 10).

In the following lists, * = endemic to Mexico, ** = endemic to Tamaulipas, *** = non-native to Tamaulipas, and ^{ms} = marine species. The distribution of the following 47 species is restricted to the Gran Sierra Plegada:

*Craugastor batrachylus***
*Craugastor decoratus**
*Eleutherodactylus dennisi***
Eleutherodactylus guttilatus
*Hyla eximia**
*Aquiloeurycea galeanae**
*Aquiloeurycea scandens**
*Chiropterotriton cieloensis***
*Chiropterotriton cracens***
*Chiropterotriton infernalis***
*Chiropterotriton miquihuanus**
*Chiropterotriton multidentatus**
*Isthmura bellii**
*Abronia taeniata**
*Barisia ciliaris**
*Gerrhonotus ophiurus**
*Phrynosoma orbiculare**
*Sceloporus chaneyi**
*Sceloporus minor**
*Sceloporus parvus**
*Sceloporus scalaris**
*Sceloporus spinosus**
*Sceloporus torquatus**
*Plestiodon lynxe**
*Lepidophyma micropholis**
*Xenosaurus platyceps***
*Ficimia hardyi**
*Lampropeltis mexicana**
Pseudelaphe flavirufa
Tantilla wilcoxi
*Adelphicos newmanorum**
Amastridium sapperi
Coniophanes fissidens
Coniophanes imperialis
*Geophis latifrontalis**
Pliocercus elapoides
Epictia phenops
*Storeria hidalgoensis**
Thamnophis cyrtopsis
*Thamnophis exsul**
*Thamnophis mendax***
*Thamnophis pulchrilatus**
Scaphiodontophis annulatus
Crotalus molossus
*Crotalus morulus**
Crotalus pricei
Staurotypus triporcatus

The distribution of the following 13 species is limited to the Llanura Costera Tamaulipeca:

Pseudacris clarki
Siren intermedia
Siren lacertina
*Anolis carolinensis****
Sistrurus catenatus
Caretta caretta^{ms}
Chelonia mydas^{ms}
Eretmochelys imbricata^{ms}

Iguana iguana *Lepidochelys kempii*[ms]
Holbrookia propinqua *Dermochelys coriacea*[ms]
Aspidoscelis sexlineata

The following five species occur only in the Llanuras de Coahuila y Nuevo León:

Spea bombifrons *Urosaurus ornatus*
Coleonyx brevis *Nerodia erythrogaster*
Sceloporus cowlesi

The following four species are found only in the Sierras y Llanuras Occidentales:

Anaxyrus cognatus *Sceloporus cautus**
*Gerrhonotus farri*** *Aspidoscelis inornata*

The following two species are confined to the Llanuras y Lomeríos:

Coniophanes piceivittis *Rena myopica**

A single species is restricted to the Sierra de Tamaulipas:

*Micrurus tamaulipensis***

Finally, no species are limited to the Sierra de San Carlos.

Laemanctus serratus Cope, 1864. The Serrated Casque-headed Iguana occurs "along the Atlantic versant from central Tamaulipas to northwestern Honduras, including the northern part of the Yucatan Peninsula" (Lemos-Espinal and Dixon, 2013: 103). This individual was found in tropical deciduous forest at Gómez Farías, in the municipality of Gómez Farías. Wilson et al. (2013a) ascertained its EVS as 8, placing it in the upper portion of the low vulnerability category. Its conservation status has been determined as Least Concern by IUCN, and as a species of special protection by SEMARNAT. © Elí García-Padilla

Anelytropsis papillosus Cope, 1895. The Mexican Blind Lizard, the only member of the family Dibamidae in the New World, is endemic to Mexico. This lizard is distributed "from southwestern Tamaulipas, central and eastern San Luis Potosí, eastern Querétaro, and central Veracruz" (Lemos-Espinal and Dixon, 2013: 108). This individual came from near Ejido El Huizachal, in the municipality of Victoria. Wilson et al. (2013a) determined its EVS as 10, placing it at the lower end of the medium vulnerability category. Its conservation status has been judged as Least Concern by IUCN, and as threatened by SEMARNAT. © Sergio A. Terán-Juárez

We constructed a Coefficient of Biogeographic Resemblance (CBR) matrix (Table 6) to elucidate the herpetofaunal relationships among the seven physiographic regions. The number of shared species ranges from six to 73. The lower value is found between the Sierra de Tamaulipas and the Sierras y Llanuras Occidentales pairing; the higher value is that between the Llanuras y Lomeríos and Gran Sierra Plegada regions (Table 6). The mean number of shared species is 29.6. Generally speaking, the higher the numbers of species in the regional pairings, the higher the number of shared species. At the higher end, 73 species are shared between the two highest-species regions, the Gran Sierra Plegada (135 species) and the Llanuras y Lomeríos (91). At the lower end, six species are shared between the Sierra de Tamaulipas (51) and the Sierras y Llanuras Occidentales (30). For most regions, the highest number of species shared is with another region that shares a common border or one that is physiographically similar, e.g., comprises mountains (Table 6), as indicated below (numbers in parentheses are the regional herpetofaunal values; the number connecting the two regions is the shared species value):

Llanuras de Coahuila y Nuevo León (45)—38—Llanura Costera Tamaulipeca (81)

Llanura Costera Tamaulipeca (81)—62—Llanuras y Lomeríos (91)

Sierra de San Carlos (37)—31—Llanuras y Lomeríos (91) and Gran Sierra Plegada (135)

Llanuras y Lomeríos (91)—73—Gran Sierra Plegada (135)

Sierra de Tamaulipas (51)—47—Gran Sierra Plegada (135)

Gran Sierra Plegada (135)—73—Llanuras y Lomeríos (91)

Sierra y Llanuras Occidentales (30)—20—Gran Sierra Plegada (135)

Five of the seven comparisons involve the Gran Sierra Plegada, the physiographic region with the highest number of resident species. This region, a segment of the Sierra Madre Oriental, is bounded to the west by the Sierras y Llanuras Occidentales and to the east by Llanuras y Lomeríos. Like the Gran Sierra Plegada, the Sierra de San Carlos and Sierra de Tamaulipas are montane areas. Containing 135 species, the Gran Sierra Plegada comprises 73.4% of the entire state herpetofauna of 184 species.

The CBR data in Table 6 denote a range of values from 0.15 to 0.72. The lowest value is that between the Sierra de Tamaulipas and the Sierras y Llanuras Occidentales. The greatest value is that between the Llanura Costera Tamaulipeca and Llanuras y Lomeríos. These two regions share a relatively long common border (Fig. 1) and comprise principally lowland regions that grade into one another. The greatest degrees of resemblance for the other five regions are as follows:

Llanuras de Coahuila y Nuevo León (45)—0.60—Llanura Costera Tamaulipeca (81)

Sierra de San Carlos (37)—0.55—Sierra de Tamaulipas (51)

Sierra de Tamaulipas (51)—0.59—Llanuras y Lomeríos (91)

Gran Sierra Plegada (135)—0.65—Llanuras y Lomeríos (91)

Sierras y Llanuras Occidentales (30)—0.28—Llanuras y Lomeríos (91)

Interestingly, in contrast to the picture illustrated by the absolute regional numbers, four of the seven CBR comparisons involve the Llanuras y Lomeríos instead of the Gran Sierra Plegada. The Llanuras y Lomeríos region shares relatively long borders with the Llanura Costera Tamaulipeca and the Gran Sierra Plegada, and encompasses the Sierra de Tamaulipas. The Llanuras y Lomeríos is separated only from the Sierras y Llanuras Occidentales by the Gran Sierra Plegada.

Table 6. Pair-wise comparison matrix of Coefficient of Biogeographic Resemblance (CBR) data of herpetofaunal relationships for the seven physiographic regions in Tamaulipas, 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 2. for the UPGMA dendrogram produced from the CBR data.

	CN	CT	SC	LL	ST	GS	SO
CN	**45**	38	21	34	17	22	8
CT	0.60	**81**	28	62	32	47	13
SC	0.51	0.47	**37**	31	24	31	8
LL	0.50	0.72	0.48	**91**	42	73	17
ST	0.35	0.48	0.55	0.59	**51**	47	6
GS	0.24	0.44	0.36	0.65	0.51	**135**	20
SO	0.21	0.23	0.24	0.28	0.15	0.24	**30**

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 indicate that two lowland regions (Llanura Coastera Tamaulipeca [CT] and Llanuras y Lomerios [LL]) contain the highest resemblance factor (0.72) and both have contiguous sections that extend along the entire Gulf Coastal Plain from the United States to the Veracruz border. The Llanuras de Coahuila y Nuevo León (CN) region, another lowland area, which directly abuts CT and narrowly parallels the Rio Grande to the northwest, completes a cluster of the three interconnected mentioned lowland regions, although they do not have particularly high resemblance values (average = 0.61). All three areas share some mostly dry-adapted vegetation structure although CN becomes drier as it ascends the Rio Grande Valley and the LL region becomes more mesic as it extends south and westward. The Sierra de Tamaulipas (ST), the Gran Sierra Plegada (GS), and the Sierra de San Carlos (SC) are moderately elevated

and reflect changing habitats based on elevational zonation and moisture availability; all have at least one side connected directly to lowland regions and ST and SC cluster together (0.55 level) even though they are isolated from each other by the lowlands of the coastal plain. The herpetofaunal resemblance of ST and SC cluster with the three lowland regions, but at a fairly low level (0.46); GS clusters with the lowland regions and the ST and SC highland masses at a lower level (0.44) of resemblance, suggesting that the herpetofauna within all regions are somewhat distinctive when compared to each other. By far the most distinctive physiographic region is the Sierras y Llanuras Occidentales (SO), which clusters with all other regions combined at the 0.23 level, and has the fewest number of species (30). It also abuts the GS region, which has the highest species richness (135) in Tamaulipas. Reasons for the small number of species in SO and the low resemblance to other regions most likely are due to its small size, higher elevations, dry conditions, and predominance of desert scrub vegetation. The GS region to the east of SO has the most variable habitat types, including mountainous and lowland types, and is more mesic on the eastern slopes than the other mountainous regions.

The general patterns from the UPGMA data indicate that the amount of lower elevation habitats within a region generally reflects more species than regions containing mostly high elevation sections. The size of a region also influences species richness, especially if containing heterogeneous habitats. The highest number of species is found in regions having both mountainous and lowland environments, and share species with each environmental group from other regions.

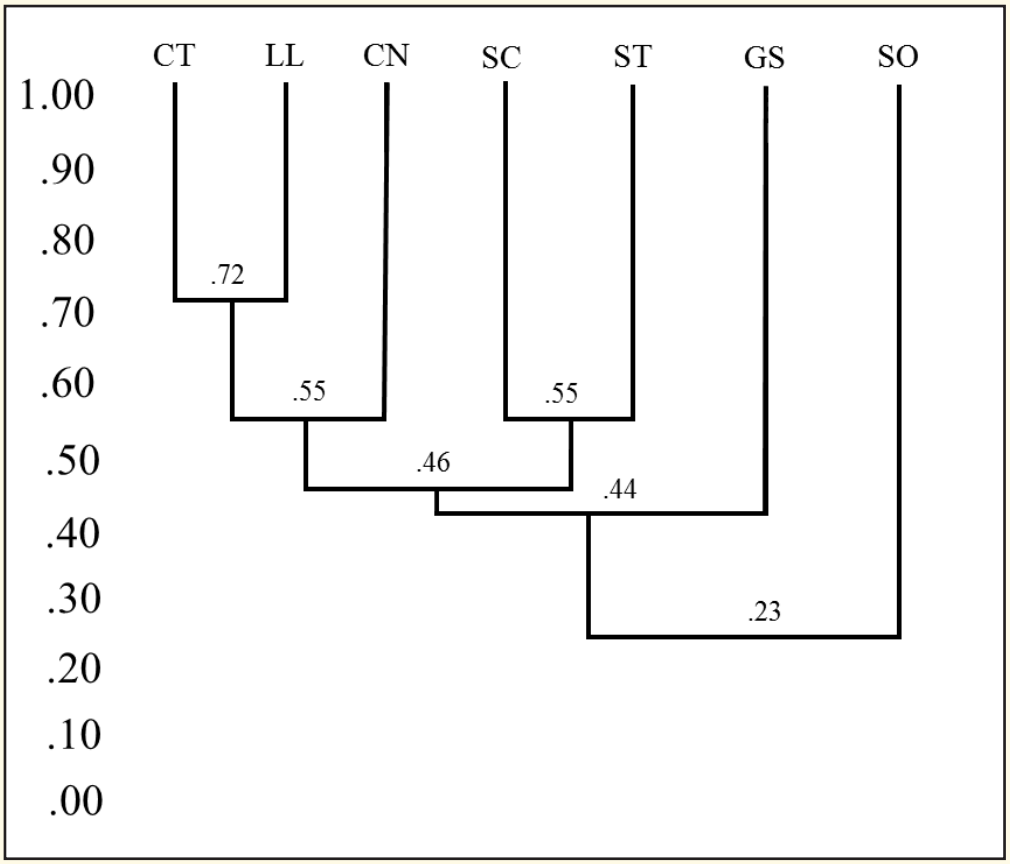

Fig. 2. A UPGMA generated dendrogram illustrating the similarity relationships of species richness among the herpetofaunas of the seven physiographic regions of Tamaulipas (based on data in Table 6). See Table 4 for explanation of abbreviations. We calculated the similarity values using Duellman's (1990)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

Phrynosoma modestum Girard, 1852. The Round-tailed Horned Lizard ranges "from southeastern Arizona to western Texas and southeastern Colorado, in the United States, southward in Mexico through Chihuahua, east of the Sierra Madre Occidental (except for the northwestern portion), to San Luis Potosí" (Lemos-Espinal and Dixon, 2013: 121) and southern Tamaulipas. This individual was found near Ejido Magdaleno Cedillo, in the municipality of Tula. Wilson et al. (2013a) calculated its EVS as 12, placing it in the middle portion of the medium vulnerability category. Its conservation status has been placed as Least Concern by IUCN, and this species is not listed by SEMARNAT.
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Phrynosoma orbiculare (Linnaeus, 1758). The Mountain Horned Lizard is a Mexican endemic species that occurs "from eastern Sonora and western Chihuahua southward through the mountains of Durango, Zacatecas, Aguascalientes, Jalisco, and Michoacán, and from the mountains of southern Nuevo León southward through San Luis Potosí, Querétaro, Hidalgo, Veracruz, and westward through Puebla, Tlaxcala, Mexico, the Distrito Federal, and Morelos" (Lemos-Espinal and Dixon, 2013: 122). Bryson et al. (2011) noted, however, that this species probably is comprised of several distinct lineages, of which some appear to have small distributions and long independent evolutionary histories, and that some of these lineages merit additional consideration for protection. This individual was found in a transition area between pine-oak forest and xerophytic vegetation at Ejido La Marcela, in the municipality of Miquihuana. Wilson et al. (2013a) calculated its EVS as 12, placing it in the upper half of the medium vulnerability category. Its conservation status has been reported as Least Concern by IUCN, and as threatened by SEMARNAT.
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DISTRIBUTIONAL STATUS CATEGORIZATIONS

We utilized the system developed by Alvarado-Díaz et al. (2013) and also used by Mata-Silva et al. (2015) and Johnson et al. (2015a) to categorize the distributional status of the members of the Tamaulipan herpetofauna. We located these data in Table 7, and summarize them in Table 8.

As might be expected of a Mexican state that shares a border with the United States, a significant number of species lie in the non-Mexican endemic category. Of a total herpetofauna of 184 species, 120 (65.2%) fall into this category. Interestingly, this is a higher percentage than that seen in Chiapas (41.4%), one of the states that border Central America, the major region south of Mexico.

The next highest category of species includes the country endemics, numbering 49 (26.6%). Relatively few species are endemic to Tamaulipas (10; 5.4%), and only five (2.7%) are non-native to the state.

The non-endemic species are composed of 24 anurans, three salamanders, one crocodylian, 24 lizards, 56 snakes, and 12 turtles. The country endemics amount to five anurans, seven salamanders, 19 lizards, 15 snakes, and three turtles. The Tamaulipan endemics comprise two anurans (*Craugastor batrachylus* and *Eleutherodactylus dennisi*), three salamanders (*Chiropterotriton cieloensis*, *C. cracens*, and *C. infernalis*), two lizards (*Gerrhonotus farri* and *Xenosaurus platyceps*), and three snakes (*Micrurus tamaulipensis*, *Rena iversoni*, and *Thamnophis mendax*). The five non-native species include four lizards (*Anolis carolinensis*, *Norops sagrei*, *Hemidactylus frenatus*, and *H. turcicus*), and one snake (*Indotyphlops braminus*).

Of the 184 species recorded from Tamaulipas, 59 (32.1%) are endemic to Mexico, including the country and state endemics. Interestingly, the percentage is significantly higher than the comparable figure for Chiapas (Johnson et al., 2015a), which is 17.6%; the absolute figures for the two states, however, are almost the same (59 for Tamaulipas, 58 for Chiapas). The number of Mexican endemics in Tamaulipas is 7.7% of the 762 species presently known as endemic to Mexico (J. Johnson, unpublished).

Table 7. Distributional and conservation status measures for members of the herpetofauna of Tamaulipas, Mexico. Distributional Status: SE = endemic to state of Tamaulipas; 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.

Taxa	Distributional Status	Environmental Vulnerability Category (Score)	IUCN Categorization	SEMARNAT Status
Anaxyrus cognatus	NE	L (9)	LC	NS
Anaxyrus debilis	NE	L (7)	LC	Pr
Anaxyrus punctatus	NE	L (5)	LC	NS
Anaxyrus speciosus	NE	M (12)	LC	NS
Incilius nebulifer	NE	L (6)	LC	NS
Rhinella marina	NE	L (3)	LC	NS
Craugastor augusti	NE	L (8)	LC	NS
*Craugastor batrachylus***	SE	H (18)	DD	Pr
*Craugastor decoratus**	CE	H (15)	VU	Pr
Eleutherodactylus cystignathoides	NE	M (12)	LC	NS
*Eleutherodactylus dennisi***	SE	H (18)	EN	Pr
Eleutherodactylus guttilatus	NE	M (11)	LC	NS
*Eleutherodactylus longipes**	CE	H (15)	VU	NS
*Eleutherodactylus verrucipes**	CE	H (16)	VU	Pr
*Ecnomiohyla miotympanum**	CE	L (9)	NT	NS
*Hyla eximia**	CE	M (10)	LC	NS
Pseudacris clarkii	NE	M (12)	LC	NS

Scinax staufferi	NE	L (4)	LC	NS
Smilisca baudinii	NE	L (3)	LC	NS
Trachycephalus typhonius	NE	L (4)	LC	NS
Leptodactylus fragilis	NE	L (5)	LC	NS
Leptodactylus melanonotus	NE	L (6)	LC	NS
Gastrophryne elegans	NE	L (8)	LC	Pr
Gastrophryne olivacea	NE	L (9)	LC	Pr
Hypopachus variolosus	NE	L (4)	LC	NS
Lithobates berlandieri	NE	L (7)	LC	Pr
Lithobates catesbeianus	NE	M (10)	LC	NS
Rhinophrynus dorsalis	NE	L (8)	LC	Pr
Scaphiopus couchii	NE	L (3)	LC	NS
Spea bombifrons	NE	M (10)	LC	NS
Spea multiplicata	NE	L (6)	LC	NS
*Aquiloeurycea cephalica**	CE	H (14)	NT	A
*Aquiloeurycea galeanae**	CE	H (18)	NT	A
*Aquiloeurycea scandens**	CE	H (17)	VU	Pr
*Bolitoglossa platydactyla**	CE	H (15)	NT	Pr
*Chiropterotriton cieloensis***	SE	H (17)	NE	NS
*Chiropterotriton cracens***	SE	H (17)	EN	NS
*Chiropterotriton infernalis***	SE	H (18)	NE	NS
*Chiropterotriton miquihuanus**	CE	H (18)	NE	NS
*Chiropterotriton multidentatus**	CE	H (15)	EN	Pr
*Isthmura bellii**	CE	M (12)	VU	A
Notophthalmus meridionalis	NE	M (12)	EN	P
Siren intermedia	NE	M (12)	LC	A
Siren lacertina	NE	M (12)	LC	A
Crocodylus moreletii	NE	M (13)	LC	Pr
*Abronia taeniata**	CE	H (15)	VU	Pr
*Barisia ciliaris**	CE	H (15)	NE	NS
*Gerrhonotus farri***	SE	H (17)	NE	NS
Gerrhonotus infernalis	NE	M (13)	LC	NS
*Gerrhonotus ophiurus**	CE	M (12)	LC	NS
*Ophisaurus incomptus**	CE	H (15)	DD	P
Laemanctus serratus	NE	L (8)	LC	Pr
Crotaphytus collaris	NE	M (13)	LC	A
Crotaphytus reticulatus	NE	M (12)	VU	A
*Anolis carolinensis****	NN	—	—	—
*Norops sagrei****	NN	—	—	—
Norops sericeus	NE	L (8)	NE	NS
*Anelytropsis papillosus**	CE	M (10)	LC	A
Coleonyx brevis	NE	H (14)	LC	Pr
*Hemidactylus frenatus****	NN	—	—	—
*Hemidactylus turcicus****	NN	—	—	—
Ctenosaura acanthura	NE	M (12)	NE	Pr
Iguana iguana	NE	M (12)	NE	Pr
Cophosaurus texanus	NE	H (14)	LC	A
Holbrookia propinqua	NE	H (15)	LC	NS
Phrynosoma cornutum	NE	M (11)	LC	NS
Phrynosoma modestum	NE	M (12)	LC	NS
*Phrynosoma orbiculare**	CE	M (12)	LC	A
*Sceloporus cautus**	CE	H (15)	LC	NS
*Sceloporus chaneyi**	CE	H (15)	EN	NS
Sceloporus cowlesi	NE	M (13)	NE	NS
Sceloporus cyanogenys	NE	M (13)	NE	NS
Sceloporus grammicus	NE	L (9)	LC	Pr

*Sceloporus minor**	CE	H (14)	LC	NS
Sceloporus olivaceus	NE	M (13)	LC	NS
*Sceloporus parvus**	CE	H (15)	LC	NS
*Sceloporus scalaris**	CE	M (12)	LC	NS
*Sceloporus spinosus**	CE	M (12)	LC	NS
*Sceloporus torquatus**	CE	M (11)	LC	NS
Sceloporus variabilis	NE	L (5)	LC	NS
Urosaurus ornatus	NE	M (10)	LC	NS
*Plestiodon dicei**	CE	M (12)	NE	NS
*Plestiodon lynxe**	CE	M (10)	LC	Pr
Plestiodon obsoletus	NE	M (11)	LC	NS
Plestiodon tetragrammus	NE	M (12)	LC	NS
*Scincella silvicola**	CE	M (12)	LC	A
Aspidoscelis gularis	NE	L (9)	LC	NS
Aspidoscelis inornata	NE	H (14)	LC	NS
Aspidoscelis laredoensis	NE	H (14)	LC	NS
Aspidoscelis sexlineata	NE	H (14)	LC	NS
*Holcosus amphigrammus**	CE	M (11)	NE	NS
*Lepidophyma micropholis**	CE	H (15)	VU	A
*Lepidophyma sylvaticum**	CE	M (11)	LC	Pr
*Xenosaurus platyceps***	SE	H (14)	EN	Pr
Boa imperator	NE	M (10)	NE	A
Arizona elegans	NE	L (5)	LC	NS
Coluber constrictor	NE	M (10)	LC	A
Drymarchon melanurus	NE	L (6)	LC	NS
Drymobius margaritiferus	NE	L (6)	NE	NS
*Ficimia hardyi**	CE	M (13)	EN	NS
*Ficimia olivacea**	CE	L (9)	NE	NS
Ficimia streckeri	NE	M (12)	LC	NS
Lampropeltis annulata	NE	M (12)	NE	NS
*Lampropeltis mexicana**	CE	H (15)	LC	A
Lampropeltis splendida	NE	M (12)	NE	NS
Leptophis mexicanus	NE	L (6)	LC	A
Masticophis flagellum	NE	L (8)	LC	A
Masticophis mentovarius	NE	L (6)	NE	A
Masticophis schotti	NE	M (13)	LC	NS
Mastigodryas melanolomus	NE	L (6)	LC	NS
Opheodrys aestivus	NE	M (13)	LC	NS
Oxybelis aeneus	NE	L (5)	NE	NS
Pantherophis bairdi	NE	H (15)	LC	NS
Pantherophis emoryi	NE	M (13)	LC	NS
Pituophis catenifer	NE	L (9)	LC	NS
*Pituophis deppei**	CE	H (14)	LC	A
Pseudelaphe flavirufa	NE	M (10)	LC	NS
Rhinocheilus lecontei	NE	L (8)	LC	NS
Salvadora grahamiae	NE	M (10)	LC	NS
Senticolis triaspis	NE	L (6)	LC	NS
Sonora semiannulata	NE	L (5)	LC	NS
Spilotes pullatus	NE	L (6)	NE	NS
Tantilla atriceps	NE	M (11)	LC	A
Tantilla nigriceps	NE	M (11)	LC	NS
Tantilla rubra	NE	L (5)	LC	Pr
Tantilla wilcoxi	NE	M (10)	LC	NS
*Trimorphodon tau**	CE	M (13)	LC	NS
*Adelphicos newmanorum**	CE	M (12)	NE	NS
Amastridium sapperi	NE	M (10)	LC	NS

Coniophanes fissidens	NE	L (7)	NE	NS
Coniophanes imperialis	NE	L (8)	LC	NS
Coniophanes piceivittis	NE	L (7)	LC	NS
*Geophis latifrontalis**	CE	H (14)	DD	Pr
Heterodon kennerlyi	NE	M (11)	NE	NS
Hypsiglena jani	NE	L (6)	NE	NS
Imantodes cenchoa	NE	L (6)	NE	Pr
Leptodeira maculata	NE	L (7)	LC	Pr
Leptodeira septentrionalis	NE	L (8)	NE	NS
Pliocercus elapoides	NE	M (10)	LC	NS
*Rhadinaea gaigeae**	CE	M (12)	DD	NS
Tropidodipsas fasciata	NE	M (10)	NE	NS
Tropidodipsas sartorii	NE	L (9)	LC	Pr
*Micrurus tamaulipensis***	SE	H (19)	DD	NS
Micrurus tener	NE	M (11)	LC	NS
Epictia phenops	NE	L (4)	NE	NS
Rena dulcis	NE	M (13)	LC	NS
*Rena iversoni***	SE	H (15)	NE	NS
*Rena myopica**	CE	M (13)	LC	NS
Nerodia erythrogaster	NE	M (11)	LC	A
Nerodia rhombifer	NE	M (10)	LC	NS
Storeria dekayi	NE	L (7)	LC	NS
*Storeria hidalgoensis**	CE	M (13)	VU	NS
Thamnophis cyrtopsis	NE	L (7)	LC	NS
*Thamnophis exsul**	CE	H (16)	LC	A
Thamnophis marcianus	NE	M (10)	LC	A
*Thamnophis mendax***	SE	H (14)	EN	A
Thamnophis proximus	NE	L (7)	LC	A
*Thamnophis pulchrilatus**	CE	H (15)	LC	NS
Scaphiodontophis annulatus	NE	M (11)	LC	NS
*Indotyphlops braminus****	NN	—	—	—
*Agkistrodon taylori**	CE	H (17)	LC	A
Bothrops asper	NE	M (12)	NE	NS
Crotalus atrox	NE	L (9)	LC	Pr
Crotalus molossus	NE	L (8)	LC	Pr
*Crotalus morulus**	CE	H (16)	NE	NS
Crotalus pricei	NE	H (14)	LC	Pr
Crotalus scutulatus	NE	M (11)	LC	Pr
*Crotalus totonacus**	CE	H (17)	NE	NS
Sistrurus catenatus	NE	M (13)	LC	Pr
Caretta caretta[ms]	NE	—	EN	P
Chelonia mydas[ms]	NE	—	EN	P
Eretmochelys imbricata[ms]	NE	—	CR	P
Lepidochelys kempii[ms]	NE	—	CR	P
Dermochelys coriacea[ms]	NE	—	VU	P
Pseudemys gorzugi	NE	H (16)	NT	A
*Terrapene mexicana**	CE	H (19)	NE	NS
Trachemys venusta	NE	M (13)	VU	Pr
Kinosternon flavescens	NE	M (12)	LC	NS
*Kinosternon herrerai**	CE	H (14)	NT	Pr
*Kinosternon integrum**	CE	M (11)	LC	Pr
Kinosternon scorpioides	NE	M (10)	NE	Pr
Staurotypus triporcatus	NE	H (14)	NT	A
Gopherus berlandieri	NE	H (18)	LC	A
Apalone spinifera	NE	H (15)	LC	Pr

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

Families	Number of Species	Distributional Status			
		Non-endemic (NE)	Country Endemic (CE)	State Endemic (SE)	Non-native (NN)
Bufonidae	6	6	—	—	—
Craugastoridae	3	1	1	1	—
Eleutherodactylidae	5	2	2	1	—
Hylidae	6	4	2	—	—
Leptodactylidae	2	2	—	—	—
Microhylidae	3	3	—	—	—
Ranidae	2	2	—	—	—
Rhinophrynidae	1	1	—	—	—
Scaphiopodidae	3	3	—	—	—
Subtotals	**31**	**24**	**5**	**2**	**—**
Plethodontidae	10	—	7	3	—
Salamandridae	1	1	—	—	—
Sirenidae	2	2	—	—	—
Subtotals	**13**	**3**	**7**	**3**	**—**
Totals	**44**	**27**	**12**	**5**	**—**
Crocodylidae	1	1	—	—	—
Subtotals	**1**	**1**	**—**	**—**	**—**
Anguidae	6	1	4	1	—
Corytophanidae	1	1	—	—	—
Crotaphytidae	2	2	—	—	—
Dactyloidae	3	2	—	—	1
Dibamidae	1	—	1	—	—
Eublepharidae	1	1	—	—	—
Gekkonidae	2	—	—	—	2
Iguanidae	2	2	—	—	—
Phrynosomatidae	18	10	8	—	—
Scincidae	4	2	2	—	—
Sphenomorphidae	1	—	1	—	—
Teiidae	5	4	1	—	—
Xantusiidae	2	—	2	—	—
Xenosauridae	1	—	—	1	—
Subtotals	**49**	**25**	**19**	**2**	**3**
Boidae	1	1	—	—	—
Colubridae	32	27	5	—	—
Dipsadidae	15	12	3	—	—
Elapidae	2	1	—	1	—
Leptotyphlopidae	4	2	1	1	—
Natricidae	10	6	3	1	—
Sibynophiidae	1	1	—	—	—
Typhlopidae	1	—	—	—	1
Viperidae	9	6	3	—	—
Subtotals	**75**	**56**	**15**	**3**	**1**
Cheloniidae	4	4	—	—	—
Dermochelyidae	1	1	—	—	—
Emydidae	3	2	1	—	—
Kinosternidae	4	2	2	—	—
Staurotypidae	1	1	—	—	—
Testudinidae	1	1	—	—	—
Trionychidae	1	1	—	—	—
Subtotals	**15**	**12**	**3**	**—**	**—**
Totals	**140**	**94**	**37**	**5**	**4**
Sum Totals	**184**	**119**	**49**	**10**	**4**

Sceloporus chaneyi Liner and Dixon, 1992. Chaney's Spiny Lizard is a Mexican endemic distributed in the region of Cerro Peña Nevada in Nuevo León, and the vicinity of Tapalpa, Tamaulipas (www.reptile-database.org; accessed 2 December 2015). This individual came from Ejido La Marcela, in the municipality of Miquihuana. Wilson et al. (2013a) determined its EVS as 15, placing it in the lower portion of the high vulnerability category. Its conservation status has been assessed as Endangered by IUCN, and this species is not listed by SEMARNAT.
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COMMENTS ON THE SPECIES LISTS

Speculative distributional accounts of *Chelydra serpentinia* occurring in Tamaulipas directly south of the Rio Grande are available (see Legler and Vogt, 2013). Dixon's (2013) book on the herpetofauna of Texas shows the species only occurring in that area in Hidalgo County, which borders the Rio Grande in the far southern portion of the state. He based his evidence on a specimen (TCWC 93912) caught in a pond on 30 May 2009 and reported by Dickerson et al. (2009), based on research funded by the Texas Parks and Wildlife Department's freshwater turtle assessment grant to M. R. J. Forstner, Texas State University. Legler and Vogt (2013) mentioned that the turtle occurs in canals on both sides of the Rio Grande based on personal communications with A. Rentfro and M. Forstner. Recently, we contacted Mike Forstner to inquire if any voucher material was collected during the sightings, and he replied that they had observed the species in Tamaulipas but were unable gather voucher specimens. Thus, even though *Chelydra serpentina* most assuredly does or did occur in northern Tamaulipas in aquatic habitats, at least in the vicinity to the Rio Grande across from Hidalgo County, Texas, we did not list the species in Table 4 because no verified records are available. The existence of the species in Hidalgo County, Texas, and adjacent Tamaulipas, might well be due to human facilitated introductions, as implied by Dixon's (2013) map.

The status of the *Trachemys scripta* group of turtles has a contentious taxonomic history (see Johnson et al. 2015b), although many turtle taxonomists agree that the species group is underestimated highly with respect to the number of species it contains. We now consider one native species to occur in Tamaulipas, *T. venusta*, based on Parham et al.'s (2015) evidence for removing it from the synonymy of *T. ornata*. Nonetheless, we recognize the possibility that *T. scripta* (the Elegans pattern class) occurs in the extreme northern portion of the state along the Rio Grande. Legler and Vogt (2013) took this position, although they did not provide evidence of voucher material or indicated if populations are native or came from escaped or released pets, which probably are common incidences in Mexico and the United States. Because this problem is not resolved, we did not include *T. scripta* as a verified member of the Tamaulipan herpetofauna.

We included *Staurotypus triporcatus* in our list, based on the report by Terán-Juarez et al. (2015), who indicated this species as non-native in the state. Herein, however, we regard this species as native to Tamaulipas, until evidence is available to support its presence as a result of human introduction.

To date, the distributional status of *Norops sagrei* in Tamaulipas remains unclear, and is based on information provided by Terán-Juárez et al. (2015). Presumably, this species was introduced as a result of human related activities, but because of the high vagility of this species this view needs to be substantiated. Thus, herein we regard *N. sagrei* as a non-native species in Tamaulipas.

Following Leache (2009), we included *Sceloporus cowlesi*, a member of the *Sceloporus undulatus* complex, in our herpetofaunal list.

We also included *Sistrurus catenatus* in the state's herpetofaunal list based on two specimens (USNM 507 and USNM 509) deposited in the Smithsonian Institution, National Museum of Natural History. USNM 507 was collected on the "south bank of Río Grande," Tamaulipas (with no specific locality data). Presumably, *S. catenatus* occurs, or occurred until fairly recently, in northern Tamaulipas (Jan and Sordelli, 1874, cited *In* Campbell and Lamar, 2004).

Lepidophyma micropholis Walker, 1955. The Tropical Cave Night Lizard is a Mexican endemic "known only from extreme southeastern Tamaulipas and eastern San Luis Potosí" (Lemos-Espinal and Dixon, 2013: 153). This individual is from Cueva del Tigre near Gómez Farías, in the municipality of Gómez Farías. Wilson et al. (2013a) calculated its EVS as 15, placing it in the lower portion of the high vulnerability category. Its conservation status has been allocated as Vulnerable by IUCN, and as threatened by SEMARNAT. © Elí García-Padilla

Finally, we designed Table 19, in which we provide a herpetofaunal list for five Natural Protected Areas in Tamaulipas, based on the few available sources. Nonetheless, most of these sources are not in-depth studies, and some contain inaccuracies. For this reason, we are providing a revised list for each of the five Natural Protected Areas based entirely on published or vouchered records. For example, Lavín-Murcio et al. (2005) reported four species (*Pituophis catenifer*, *P. deppei*, *Crotalus pricei*, and *C. scutulatus*) as occurring in El Cielo Biosphere Reserve, but we question their presence in this area. Consequently, based on our own field experience and lack of properly published records or vouchers, we did not include these species for El Cielo. We noticed similar inconsistences with the available herpetofaunal lists for the remaining Natural Protected Areas, particularly in sources called Planes de Manejo de la Comisión Nacional de Areas Naturales Protegidas (CONANP). Similarly, we did not include these inconsistencies in Table 19.

CONSERVATION STATUS

We utilized the same three systems as Alvarado-Díaz et al. (2013), Mata-Silva et al. (2015), and Johnson et al. (2015a) to analyze the conservation status of the Tamaulipan herpetofauna. Except where updates were necessary, we drew 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 often is used to estimate the conservation status of members of the Mexican herpetofauna, most prominently by Mexican nationals (Johnson et al., 2015a). We include the ratings available for members of the Tamaulipan herpetofauna based on this system in Table 7 and summarize them in Table 9 (excluding the five non-native species).

Xenosaurus platyceps King and Thompson, 1968. The Flat-headed Knob-scaled Lizard is known only from the state of Tamaulipas, ranging from Ciudad Victoria southwest to Jaumave, and east and southeast to the Reserva de la Biósfera El Cielo (Lemos-Espinal et al., 2012). This individual came from cloud forest in the vicinity of Ejido Altacimas, in the municipality of Gómez Farías. Wilson et al. (2013a) calculated its EVS as 14, placing it at the lower end of the high vulnerability category. Its conservation status has been judged as Endangered by IUCN, and as a species of special protection by SEMARNAT. © Elí García-Padilla

Table 9. SEMARNAT categorizations for herpetofaunal species in Tamaulipas, 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	6	—	—	1	5
Craugastoridae	3	—	—	2	1
Eleutherodactylidae	5	—	—	2	3
Hylidae	6	—	—	—	6
Leptodactylidae	2	—	—	—	2
Microhylidae	3	—	—	2	1
Ranidae	2	—	—	1	1
Rhinophrynidae	1	—	—	1	—
Scaphiopodidae	3	—	—	—	3
Subtotals	**31**	**—**	**—**	**9**	**22**
Plethodontidae	10	—	3	3	4
Salamandridae	1	1	—	—	—
Sirenidae	2	—	2	—	—
Subtotals	**13**	**1**	**5**	**3**	**4**
Totals	**44**	**1**	**5**	**12**	**26**
Crocodylidae	1	—	—	1	—
Subtotals	**1**	**—**	**—**	**1**	**—**
Anguidae	6	1	—	1	4
Corytophanidae	1	—	—	1	—
Crotaphytidae	2	—	2	—	—
Dactyloidae	1	—	—	—	1
Dibamidae	1	—	1	—	—
Eublepharidae	1	—	—	1	—
Iguanidae	2	—	—	2	—
Phrynosomatidae	18	—	2	1	15
Scincidae	4	—	—	1	3
Sphenomorphidae	1	—	1	—	—
Teiidae	5	—	—	—	5
Xantusiidae	2	—	1	1	—
Xenosauridae	1	—	—	1	—
Subtotals	**45**	**1**	**7**	**9**	**28**
Boidae	1	—	1	—	—
Colubridae	32	—	7	1	24
Dipsadidae	15	—	—	4	11
Elapidae	2	—	—	—	2
Leptotyphlopidae	4	—	—	—	4
Natricidae	10	—	5	—	5
Sibynophiidae	1	—	—	—	1
Viperidae	9	—	1	5	3
Subtotals	**74**	**—**	**14**	**10**	**50**
Cheloniidae	4	4	—	—	—
Dermochelyidae	1	1	—	—	—
Emydidae	3	—	1	1	1
Kinosternidae	4	—	—	3	1
Staurotypidae	1	—	1	—	—
Testudinidae	1	—	1	—	—
Trionychidae	1	—	—	1	—
Subtotals	**15**	**5**	**3**	**5**	**2**
Totals	**135**	**6**	**24**	**25**	**80**
Sum Totals	**179**	**7**	**29**	**37**	**106**

Drymarchon melanurus (Duméril, Bibron, & Duméril, 1854). The Black-tailed Cribo is distributed "from south-central Texas, USA, on the Atlantic versant and from southern Sonora, Mexico, on the Pacific versant to northern Venezuela and northwestern Peru…It also occurs on the Islas Tres Marías, Nayarit, Mexico, and on the Islas de la Bahía and Isla del Tigre, Honduras" (McCranie, 2011: 114). This individual was found in tropical deciduous forest near Gómez Farías, in the municipality of Gomez Farías. Wilson et al. (2013a) ascertained its EVS as 6, placing it in the middle of the low vulnerability category. Its conservation status has been established as Least Concern by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

Leptophis mexicanus (Duméril, Bibron, & Duméril, 1854). The Mesoamerican Parrot Snake is distributed "on the Atlantic versant from southern Tamaulipas, Mexico, to north-central Costa Rica and discontinuously on the Pacific versant from eastern Oaxaca, Mexico, to northwestern Costa Rica" (McCranie, 2011: 146). This individual was found in tropical deciduous forest near Gómez Farías, in the municipality of Gómez Farías. Wilson et al. (2013a) determined its EVS as 6, placing it in the middle of the low vulnerability category. Its conservation status has been reported as Least Concern by IUCN, and as threatened by SEMARNAT. © Elí García-Padilla

The SEMARNAT system is comprised of three categories: endangered (P), threatened (A), and of special protection (Pr). From the work on the herpetofaunas of Michoacán (Alvarado-Díaz et al., 2013), Oaxaca (Mata-Silva et al., 2015), and Chiapas (Johnson et al., 2015a), many species evidently remain unallocated to any of these three categories, and like the above authors we placed them in a "no status" (NS) category.

Of the 179 species that make up the native herpetofauna of Tamaulipas, 106 (59.2%) have not been evaluated (i.e., NS species), which is almost the same percentage of these species for Chiapas (58.0%; Johnson et al., 2015a) and fairly close to the percentages for Oaxaca (52.3%; Mata-Silva et al., 2015) and Michoacán (46.2%; Alvarado-Díaz et al., 2013). Of the remaining 73 species, 37 (20.7% of 179) have been placed in the Pr category, 29 (16.2%) in the A category, and seven (3.9%) in the P category. These proportions are similar, respectively, to those (58.0%, 29.8%, 9.8%, and 2.5%) calculated for Chiapas by Johnson et al. (2015a), those (52.3%, 32.5%, 13.6%, and 1.6%) determined for Oaxaca by Mata-Silva et al. (2015), and those (46.2%, 37.1%, 14.6%, and 1.9%) figured for Michoacán by Alvarado-Díaz et al. (2013).

Since more than one-half of the species occurring in Tamaulipas have not been assessed by the SEMARNAT system, this system is of little use in evaluating the conservation status of the members of the state's herpetofauna. Of seven endangered (P) species, one is a salamandrid salamander, one is an anguid lizard, and five are sea turtles. Of the 29 threatened (A) species, the majority are salamanders (five species in two families), lizards (seven species in five families), and snakes (14 species in four families), and the remainder turtles (three species in three families).

Oxybelis aeneus (Wagler, in Spix, 1824). The Brown Vinesnake is broadly distributed "from south-central Nuevo León, Mexico, on the Atlantic versant and extreme southern Arizona, USA, on the Pacific versant to southern Brazil east of the Andes and northwestern Peru west of the Andes" (McCranie, 2011: 168). This individual was found in tropical deciduous forest near Gómez Farías, in the municipality of Gómez Farías. Wilson et al. (2013a) calculated its EVS as 5, placing it in the lower portion of the low vulnerability category. Its conservation status has not been determined by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

The IUCN System

Given the global use of the IUCN system of conservation assessment, it is interesting how deficient it is with respect to the Mesoamerican herpetofauna (Wilson et al., 2013a, b; Johnson et al., 2015b). Given that Alvarado-Díaz et al. (2013), Mata-Silva et al. (2015), and Johnson et al. (2015a) found a similar pattern for different states of Mexico, it does not follow that the general pattern reported for all the country (Wilson et al., 2013a, b) would apply on a state-by-state basis. Nonetheless, the patterns determined for southern (Oaxaca and Chiapas) and west-central (Michoacán) Mexico are shared by Tamaulipas, a state at the northeastern extreme of the country.

As a result of the completion of IUCN surveys for amphibians on a global basis in 2004 (Stuart et al., 2010) and Mexican reptiles in 2007 (www. natureserve.org/sites/default/files/projects/files/reptile_assessment_fact-sheet_low1_0; accessed 24 April 2015), assessments now are available for 145 of the 179 native members of the Tamaulipan herpetofauna (81.0%), which are placed in a total of six IUCN categories, except for the Extinct and Extinct in the Wild categories because they do not apply to the members of the Tamaulipan herpetofauna. We summarize these assignments in Table 10, as follows: CR = two (1.1%); EN = 10 (5.6%); VU = 11 (6.1%); NT = seven (3.9%); LC = 110 (61.4%); DD = five (2.8%). Unlike the comparable values for the Oaxacan and Chiapan herpetofaunas (Mata-Silva et al. [2015] and Johnson et al. [2015a], respectively), the percentage of LC species is significantly higher (61.4%) for the Tamaulipan herpetofauna than for either the Oaxacan or Chiapan herpetofaunas (39.3% and 37.4%, respectively).

When we organized the values for the six IUCN categories plus that for the NE species in Table 10 into three summary categories, the results are as follows: CR+EN+VU = 23 (12.8%); NT+LC = 117 (65.4%); and DD+NE = 39 (21.8%). These proportional figures are more comparable to those for Michoacán (CR+EN+VU = 12.7%; NT+LC = 61.8%; and DD+NE = 25.5%; Alvarado-Díaz et al., 2013) than they are to those for Oaxaca (CR+EN+VU = 23.2%; NT+LC = 43.2%; and DD+NE = 33.6%; Mata-Silva et al., 2015) or Chiapas (CR+EN+VU = 20.2%; NT+LC = 42.3%; and DD+NE = 37.4%; Johnson et al. 2015a), respectively.

Alvarado-Díaz et al. (2013), Wilson et al. (2013a, b), Johnson et al. (2015a), and Mata-Silva et al. (2015) pointed out that practitioners of the IUCN methodology have allocated an overwhelming proportion of any assemblage of Mexican species to the LC category. As noted above, 61.4% of all native Tamaulipan species have been allocated to this category (Table 10). Based on the criteria for allocation in the IUCN system, apparently there is relatively little concern for the survivability of the Tamaulipan herpetofauna. In addition to the species allocated to the LC category, 39 species (21.8%) have been allocated to the DD category or have not been evaluated by the IUCN methodology.

Geophis latifrontalis Garman, 1884. The Potosí Earthsnake is a Mexican endemic distributed in "Hidalgo, Querétaro, San Luis Potosí, and Tamaulipas…" (Wilson and Townsend, 2007: 13). This individual came from pine-oak forest at Ejido El Porvenir (La Perra), in the municipality of Gomez Farías. Wilson et al. (2013a) determined its EVS as 14, placing it at the lower end of the high vulnerability category. Its conservation status has been judged as Data Deficient by IUCN, and as a species of special protection by SEMARNAT.

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Table 10. IUCN Red List categorizations for herpetofaunal families in Tamaulipas, 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	6	—	—	—	—	6	—	—
Craugastoridae	3	—	—	1	—	1	1	—
Eleutherodactylidae	5	—	1	2	—	2	—	—
Hylidae	6	—	—	—	1	5	—	—
Leptodactylidae	2	—	—	—	—	2	—	—
Microhylidae	3	—	—	—	—	3	—	—
Ranidae	2	—	—	—	—	2	—	—
Rhinophrynidae	1	—	—	—	—	1	—	—
Scaphiopodidae	3	—	—	—	—	3	—	—
Subtotals	**31**	**—**	**1**	**3**	**1**	**25**	**1**	**—**
Plethodontidae	10	—	2	2	3	—	—	3
Sallamandridae	1	—	1	—	—	—	—	—
Sirenidae	2	—	—	—	—	2	—	—
Subtotals	**13**	**—**	**3**	**2**	**3**	**2**	**—**	**3**
Totals	**44**	**—**	**4**	**5**	**4**	**27**	**1**	**3**
Crocodylidae	1	—	—	—	—	1	—	—
Subtotals	**1**	**—**	**—**	**—**	**—**	**1**	**—**	**—**
Anguidae	6	—	—	1	—	2	1	2
Corytophanidae	1	—	—	—	—	1	—	—
Crotaphytidae	2	—	—	1	—	1	—	—
Dactyloidae	1	—	—	—	—	—	—	1
Dibamidae	1	—	—	—	—	1	—	—
Eublepharidae	1	—	—	—	—	1	—	—
Iguanidae	2	—	—	—	—	—	—	2
Phrynosomatidae	18	—	1	—	—	15	—	2
Scincidae	4	—	—	—	—	3	—	1
Sphenomorphidae	1	—	—	—	—	1	—	—
Teiidae	5	—	—	—	—	4	—	1
Xantusiidae	2	—	—	1	—	1	—	—
Xenosauridae	1	—	1	—	—	—	—	—
Subtotals	**45**	**—**	**2**	**3**	**—**	**30**	**1**	**9**
Boidae	1	—	—	—	—	—	—	1
Colubridae	32	—	1	—	—	24	—	7
Dipsadidae	15	—	—	—	—	6	2	7
Elapidae	2	—	—	—	—	1	1	—
Leptotyphlopidae	4	—	—	—	—	2	—	2
Natricidae	10	—	1	1	—	8	—	—
Sibynophiidae	1	—	—	—	—	1	—	—
Viperidae	9	—	—	—	—	6	—	3
Subtotals	**74**	**—**	**2**	**1**	**—**	**48**	**3**	**20**
Cheloniidae	4	2	2	—	—	—	—	—
Dermochelyidae	1	—	—	1	—	—	—	—
Emydidae	3	—	—	1	1	—	—	1
Kinosternidae	4	—	—	—	1	2	—	1
Staurotypidae	1	—	—	—	1	—	—	—
Testudinidae	1	—	—	—	—	1	—	—
Trionychidae	1	—	—	—	—	1	—	—
Subtotals	**15**	**2**	**2**	**2**	**3**	**4**	**—**	**2**
Totals	**135**	**2**	**6**	**6**	**3**	**83**	**4**	**31**
Sum Totals	**179**	**2**	**10**	**11**	**7**	**110**	**5**	**34**
Category Totals	**—**	**23**			**117**		**39**	

Pliocercus elapoides Cope, 1860. The Variegated False Coralsnake occurs "from central Tamaulipas, Mexico, to northeastern Honduras on the Atlantic versant and from western Oaxaca, Mexico, to southwestern Honduras and south-central on the Pacific versant" (McCranie, 2011: 362). This individual was found in Peregrina Canyon, in the municipality of Victoria. Wilson et al. (2013a) calculated its EVS as 10, placing it at the lower end of the medium vulnerability category. Its conservation status has been gauged as Least Concern by IUCN, and this species is not listed by SEMARNAT. © Sergio A. Terán-Juárez

The EVS System

The history of the development and use of the EVS (Environmental Vulnerability Score) system has been documented elsewhere (Mata-Silva et al., 2015; Johnson et al., 2015a), as well as its advantages over those of the IUCN system (Wilson et al., 2013a, b). Thus, we did not revisit this information.

Several of us applied the EVS system to determine the conservation status of the entire Mexican herpetofauna (Wilson et al., 2013a, b) and to that of various states in the country, including Michoacán (Alvarado-Díaz et al., 2013), Oaxaca (Mata-Silva et al., 2015), and Chiapas (Johnson et al., 2015a). In this paper, we applied the EVS system to the herpetofauna of Tamaulipas (Tables 7, 11). The EVS values range from 3 to 19, one value less than the total theoretical range (3–20). No species in Tamaulipas, therefore, has been assessed a score of 20. The most common EVS values (for 15 or more species) are 10 (17), 12 (25), 13 (16), and 15 (17). We applied these scores to 75 species, 43.1% of the 174 species for which EVS can be calculated (Table 11). At the lower end of the EVS range, we assigned a value of 3 to three anurans, one each in the families Bufonidae (*Rhinella marina*), Hylidae (*Smilisca baudinii*), and Scaphiopodidae (*Scaphiopus couchii*). At the upper end of the range, we assessed a score of 19 for two species, one an elapid snake (*Micrurus tamaulipensis*) and the other an emydid turtle (*Terrapene mexicana*).

As in similar studies, we partitioned the scores for the members of the Tamaulipan herpetofauna into three categories (Table 11): low (3–9); medium (10–13); and high (14–19). Unlike the studies on the herpetofaunas of Michoacán (Alvarado-Díaz et al., 2013) and Oaxaca (Mata-Silva et al., 2015), the EVS values do not increase from low through medium to high, but rather increased from low to medium (53 and 72, respectively) and then decreased to the lowest number at the high level (49; Table 11), similar to the pattern seen with the herpetofauna of Chiapas (Johnson et al., 2015a). The reason for the disparity in these two patterns for Tamaulipas is the same as for Chiapas; i.e., in both states a major portion of the species are shared with a country outside of Mexico, Guatemala in the case of Chiapas and the United States in that of Tamaulipas. As with Chiapas, relatively few endemics are found in Tamaulipas, more especially at the state level, and thus the state contains a much larger proportion of non-endemic species. The number of state-level endemics in Tamaulipas is 10 (5.4% of the total of 184 species), many fewer than in Chiapas (25; 7.6%). Interestingly, more country-level endemics are found in Tamaulipas (49; 26.6%) than in Chiapas (33; 10.0%).

Table 11. Environmental Vulnerability Scores (EVS) for the herpetofauna of Tamaulipas, 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	6	1	—	1	1	1	—	1	—	—	1	—	—	—	—	—	—	—
Craugastoridae	3	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	1	—
Eleutherodactylidae	5	—	—	—	—	—	—	—	—	1	1	—	—	1	1	—	1	—
Hylidae	6	1	2	—	—	—	—	1	1	—	1	—	—	—	—	—	—	—
Leptodactylidae	2	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Microhylidae	3	—	1	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—
Ranidae	2	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	—	—
Rhinophrynidae	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Scaphiopodidae	3	1	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—
Subtotals	**31**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**1**	**3**	**—**	**—**	**2**	**1**	**—**	**2**	**—**
Plethodontidae	10	—	—	—	—	—	—	—	—	—	1	—	1	2	—	3	3	—
Salamandridae	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Sirenidae	2	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—
Subtotals	**13**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**4**	**—**	**1**	**2**	**—**	**3**	**3**	**—**
Totals	**44**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**1**	**7**	**—**	**1**	**4**	**1**	**3**	**5**	**—**
Crocodylidae	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Subtotals	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**	**—**	**—**
Anguidae	6	—	—	—	—	—	—	—	—	—	1	1	—	3	—	1	—	—
Corytophanidae	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Crotaphytidae	2	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—
Dactyloidae	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Dibamidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Eublepharidae	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Iguanidae	2	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—
Phrynosomatidae	18	—	—	1	—	—	—	1	1	2	4	3	2	4	—	—	—	—
Scincidae	4	—	—	—	—	—	—	—	1	1	2	—	—	—	—	—	—	—
Sphenomorphidae	1	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Teiidae	5	—	—	—	—	—	—	1	—	1	—	—	3	—	—	—	—	—
Xantusiidae	2	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—
Xenosauridae	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Subtotals	**45**	**—**	**—**	**1**	**—**	**—**	**2**	**2**	**3**	**5**	**11**	**5**	**7**	**8**	**—**	**1**	**—**	**—**
Boidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Colubridae	32	—	—	4	7	—	2	2	4	2	3	5	1	2	—	—	—	—
Dipsadidae	15	—	—	—	2	3	2	1	3	1	2	—	1	—	—	—	—	—
Elapidae	2	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
Leptotyphlopidae	4	—	1	—	—	—	—	—	—	—	—	2	—	1	—	—	—	—
Natricidae	10	—	—	—	—	3	—	—	2	1	—	1	1	1	1	—	—	—
Sibynophiidae	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—
Viperidae	9	—	—	—	—	—	1	1	—	1	1	1	1	—	1	2	—	—
Subtotals	**74**	**—**	**1**	**4**	**9**	**6**	**5**	**4**	**10**	**7**	**6**	**9**	**4**	**4**	**2**	**2**	**—**	**1**
Emydidae	3	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	1
Kinosternidae	4	—	—	—	—	—	—	—	1	1	1	—	1	—	—	—	—	—
Staurotypidae	1	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
Testudinidae	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—
Trionychidae	1	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
Subtotals	**10**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**1**	**1**	**1**	**1**	**2**	**1**	**1**	**—**	**1**	**1**
Totals	**130**	**—**	**1**	**5**	**10**	**6**	**7**	**6**	**14**	**13**	**18**	**16**	**13**	**13**	**3**	**3**	**1**	**2**
Sum Totals	**174**	**3**	**4**	**7**	**12**	**8**	**10**	**9**	**17**	**14**	**25**	**16**	**14**	**17**	**4**	**6**	**6**	**2**
Sum Totals%	**—**	**1.7**	**2.3**	**4.0**	**6.9**	**4.6**	**5.7**	**5.2**	**9.8**	**8.0**	**14.4**	**9.2**	**8.0**	**9.8**	**2.3**	**3.4**	**3.4**	**1.1**
Category Totals	**174**	**53**							**72**				**49**					

Tamaulipas shares a substantial border with Texas, the largest of the conterminous United States, and so might be expected to share a significant proportion of its herpetofauna with this state. A comparison of our list in Table 7 with the listings at the Center for North American Herpetology website (www.cnah.org; accessed 11 October 2015) indicates that of the 184 species recorded from Tamaulipas, 92 (50.0 %) also occur in the United States. Some of these species range no farther into the United States than southernmost Texas (*Rhinella marina*, *Smilisca baudinii*, *Leptodactylus fragilis*, *Hypopachus variolosus*, *Rhinophrynus dorsalis*, *Notophthalmus meridionalis*, *Sceloporus variabilis*, *Drymobius margaritiferus*, *Tantilla atriceps*, *Coniophanes imperialis*, and *Leptodeira septentrionalis*) and another two (*Oxybelis aeneus* and *Tantilla wilcoxi*) into southern Arizona. All 13 of these species also range outside of Tamaulipas, in some cases into Central America and even into South America. Of the remaining 28 non-endemic species, by definition all range to the south of Mexico; of these, 10 also occur to some point in South America.

As in similar studies (Wilson et al., 2013a, b; Mata-Silva et al., 2015; Johnson et al., 2015a), herein we compared the EVS and IUCN categorizations for the Tamaulipan herpetofauna (Table 12). The data in this table demonstrate that only 24.5% (12 of 49) of the high vulnerability species have been placed in one of the three IUCN threat categories (CR, EN, or VU); none of these species has been allocated to the CR category. This proportion is significantly lower than that for either the Oaxacan (37.4%; Mata-Silva et al., 2015) or the Chiapan herpetofaunas (42.0%; Johnson et al., 2015a). At the other extreme of the fully assessed IUCN categories (the LC category), 110 species comprise 2.1 times the number of low vulnerability species (53). This value exceeds both of those for the Oaxacan (1.7 times; Mata-Silva et al., 2015) and the Chiapan (1.3 times; Johnson et al., 2015a) herpetofaunas. Thus, in both cases, the IUCN and EVS systems are at odds with one another, as demonstrated in the aforementioned studies.

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

	IUCN Categories							
EVS	**Critically Endangered**	**Endangered**	**Vulnerable**	**Near Threatened**	**Least Concern**	**Data Deficient**	**Not Evaluated**	**Totals**
3	—	—	—	—	3	—	—	3
4	—	—	—	—	3	—	1	4
5	—	—	—	—	6	—	1	7
6	—	—	—	—	7	—	5	12
7	—	—	—	—	7	—	1	8
8	—	—	—	—	8	—	2	10
9	—	—	—	1	7	—	1	9
10	—	—	—	—	14	—	3	17
11	—	—	—	—	12	—	2	14
12	—	1	2	—	14	1	7	25
13	—	1	2	—	11	—	2	16
14	—	2	—	3	8	1	—	14
15	—	2	4	1	7	1	2	17
16	—	—	1	1	1	—	1	4
17	—	1	1	—	1	—	3	6
18	—	1	—	1	1	1	2	6
19	—	—	—	—	—	1	1	2
Totals	**—**	**8**	**10**	**7**	**110**	**5**	**34**	**174**

Only five species have been allocated to the IUCN DD category (Table 13), which on the surface would appear to be reflective of the small number of state endemics in Tamaulipas (10; Table 8). An examination of the data in Table 13, however, demonstrates that of the five DD species, two are state endemics (*Craugastor batrachylus* and *Micrurus tamaulipensis*) and the other three are country endemics (*Ophisaurus incomptus*, *Geophis latifrontalis*, and *Rhadinaea gaigeae*). The other eight state endemics have been judged as Endangered by the IUCN (*Eleutherodactylus dennisi*, *Chiropterotriton cracens*, *Xenosaurus platyceps*, and *Thamnophis mendax*) or have not been evaluated (*Chiropterotriton cieloensis*, *C. infernalis*, *Gerrhonotus farri*, and *Rena iversoni*). The EVS values for the five DD species are 12, 14, 15, 18, and 19, of which all but one fall into the high vulnerability category (EVS 14–20). The exception is *Rhadinaea gaigeae*, with an EVS of 12, which is a fairly broadly distributed snake with an elevational range of 200–2,835 m in the Sierra Madre Oriental from southwestern Tamaulipas southward to Guanajuato, Querétaro, and Hidalgo (Wallach et al., 2014). The other four species perhaps should be allocated to one of the three IUCN threat categories (CR, EN, or VU).

Table 13. Environmental Vulnerability Scores for members of the herpetofauna of Tamaulipas, Mexico, allocated to the IUCN Data Deficient category. * = country endemic; ** = state endemic.

Taxa	Environmental Vulnerability Score			
	Geographic Distribution	Ecological Distribution	Reproductive Mode/Degree of Persecution	Total Score
*Craugastor batrachylus***	6	8	4	18
*Ophisaurus incomptus**	5	8	2	15
*Geophis latifrontalis**	5	7	2	14
*Rhadinaea gaigeae**	5	5	2	12
*Micrurus tamaulipensis***	6	8	5	19

Rhadinaea gaigeae Bailey, 1937. Gaige's Pine Forest Snake is distributed from "southern Tamaulipas to Hidalgo, with a disjunct population ocurring at higher elevations in central San Luis Potosí" (Lemos-Espinal and Dixon, 2013: 214). This individual came from near Ejido Sierra Madre, in the municipality of Victoria. Wilson et al. (2013a) ascertained its EVS as 12, placing it in the middle of the medium vulnerability category. Its conservation status has been assessed as Data Deficient by IUCN, and this species is not listed by SEMARNAT.

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Wilson et al. (2013a, b), Mata-Silva et al. (2015), and Johnson et al. (2015a, b) criticized the use of the DD category, inasmuch as it functions largely as a depository for taxa that are poorly understood, especially those known from only the holotype and/or the type locality. These species, however, often are in most need of close conservation attention. Howard and Bickford (2014: 837) demonstrated that amphibians in this category "are likely to be more threatened with extinction than their fully assessed counterparts." We consider their conclusion to be of tremendous significance in efforts to effectively address the global problem of amphibian species decline, especially as the IUCN currently has assessed 24.5% of the species in the DD category (www.iucnredlist.org; accessed 19 October 2015). Nori and Loyola (2015: 1) also addressed this issue, noting that the DD species are "eclipsed by those species flagged with a threat status" and "often remain marginalized in most conservation planning and policies." This marginalization appears to be of major consequence. Currently, the IUCN website indicates that of 6,260 species of amphibians assessed, 38 are considered Extinct (0.6% of the total), one is Extinct in the Wild (0.02%), 489 are Critically Endangered (7.8%), 787 are Endangered (12.6%), and 715 are Vulnerable (11.4%). In total, 2,030 species have been assessed in these five categories, 32.4% of the total number. Given that the species in the Extinct and Extinct in the Wild categories largely or completely are beyond help, they can be deleted from consideration, which would reduce the number of species to 1,991 (31.8% of the species assessed). The absolute number of these species is only 458 more than that of the 1,533 Data Deficient species indicated (i.e., 7.3% of the total of 6,260). We argue, therefore, that consigning this proportion of species to the DD category allows for a serious underestimation of the threat of extinction by a factor of almost two. As Wilson et al. (2013a, b, Mata-Silva et al. (2015), and Johnson et al. (2015) have demonstrated, when DD species are examined using the EVS measure they usually appear to fall into one of the three IUCN threat categories. Thus, since almost one-fourth of the world's amphibians have been placed in the DD category, the global environmental issue of amphibian species decline is almost twice as critical as we have thought. In this context, another factor to consider is that the IUCN analysis is considerably out of date. The AmphibiaWeb site (www.amphibiaweb.org) maintains a running count of the number of amphibian species recognized globally. Presently (as of 12 January 2016) that number is 7,501, 1,241 more species than indicated by IUCN. Because new species usually are described based on limited material from a small geographic range (often one or a few individuals from the type locality or the vicinity thereof), we predict that many, if not most of these species will be placed in the DD category by IUCN evaluators, thereby exacerbating the amount of threat posed by humanity on the world's amphibians. We still understand very little about the biodiversity of our planet or how it

Tropidodipsas sartorii Cope, 1863. The Terrestrial Snail Sucker is distributed "on the Atlantic versant from central Nuevo León, México, to northeastern Honduras and on the Pacific versant from eastern Oaxaca, Mexico, to western El Salvador, and in western Nicaragua and northwestern Costa Rica" (McCranie, 2011: 424). This individual was found in tropical deciduous forest near Gómez Farías, in the municipality of Gómez Farías. Wilson et al. (2013a) calculated its EVS as 9, placing it at the upper end of the low vulnerability category. Its conservation status has not been determined by IUCN, and it is listed as a species of special protection by SEMARNAT.

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functions in concert with the other spheres of the environment, that life largely is endangered by habitat degradation and destruction, that the severity of this factor increases commensurate with the exponential rate of the human population, and consequently, that humanity is responsible for the sixth mass extinction episode (Wake and Vredenburg, 2008). Unfortunately, most humans remain abysmally ignorant of what our future portends.

A relatively small number of Tamaulipan species (34 of 184; 18.5%) remains unevaluated by the IUCN, which is about one-third of the corresponding number Johnson et al. (2015a) reported for Chiapas (99 of 325; 30.5%). To determine why this proportion of Tamaulipan species is in the NE category, we examined the geographic and ecological distributions of these 34 species (Table 14). Unlike the case in Chiapas, 13 of these 34 species in Tamaulipas are endemic to Mexico (with geographic scores of 5 or 6). The EVS values for these 13 species range from 9 to 19 and are categorized as follows: low (9, one species); medium (11, one species; 12, two species); high (15, two species; 16, one species; 17, three species; 18, two species, and 19, one species). If and when these 13 species are evaluated by the IUCN, it appears likely that the one species with an EVS of 9 (*Ficimia olivacea*) will be placed in the LC category, the three species with an EVS of 11 or 12 (*Plestiodon dicei*, *Holcosus amphigrammus*, and *Adelphicos newmanorum*) probably will be allocated to the NT category, and the remaining nine species will be consigned to one or the other of the three threat categories (with six of them with the highest EVS in either the EN or CR category). The other 21 species are non-endemic to Mexico and are accorded EVS values from 4 to 13. All of the 21 scores, therefore, fall into the low and medium vulnerability categories. The geographic distribution scores for these 21 species range from 1 to 4, as follows: 1 (seven; 33.3%); 2 (five; 23.8%); 3 (five; 23.8%); and 4 (four; 19.0%). The ecological distribution scores range from 1 to 6, as follows: 1 (six; 28.6%); 2 (one; 4.8%); 3 (six; 28.6%); 4 (five; 23.8%); 5 (one; 4.8%); and 6 (two; 9.5%). When we combined these two scores, we found 13 such combinations, of which only four are represented more than once; they are 1,1 (four), 1,3 (two), 2,4 (two), and 3,4 (three). Perusal of the list of species in Table 14 indicates that of the 34 species, the distribution of 15 (44.1%) extends into Central America (and, in a few cases, farther south); thus, presumably these species will remain unevaluated until the results of the 2012 IUCN Central American Reptile Assessment Workshop held in Palo Verde, Costa Rica, become available, as well as other workshops dealing with regions in South America. The total EVS values for these NE species range from 4 to 19, almost that of the entire possible range (3–20). When arranged into the three categories of vulnerability, the 34 values are as follows: low, 11 (32.4%); medium, 14 (41.2%); and high, nine (26.5%). Based on these figures, it appears likely that the low and medium category species should be placed in the LC category.

Storeria hidalgoensis Taylor, 1942. The Mexican Yellow-bellied Brownsnake is a Mexican endemic species that ranges in the states of Tamaulipas, Nuevo León, Coahuila, San Luis Potosí, Hidalgo, and Querétaro (Ramírez-Bautista et al., 2014). This individual came from pine-oak forest at Ejido El Porvenir (La Perra), in the municpality of Gomez Farías. Wilson et al. (2013a) ascertained its EVS as 13, placing it at the upper end of the medium vulnerability category. Its conservation status has been determined as Vulnerable by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

Table 14. Environmental Vulnerability Scores for members of the herpetofauna of Tamaulipas, Mexico, currently not evaluated (NE) by the IUCN. Non-native taxa are not included.

Taxa	Environmental Vulnerability Score			
	Geographic Distribution	Ecological Distribution	Reproductive Mode/Degree of Persecution	Total Score
*Chiropterotriton cieloensis***	6	7	4	17
*Chiropterotriton infernalis***	6	8	4	18
*Chiropterotriton miquihuanus**	6	8	4	18
*Barisia ciliaris**	5	7	3	15
*Gerrhonotus farri***	6	8	3	17
Norops sericeus	2	3	3	8
Ctenosaura acanthura	2	4	6	12
Iguana iguana	3	3	6	12
Sceloporus cowlesi	4	6	3	13
Sceloporus cyanogenys	4	6	3	13
*Plestiodon dicei**	5	4	3	12
*Holcosus amphigrammus**	5	3	3	11
Boa imperator	3	1	6	10
Drymobius margaritiferus	1	1	4	6
*Ficimia olivacea**	5	2	2	9
Lampropeltis annulata	4	3	5	12
Lampropeltis splendida	4	5	3	12
Masticophis mentovarius	1	1	4	6
Oxybelis aeneus	1	1	3	5
Spilotes pullatus	1	1	4	6
*Adelphicos newmanorum**	5	5	2	12
Coniophanes fissidens	1	3	3	7
Heterodon kennerlyi	3	4	4	11
Hypsiglena jani	1	3	2	6
Imantodes cenchoa	1	3	2	6
Leptodeira septentrionalis	2	2	4	8
Tropidodipsas fasciata	2	4	4	10
Epictia phenops	2	1	1	4
*Rena iversoni***	6	6	1	13
Bothrops asper	3	4	5	12
*Crotalus morulus**	5	6	5	16
*Crotalus totonacus**	5	7	5	17
*Terrapene mexicana**	5	8	6	19
Kinosternon scorpiodes	3	4	3	10

The IUCN has allocated a sizable portion of the native Tamaulipan herpetofauna to the LC category (110 species; 59.8%). To determine if these species deserve a limited amount of attention by placing them in this category, we included them in Table 15, along with their calculated EVS values. The EVS values in this table range from 3 to 18, one number less than the entire range for the members of the Tamaulipan herpetofauna (3–19; Table 7). The absolute and relative numbers of EVS values in the LC category are as follows: 3 (three; 2.7%); 4 (three; 2.7%); 5 (six; 5.5%); 6 (seven; 6.4%); 7 (seven; 6.4%); 8 (eight; 7.3%); 9 (seven; 6.4%); 10 (14; 12.7%); 11 (12; 10.9%); 12 (14; 12.7%); 13 (11; 10.0%); 14 (eight; 7.3%); 15 (seven; 6.4%); 16 (one; 0.9%); 17 (one; 0.9%); and 18 (one; 0.9%). We positioned the EVS values into the three categories of vulnerability: low, 41 (37.3%); medium, 51 (46.4%); and

high, 18 (16.4%). Based on the same supposition discussed in the previous paragraph, it seems likely that the 92 species in the low and medium categories should remain in the LC category or perhaps the NT category, but the 18 species in the high vulnerability category probably should not remain in the LC category. These 18 species and their respective EVS calculations are as follows (* = endemic to Mexico):

Coleonyx brevis (4+6+4 = 14)
Cophosaurus texanus (4+7+3 = 14)
Holbrookia propinqua (4+8+3 = 15)
*Sceloporus cautus** (5+7+3 = 15)
*Sceloporus minor** (5+6+3 = 14)
*Sceloporus parvus** (5+7+3 = 15)
Aspidoscelis inornata (4+7+3 = 14)
Aspidoscelis laredoensis (4+7+3 = 14)
Aspidoscelis sexlineata (3+8+3 = 14)
*Lampropeltis mexicana** (5+7+3 = 15)
Pantherophis bairdi (4+7+4 = 15)
*Pituophis deppei** (5+5+4 = 14)
*Thamnophis exsul** (5+7+4 = 16)
*Thamnophis pulchrilatus** (5+6+4 = 15)
*Agkistrodon taylori** (5+7+5 = 17)
Crotalus pricei (2+7+5 = 14)
Gopherus berlandieri (4+8+6 = 18)
Apalone spinifera (3+6+6 = 15)

An obvious feature of these species is that most are limited in geographic or ecological distribution, or both. Eight of these 18 species are endemic to Mexico (thus were assigned a geographic distribution score of 5). Another seven are limited in distribution to the region near the border between Mexico and the United States (and given a geographic distribution score of 4). With reference to ecological distribution, three species are limited to one forest formation, 10 to two formations, and four to three formations. In total, all 18 species are limited in geographic or ecological distribution or both. Consequently, we believe that all of these species should be removed from the LC category and placed into one of the three threat categories, as follows: CR (*Thamnophis exsul*, *Agkistrodon taylori*, and *Gopherus berlandieri*); EN (*Holbrookia propinqua*, *Sceloporus cautus*, *S. parvus*, *Lampropeltis mexicana*, *Pantherophis bairdi*, and *Thamnophis pulchrilatus*); and VU (*Coleonyx brevis*, *Cophosaurus texanus*, *Sceloporus minor*, *Aspidoscelis inornata*, *A. laredoensis*, *A. sexlineata*, *Pituophis deppei*, and *Crotalus pricei*). We cannot determine if our suggested changes ever will occur, but until then their EVS values can be used to judge how much conservation attention should be accorded these significant elements of the Tamaulipan herpetofauna

Thamnophis mendax Walker, 1955. The Tamaulipan Montane Gartersnake is a state endemic "known only from the Sierra de Guatemala portion of the Sierra Madre Oriental in southwestern Tamaulipas, Mexico" (Rossman et al., 1996: 213). This individual was found near Ejido 20 de Abril (La Joya de Salas), in the municipality of Jaumave. Wilson et al. (2013a) determined its EVS as 14, placing it at the lower end of the high vulnerability category. Its conservation status has been listed as Endangered by IUCN, and as threatened by SEMARNAT.
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Table 15. Environmental Vulnerability Scores for members of the herpetofauna of Tamaulipas, Mexico, assigned to the IUCN Least Concern category. Non-native taxa are not included.

Taxa	Environmental Vulnerability Score			
	Geographic Distribution	Ecological Distribution	Reproductive Mode/Degree of Persecution	Total Score
Anaxyrus cognatus	3	5	1	9
Anaxyrus debilis	1	5	1	7
Anaxyrus punctatus	1	3	1	5
Anaxyrus speciosus	4	7	1	12
Incilius nebulifer	1	4	1	6
Rhinella marina	1	1	1	3
Craugastor augusti	2	2	4	8
Eleutherodactylus cystignathoides	2	6	4	12
Eleutherodactylus guttilatus	2	5	4	11
*Hyla eximia**	5	4	1	10
Pseudacris clarkii	3	8	1	12
Scinax staufferi	2	1	1	4
Smilisca baudinii	1	1	1	3
Trachycephalus typhonius	1	2	1	4
Leptodactylus fragilis	1	2	2	5
Leptodactylus melanonotus	1	3	2	6
Gastrophryne elegans	2	5	1	8
Gastrophryne olivacea	3	5	1	9
Hypopachus variolosus	2	1	1	4
Lithobates berlandieri	4	2	1	7
Lithobates catesbeianus	3	6	1	10
Rhinophrynus dorsalis	2	5	1	8
Scaphiopus couchii	1	1	1	3
Spea bombifrons	3	6	1	10
Spea multiplicata	1	4	1	6
Siren intermedia	3	8	1	12
Siren lacertina	3	8	1	12
Crocodylus moreletii	2	5	6	13
Gerrhonotus infernalis	5	5	3	13
*Gerrhonotus ophiurus**	5	4	3	12
Laemanctus serratus	2	3	3	8
Crotaphytus collaris	3	7	3	13
*Anelytropsis papillosus**	5	4	1	10
Coleonyx brevis	4	6	4	14
Cophosaurus texanus	4	7	3	14
Holbrookia propinqua	4	8	3	15
Phrynosoma cornutum	1	7	3	11
Phrynosoma modestum	4	5	3	12
*Phrynosoma orbiculare**	5	4	3	12
*Sceloporus cautus**	5	7	3	15
Sceloporus grammicus	2	4	3	9
*Sceloporus minor**	5	6	3	14
Sceloporus olivaceus	4	6	3	13
*Sceloporus parvus**	5	7	3	15
*Sceloporus scalaris**	5	4	3	12
Sceloporus serrifer	2	1	3	6
*Sceloporus spinosus**	5	4	3	12
*Sceloporus torquatus**	5	3	3	11
Sceloporus variabilis	1	1	3	5

Urosaurus ornatus	2	5	3	10
*Plestiodon lynxe**	5	2	3	10
Plestiodon obsoletus	3	5	3	11
Plestiodon tetragrammus	4	5	3	12
*Scincella silvicola**	5	4	3	12
Aspidoscelis gularis	2	4	3	9
Aspidoscelis inornata	4	7	3	14
Aspidoscelis laredoensis	4	7	3	14
Aspidoscelis sexlineata	3	8	3	14
*Lepidophyma sylvaticum**	5	4	2	11
Arizona elegans	1	1	3	5
Coluber constrictor	1	6	3	10
Drymarchon melanurus	1	1	4	6
Ficimia streckeri	3	7	2	12
*Lampropeltis mexicana**	5	7	3	15
Leptophis mexicanus	1	1	4	6
Masticophis flagellum	1	3	4	8
Masticophis schotti	4	5	4	13
Mastigodryas melanolomus	1	1	4	6
Opheodrys aestivus	3	7	3	13
Pantherophis bairdi	4	7	4	15
Pantherophis emoryi	3	6	4	13
Pituophis catenifer	4	1	4	9
*Pituophis deppei**	5	5	4	14
Pseudelaphe flavirufa	2	4	4	10
Rhinocheilus lecontei	1	3	4	8
Salvadora grahamiae	4	2	4	10
Senticolis triaspis	2	1	3	6
Sonora semiannulata	1	1	3	5
Tantilla atriceps	2	7	2	11
Tantilla nigriceps	3	6	2	11
Tantilla rubra	2	1	2	5
Tantilla wilcoxi	2	6	2	10
*Trimorphodon tau**	5	4	4	13
Amastridium sapperi	4	4	2	10
Coniophanes imperialis	2	3	3	8
Coniophanes piceivittis	1	3	3	7
Leptodeira maculata	2	1	4	7
Pliocercus elapoides	4	1	5	10
Tropidodipsas sartorii	2	2	5	9
Micrurus tener	1	5	5	11
Rena dulcis	4	8	1	13
*Rena myopica**	5	7	1	13
Nerodia erythrogaster	3	4	4	11
Nerodia rhombifer	1	5	4	10
Storeria dekayi	1	4	2	7
Thamnophis cyrtopsis	2	1	4	7
*Thamnophis exsul**	5	7	4	16
Thamnophis marcianus	1	5	4	10
Thamnophis proximus	1	2	4	7
*Thamnophis pulchrilatus**	5	6	4	15
Scaphiodontophis annulatus	1	5	5	11
*Agkistrodon taylori**	5	7	5	17
Crotalus atrox	1	3	5	9
Crotalus molossus	2	1	5	8
Crotalus pricei	2	7	5	14

Crotalus scutulatus	2	4	5	11
Sistrurus catenatus	3	5	5	13
Kinosternon flavescens	3	6	3	12
*Kinosternon integrum**	5	3	3	11
Gopherus berlandieri	4	8	6	18
Apalone spinifera	3	6	6	15

RELATIVE HERPETOFAUNAL PRIORITY

Johnson et al. (2015a) introduced the concept of Relative Herpetofaunal Priority (RHP), a simple measure of the relative importance of the herpetofauna recorded in the physiographic regions recognized in any geographical entity (e.g., the state of Chiapas in Johnson et al., 2015a), as determined by (1) the proportion of state and country endemics relative to the entire physiographic regional herpetofauna, and (2) by the absolute number of high EVS species in each regional herpetofauna. In the case of Chiapas (Johnson et al., 2015a), the highest RHP for state and country endemics was found in the Northern Highlands, a region with 28 recorded state and national endemic species within a total endemic herpetofauna of 58 species; thus, the proportion is 48.3%, placing the Northern Highlands in rank number one. Using the other measure, the highest rank was garnered by the Sierra Madre de Chiapas, with 32 high EVS species among 169 total taxa (18.9%).

To determine the RHP for the herpetofauna of Tamaulipas, we constructed two tables, one for the endemicity values (Table 16) and the other for the high EVS values (Table 17). The data in Table 16 illustrate that the combined number of state and country endemics, at 54 (91.5%) of the total of 59 species, is the highest for the state in the Gran Sierra Plegada, placing this region in RHP rank order one. The rest of the regions (and the size of their respective endemic herpetofaunal components) in rank order, from highest to lowest, are as follows: Sierra de Tamaulipas (12; 20.3%); Llanuras y Lomeríos (12; 20.3%); Sierras y Llanuras Occidentales (eight; 15.3%); Llanura Costera Tamaulipeca (four; 6.8%); Sierra de San Carlos (three; 5.1%); and Llanuras de Coahuila y Nuevo León (zero; 0%).

Micrurus tener (Baird and Girard, 1853). The Texas Coralsnake ranges "from the Mississippi River westward into Texas, in the United States, and in Mexico, from Tamaulipas south to Veracruz…" (Lemos-Espinal and Dixon, 2013: 240). This individual came from near Gómez Farías, in the municipality of Gómez Farías. Wilson et al. (2013a) calculated its EVS as 11, placing it in the middle of the medium vulnerability category. Its conservation status has been determined as Least Concern by IUCN, and this species is not listed by SEMARNAT.

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

Physiographic Provinces	Non-endemics	Country Endemics	State Endemics	Non-natives	Totals	Rank Order
Llanuras de Coahuila y Nuevo León	44	—	—	1	45	6
Llanura Costera Tamaulipeca	75	4	—	2	81	4
Sierra de San Carlos	34	3	—	—	37	5
Llanuras y Lomeríos	76	11	1	3	91	2
Sierra de Tamaulipas	39	11	1	—	51	2
Gran Sierra Plegada	79	46	8	2	135	1
Sierras y Llanuras Occidentales	21	7	1	1	30	3

In Table 17 we summarized the number of herpetofaunal species in each of the three EVS categories, i.e., low, medium, and high. On the basis of the total number of high category species, the most significant physiographic region is the Gran Sierra Plegada, with 37 species of a total of 134 (27.6%). This region also occupies the first rank based on the other RHP measure. The rest of the regions (and the number of their respective high EVS species) in rank order, from highest to lowest, are as follows: Llanuras y Lomeríos (10; 11.5% of 87); Llanura Costera Tamaulipeca (nine species; 12.3% of 73 species); Sierras y Llanuras Occidentales (seven; 24.1% of 29); Sierra de Tamaulipas (six; 11.8% of 51); Llanuras de Coahuila y Nuevo León (five; 11.4% of 44); and Sierra de San Carlos (five; 13.5% of 37).

The rank orders demonstrated for the seven physiographic regions in Table 16 and those in Table 17 are similar but not the same, especially as there are two regions occupying rank 6 in Table 17.

Gran Sierra Plegada (1, 1)

Sierra de Tamaulipas (2, 5)

Llanuras y Lomeríos (3, 2)

Sierras y Llanuras Occidentales (4, 4)

Llanura Costera Tamaulipeca (5, 3)

Sierra de San Carlos (6, 6)

Llanuras de Coahuila y Nuevo León (7, 6)

Based on these two simple measures, therefore, the RHP is highest for the Gran Sierra Plegada and next highest for the Sierra de Tamaulipas and the Llanuras y Lomeríos. As demonstrated by Johnson et al. (2015a), these measures might provide a fundamental way of determining the best way to use scarce conservation funds.

Table 17. Number of species in the three EVS categories among the seven physiographic regions of Tamaulipas, 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
Llanuras de Coahuila y Nuevo León	19	20	5	44	6
Llanura Costera Tamaulipeca	29	35	9	73	3
Sierra de San Carlos	17	15	5	37	6
Llanuras y Lomerios	41	36	10	87	2
Sierra de Tamaulipas	29	16	6	51	5
Gran Sierra Plegada	44	53	37	134	1
Sierras y Llanuras Occidentales	10	12	7	29	4

Agkistrodon taylori Burger and Robertson, 1951. Taylor's Cantil is endemic to Mexico, where it occurs "primarily along the Atlantic versant of Mexico, from Nuevo León and central Tamaulipas to northeastern Hidalgo and adjacent Veracruz. In San Luis Potosí it has been recorded only in the northeast-central part of the state" (Lemos-Espinal and Dixon, 2013: 245). This individual was found near Ejido Canoas, in the municipality of Ocampo. Wilson et al. (2013a) determined its EVS as 17, placing it in the middle of the high vulnerability category. Its conservation status has been allocated as Least Concern by IUCN, and as threatened by SEMARNAT. © Sergio A. Terán-Juárez

Bothrops asper (Garman, 1884). The Terciopelo is a wide-ranging pit viper occurring "from southwestern Tamaulipas, Mexico, to coastal Venezuela on the Atlantic versant, and from Costa Rica to southern Ecuador on the Pacific versant, with a disjunct population occurring in southern Chiapas, Mexico, and adjacent Guatemala" (Lemos-Espinal and Dixon, 2013: 247). This individual was found in tropical deciduous forest near Gómez Farías, in the municipality of Gómez Farías, which represents the northernmost known population of this Neotropical pitviper. Wilson et al. (2013a) determined its EVS as 12, placing it in the middle of the medium vulnerability category. Its conservation status has not been determined by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

PROTECTED AREAS IN TAMAULIPAS

One of the basic tenets of conservation biology is that organisms can be protected best when allowed to exist in their natural habitats. Unfortunately, given that humans have shown little interest in regulating their own population numbers, the pressure exerted by these exponentially increasing numbers has created the plethora of interrelated environmental problems impacting all of the spheres of the planet, including most pertinently, the biosphere. Johnson et al. (2015a: 326) noted that 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" and that "only effective human population control will allow for an alternative future." Obviously, protecting the herpetofauna of Tamaulipas will be no easier than for any other state in Mexico. Nonetheless, as noted by Mata-Silva et al. (2015: 59), "natural protected areas will play a definitive role in efforts to secure the viability of populations of these creatures in the face of inexorable human population growth."

Nonetheless, this does not mean that the establishment of natural protected areas provides a long-term guarantee for maintaining populations of any group of organisms, including the herpetofauna. The design of such areas is a complex undertaking fraught with many challenges.

Any effort to design natural protected areas (NPAs) has to be initiated at a particular point in time. Inasmuch as anthropogenic habitat alteration continues apace, commensurate with an increasing human population, the design of these areas has to deal with the remaining amount of undisturbed habitat. Therefore, the sooner a design is implemented, the greater the chance for controlling habitat alteration.

Crotalus molossus Baird and Girard, 1853. The Black-tailed Rattlesnake ranges from northwestern Arizona and southwestern New Mexico, United States, southward to the southern part of the Mexican Plateau and southern Oaxaca, including Isla Tiburón in the Gulf of California (Campbell and Lamar, 2004; Anderson and Greenbaum, 2012). This individual came from Ejido La Marcela, in the municipality of Miquihuana. Wilson et al. (2013a) ascertained its EVS as 8, placing it in the middle of the medium vulnerability category. Its conservation status has been evaluated as Least Concern by IUCN, and as a species of special protection by SEMARNAT. © Elí García-Padilla

The remaining undisturbed habitat in an area depends on the advancement of habitat alteration. From the beginning of the 20th century until the present the population of Tamaulipas has increased by a factor of 15.7 (from 218,948 to 3,441,698). Population growth was most extreme from 1940 to 1980 (www.wikipedia.org; accessed 18 January 2016), when about a quadrupling occurred. Growth rates began decreasing in the 1990s and have continued this trend until the present. Nonetheless, the current rate of increase is 5.3%, which means that the population is expected to double in about 13 years (by 2028). Consequently, any effort to designate suitable habitat for members of the herpetofauna needs to proceed as rapidly as possible, since population density advances along with population growth.

Fortunately, the establishment of NPAs in Tamaulipas already is underway, as nine of these areas are recognized in the state. To evaluate the utility of these areas we constructed Table 18, in which we detail a number of their characteristics, including those that determine their degree of effectiveness. The data in this table demonstrate that these nine areas range in status from an urban park (Laguna La Escondida) to a biosphere reserve (El Cielo), and in size from 17.6 (Parque Estatal El Refugio) to 572,808.6 ha (Área de Protección de Flora y Fauna Laguna Madre y Delta del Río Bravo). The first of these areas established was Reserva de la Biósfera El Cielo (13 July 1985), and the most recent one was Parque Estatal El Refugio (30 April 2015). Six of the nine areas are under state jurisdiction, two under federal jurisdiction, and one under municipal jurisdiction. One of the most important features of the NPA design is the amount of representation given to the range of habitats in any given area. Within the NPAs of Tamaulipas, representation is provided for four of the seven physiographic regions in the state, as follows: Llanura Costera Tamaulipeca (Área de Protección de Flora y Fauna Laguna Madre y Delta de Río Bravo, Santuario Rancho Nuevo, and Parque Urbana Laguna La Escondida), Llanuras y Lomeríos (Área de Protección de Flora y Fauna Laguna Madre y Delta de Río Bravo, Monumento Natural Bernal de Horcasita, Área Protegida Ecológica Colonia Parras de la Fuente, Zona Especial Sujeta a Conservación Ecológica Laguna La Vega Escondida, and Parque Estatal El Refugio), Sierra de Tamaulipas (Área Protegida Ecológica Colonia Parras de la Fuente), and Gran Sierra Plegada (Reserva de la Biósfera El Cielo). No representation, however, is provided for Llanuras de Coahuila y Nuevo León, Sierra de San Carlos, and Sierras y Llanuras Occidentales. Our determination is rudimentary, because it does not consider the area of coverage or the quality of the habitat under protection. We do not have the data, however, to allow for more sophisticated determinations.

Crotalus morulus Klauber, 1952. The Tamaulipan Rock Rattlesnake Rattlesnake "occupies the Sierra Madre Oriental in southwestern Tamaulipas, central Nuevo León, and southeastern Coahuila" (Campbell and Lamar, 2004; Bryson et al., 2014). This individual came from Ejido El Porvenir (La Perra), in the municipality of Gómez Farías. The EVS of this rattlesnake is 15, placing it in the lower portion of the high vulnerability category. Its conservation status has not been assessed by IUCN, and this species is not listed by SEMARNAT.

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Table 18. Characteristics of Natural Protected Areas in Tamaulipas, Mexico. Abbreviations in Facilities Available as follows: A = administrative services; R = park guards; S = systems of pathways; and V = facilities for visitors.

Name	Category	Date of Decree	Area (ha)	Municipalities	Jurisdiction	Physiographic Regions	Area Demarcated	Personnel Present Year-round	Facilities Available	Occupied by Landowners	Herpetofaunal Survey Completed	Management Plan Available
Laguna Madre y Delta del Río Bravo	Área de Protección de Flora y Fauna	14 April 2005	572,808.60	Matamoros, San Fernando, Soto la Marina	Federal	Llanura Costera Tamaulipeca, Llanuras, Lomeríos	Yes	Yes	A, R, S, V	Yes	Partially	Yes
Rancho Nuevo	Santuario	16 July 2002	30	Aldama	Federal	Llanura Costera Tamaulipeca	Yes	Yes	A, R	Yes	Partially	No
Laguna La Escondida	Parque Urbano	31 May 1997	320.37	Reynosa	State	Llanura Costera Tamaulipeca	Yes	No	S, V	Yes	Partially	Yes
Bernal de Horcasitas	Monumento Natural	30 Aug 1997	18,204.51	González	State	Llanuras y Lomeríos	Yes	No	No	Yes	No	No
Altas Cumbres	Zona Especial Sujeta a Conservación Ecológica	19 Nov 1997	30,327.85	Victoria, Jaumave	State	Gran Sierra Plegada	Yes	No	S, V	Yes	Partially	Yes
Colonia Parras de la Fuente	Área Protegida Ecológica	8 July 1992	21,948.69	Abasolo, Casas, Soto la Marina	State	Sierra de Tamaulipas, Llanuras y Lomeríos	Yes	No	S	Yes	Partially	Yes
El Cielo	Reserva de la Biósfera	13 July 1985	144,530.51	Ocampo, Llera, Jaumave, Gómez Farías	State	Gran Sierra Plegada	Yes	Yes	A, R, S, V	Yes	Yes	Yes
Laguna La Vega Escondida	Zona Especial Sujeta a Conservación Ecológica	12 Nov 2003	2,217.00	Tampico	Municipal	Llanuras y Lomeríos	Yes	No	No	?	No	No
El Refugio	Parque Estatal	30 April 2015	17.58	Victoria	State	Llanuras y Lomeríos	Yes	No	S, V	No	Partially	No

In analyzing the effectiveness of NPAs in Panama, Jaramillo et al. (2010) based their analysis on five requisites, which we are using here to evaluate the situation in Tamaulipas (Table 18). In all nine NPAs, the areas involved are demarcated and people can recognize their limits. Conversely, personnel are present year-round only in four of the nine areas (Table 18). Facilities of various sorts are available in seven of the nine areas, ranging from only a system of pathways in one NPA to a full complement of administrative services, park guards, visitors' facilities, and systems of pathways in two of them (Table 18). Unfortunately, landowners occupy seven of the nine areas, are absent in one area, and the situation is unknown in another (Table 18). Management plans are available for only five of the nine areas. Herpetofaunal surveys have been completed in one area, and partially completed in six. No surveys are available for two areas. In total, none of the features we consider important have been addressed suitably for any of the NPAs in Tamaulipas. Thus, a considerable amount of work needs to be accomplished to render the existing NPAs maximally effective. Representation of the entire range of habitats also is an important consideration.

Given that herpetofaunal surveys only have been partially completed for the NPAs in Tamaulipas, we amassed the available information on the known herpetofauna of five of the nine NPAs (Table 19). These five NPAs are Área de Protección de Flora y Fauna Laguna Madre y Delta del Río Bravo (LM), Reserva de la Biósfera El Cielo (EC), Zona Especial Sujeta a Conservación Ecológica Altas Cumbres (AC), Área Protegida Ecológica Colonia Parras de la Fuente (PF), and Parque Urbano Laguna La Escondida (LE). The number of herpetofaunal species represented in these five NPAs ranges from 11 in the PF to 98 in the EC. The total number of species represented in all five of these areas is 118, including 23 of 31 anurans, seven of 13 salamanders, one of one crocodylian, 74 of 123 squamates, and 13 of 16 turtles (Table 19). Thus, 118 species of a total of 184 (63.4%) for the state have been recorded from these five NPAs. Obviously, it is a good sign that a little less than two-thirds of the Tamaulipan herpetofauna is known from these five NPAs; however, with respect to the conservation needs for these creatures this is only

Crotalus pricei Van Denburgh, 1895. The Twin-spotted Rattlesnake ranges "from southeastern Arizona, in the United States, southward in Mexico through the Sierra Madre Occidental in Sonora, Chihuahua, and Durango, and in the Sierra Madre Oriental in Coahuila, Nuevo León, and Tamaulipas, with isolated populations in San Luis Potosí and Aguascalientes" (Lemos-Espinal and Dixon, 2013). This individual came from Ejido La Marcela, in the municipality of Miquihuana. Wilson et al. (2013a) determined its EVS as 14, placing it at the lower end of the high vulnerability category. Its conservation status has been established as Least Concern, and as species of special protection by SEMARNAT. © Elí García-Padilla

a basic consideration. Beyond knowing the distribution of these species, one needs to understand the viability of their populations in these areas and the relative conservation importance of the species involved. In our opinion, the most important species are the state endemics, followed by the country endemics and the non-endemics. Thus, we calculated the number of species in these distributional categories and placed those values in Table 20. As expected, these data indicate that the greatest number of these taxa have been recorded from Reserva de la Biósfera El Cielo (two state endemics, 29 country endemics, and 66 non-endemics). The next greatest number of state and country endemics are recorded from the Zona Especial Sujeta a Conservación Ecológica Altas Cumbres (one state endemic and 11 country endemics). In sum total, of the 118 species recorded from these five NPAs, two are state endemics of a total of ten (20.0%; *Xenosaurus platyceps* and *Thamnophis mendax*), 32 are country endemics of a total of 49 (65.3%), 83 are non-endemics of a total of 121 (68.6%), and one is a non-native of a total of six (16.7%; *Hemidactylus turcicus*). Clearly, the Reserva de la Biósfera El Cielo is the most important of these five areas, given that it harbors the largest number of species and the highest number of state and country endemics. In addition, as noted above, this NPA is located in the physiographic region of greatest importance.

Table 19. Distribution of the herpetofauna in the natural protected areas of Tamaulipas, Mexico. Abbreviations are as follows: LM = Laguna Madre y Delta del Río Bravo; EC = El Cielo; AC = Altas Cumbres; PF = Parras de la Fuente; and LE = Laguna La Escondida. * = species endemic to Mexico; ** = species endemic to Tamaulipas; *** = non-native species; and [ms] = marine species.

Taxa	**Natural Protected Area**				
	LM[a]	**EC[b]**	**AC[c]**	**PF[d]**	**LE[e]**
Anura (23 species)					
Bufonidae (4 species)					
Anaxyrus debilis	x				
Anaxyrus punctatus		x	x		
Incilius nebulifer	x	x	x	x	
Rhinella marina	x	x	x		
Craugastoridae (2 species)					
Craugastor augusti		x	x		
*Craugastor decoratus**		x			
Eleutherodactylidae (3 species)					
Eleutherodactylus cystignathoides		x	x	x	
Eleutherodactylus guttilatus		x			
*Eleutherodactylus longipes**		x	x		
Hylidae (5 species)					
*Ecnomiohyla miotympanum**		x	x		
*Hyla eximia**		x			
Scinax staufferi		x			
Smilisca baudinii	x	x	x		
Trachycephalus typhonius		x			
Leptodactylidae (2 species)					
Leptodactylus fragilis	x	x			
Leptodactylus melanonotus		x			
Microhylidae (2 species)					
Gastrophryne olivacea		x	x		
Hypopachus variolosus	x	x			
Ranidae (2 species)					
Lithobates berlandieri	x	x	x	x	x
Lithobates catesbeianus	x	x			

Rhinophrynidae (1 species)					
Rhinophrynus dorsalis	x	x			
Scaphiopodidae (2 species)					
Scaphiopus couchii	x	x			
Spea multiplicata	x	x			
Caudata (7 species)					
Plethodontidae (5 species)					
*Aquiloeurycea cephalica**		x			
*Aquiloeurycea scandens**		x	x		
*Bolitoglossa platydactyla**		x			
*Chiropterotriton multidentatus**		x			
*Isthmura bellii**		x			
Salamandridae (1 species)					
Notophthalmus meridionalis	x				
Sirenidae (1 species)					
Siren intermedia	x				x
Crocodylia (1 species)					
Crocodylidae (1 species)					
Crocodylus moreletii	x	x			
Squamata (74 species)					
Anguidae (3 species)					
*Abronia taeniata**		x			
*Anguis incomptus**			x		
Gerrhonotus infernalis		x	x		
Corytophanidae (1 species)					
Laemanctus serratus		x			
Crotaphytidae (1 species)					
Crotaphytus collaris		x			x
Dactyloidae (1 species)					
Norops sericeus	x	x	x		
Dibamidae (1 species)					
*Anelytropsis papillosus**		x	x		
Gekkonidae (1 species)					
*Hemidactylus turcicus****		x			
Iguanidae (1 species)					
Ctenosaura acanthura	x	x			
Phrynosomatidae (11 species)					
Cophosaurus texanus	x		x		x
Holbrookia propinqua	x				
Phrynosoma cornutum	x	x	x	x	x
Sceloporus cyanogenys	x	x	x		
Sceloporus grammicus	x	x	x		x
*Sceloporus minor**		x	x		
Sceloporus olivaceus	x	x	x	x	
*Sceloporus parvus**		x			
*Sceloporus scalaris**		x			

*Sceloporus torquatus**		x			
Sceloporus variabilis	x	x	x		
Scincidae (2 species)					
*Plestiodon dicei**		x	x		
Plestiodon tetragrammus	x	x	x		
Sphenomorphidae (1 species)					
*Scincella silvicola**		x			
Teiidae (3 species)					
Aspidoscelis gularis	x	x	x		x
Aspidoscelis sexlineata	x				
*Holcosus amphigrammus**	x	x	x		
Xantusiidae (2 species)					
*Lepidophyma micropholis**		x			
*Lepidophyma sylvaticum**		x	x		
Xenosauridae (1 species)					
*Xenosaurus platyceps***		x	x		
Boidae (1 species)					
Boa imperator	x	x	x	x	
Colubridae (19 species)					
Coluber constrictor	x	x			
Drymarchon melanurus	x	x	x	x	x
Drymobius margaritiferus		x	x		
*Ficimia olivacea**		x			
Ficimia streckeri		x			
Lampropeltis annulata		x	x		
Leptophis mexicanus	x	x	x		
Masticophis flagellum	x	x			x
Masticophis schotti	x	x			
Mastigodryas melanolomus		x			
Oxybelis aeneus		x	x		
Pantherophis emoryi	x	x	x		x
Pseudelaphe flavirufa		x			
Salvadora grahamiae		x			
Senticolis triaspis		x	x		
Spilotes pullatus		x			
Tantilla atriceps	x				
Tantilla rubra		x	x	x	
*Trimorphodon tau**			x		
Dipsadidae (10 species)					
*Adelphicos newmanorum**		x			
Coniophanes imperialis		x			
*Geophis latifrontalis**		x			
Imantodes cenchoa		x			
Leptodeira maculata		x			
Leptodeira septentrionalis		x	x		
Pliocercus elapoides		x			

*Rhadinaea gaigeae**		x			
Tropidodipsas fasciata		x			
Tropidodipsas sartorii		x			
Elapidae (1 species)					
Micrurus tener	x	x	x	x	
Leptotyphlopidae (1 species)					
Rena dulcis		x			
Natricidae (7 species)					
Nerodia rhombifer		x			x
Storeria dekayi			x		
*Storeria hidalgoensis**		x			
Thamnophis cyrtopsis		x			
Thamnophis marcianus	x	x			x
*Thamnophis mendax***		x			
Thamnophis proximus	x	x			x
Sibynophiidae (1 species)					
Scaphiodontophis annulatus		x			
Viperidae (5 species)					
*Agkistrodon taylori**	x	x			
Bothrops asper		x			
Crotalus atrox	x		x	x	
*Crotalus morulus**		x	x		
*Crotalus totonacus**		x	x		
Testudines (13 species)					
Cheloniidae (4 species)					
Caretta caretta[ms]	x				
Chelonia mydas[ms]	x				
Eretmochelys imbricata[ms]	x				
Lepidochelys kempii[ms]	x				
Dermochelyidae (1 species)					
Dermochelys coriacea[ms]	x				
Emydidae (2 species)					
*Terrapene mexicana**		x			
Trachemys venusta	x	x			x
Kinosternidae (4 species)					
Kinosternon flavescens		x			
*Kinosternon herrerai**	x				
*Kinosternon integrum**		x			
Kinosternon scorpioides	x				
Testudinidae (1 species)					
Gopherus berlandieri	x		x	x	
Trionychidae (1 species)					
Apalone spinifera	x				x

a: CONANP, 2012; b: Gobierno del Estado de Tamaulipas – Instituto de Ecología Aplicada-UAT, 2013; c: Gobierno del Estado de Tamaulipas – Instituto de Ecología Aplicada-UAT, 2014; d: Gobierno del Estado de Tamaulipas – Terra Nostra A.C., 2014; e: Gobierno del Estado de Tamaulipas and SEA, S.A. DE C.V., 2014.

Future herpetofaunal conservation efforts should determine the best places to protect the remaining 68 species not known to occur in any NPA, especially the 25 state and country endemics, and how to best incorporate these places into the existing system of NPAs. Additionally, efforts to ascertain the health of the populations of the herpetofaunal species represented should be undertaken. In the final analysis, all native herpetofaunal species should be conserved, regardless of their conservation status.

Table 20. Summary of the distributional status of herpetofaunal species in five protected areas in Tamaulipas, Mexico. Totals = total number of species recorded in all of the listed protected areas.

Protected Areas	Number of Species	Distributional Status			
		Non-endemic (NE)	Country Endemic (CE)	State Endemic (SE)	Non-native (NN)
Laguna Madre y Delta del Río Bravo	50	47	3	—	—
El Cielo	98	66	29	2	1
Altas Cumbres	45	33	11	1	—
Parras de la Fuente	11	11	—	—	—
Laguna La Escondida	15	15	—	—	—
Totals	118	83	32	2	1

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

A. The herpetofauna of Tamaulipas currently consists of 184 species, including 31 anurans, 13 salamanders, one crocodylian, 124 squamates, and 15 turtles; the total represents 14.6% of the 1,260 species currently known from Mexico.

B. The number of herpetofaunal species among the seven physiographic regions we recognize in Tamaulipas ranges from 30 in the Sierras y Llanuras Occidentales to 135 in the Gran Sierra Plegada.

C. The species shared between physiographic regions range from six between the Sierra de Tamaulipas and Sierras y Llanuras Occidentales, to 73 between the Llanuras y Lomeríos and Gran Sierra Plegada regions. The CBR values range from 0.15 between the Sierra de Tamaulipas and the Sierras y Llanuras Occidentales regions and 0.72 between the Llanura Costera Tamaulipeca and Llanuras y Lomeríos regions. The UPGMA analysis demonstrates that the low elevation regions cluster together, as do the higher elevation regions, of which all of the latter abut portions of the former. The most distinctive but least speciose physiographic region is located in the southwestern corner of the state, and abuts the most speciose region to the east.

D. A relatively high level of herpetofaunal endemism is found in Tamaulipas. Of the 184 species known from the state, the distribution of 59 (32.1%) is confined to Mexico. Although a significant proportion of the species in Tamaulipas also occur in the United States, the percentage of endemism still is much higher than in Chiapas (17.6%), a state inhabited by a large number of species shared with neighboring Guatemala and other areas of Central America. Still, the percentage of endemism for Tamaulipas is only about one-half of that for all of Mexico (60.5%; 762/1,260), because of the proportion of species shared with the United States.

E. The distributional status of the members of the Tamaulipan herpetofauna is as follows (in the order of the size of the categories): non-endemic species (120; 65.2% of 184 species); country endemics (49; 26.6%); state endemics (10; 5.4%); and non-natives (five; 2.7%).

Crotalus totonacus Gloyd and Kauffeld, 1940. The Totonacan Rattlesnake occurs "along the Atlantic versant of Mexico, from southern Tamaulipas to eastern San Luis Potosí, and in northeastern Querétaro, eastern Hidalgo, and northern Veracruz" (Lemos-Espinal and Dixon, 2013). This individual came from an ecotone of tropical deciduous forest and oak forest near Ejido Emperadores Aztecas, in the municipality of Tula. Wilson et al. (2013a) calculated its EVS as 17, placing it in the middle of the high vulnerability category. Its conservation status has not been determined by IUCN, and this species is not listed by SEMARNAT. © Elí García-Padilla

F. We utilized the SEMARNAT, IUCN, and EVS systems to assess the conservation status of the members of the Tamaulipan herpetofauna. We found the SEMARNAT system to be of limited value, because only 40.8% of the native members of the herpetofauna have been evaluated. Otherwise, only seven species are placed in the endangered category (P), 29 in the threatened category (A), and 37 in the special protection category (Pr).

G. Various authors (Wilson et al., 2013a, b; Howard and Bickford, 2014; Mata-Silva et al., 2015; Johnson et al., 2015a; Nori and Loyola, 2015) have criticized the widely used IUCN system for a number of reasons. Johnson et al. (2015a: 324) summarized these reasons as follows: "(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 reference to the Tamaulipan herpetofauna, the category, number, and percentage of the 179 native species is as follows: CR (two; 1.1%); EN (10; 5.6); VU (11; 6.1%); NT (seven; 3.9%); LC (110; 61.4%); DD (five; 2.8%); and NE (34; 19.0%).

H. Wilson et al. (2013a, b) demonstrated that the EVS system for evaluating conservation status addresses the deficiencies of the SEMARNAT and IUCN systems. Once we determined the EVS scores for members of the Tamaulipan herpetofauna and partitioned them into low, medium, and high categories of vulnerability, the number of species in these categories increased from low (53; 30.5% of 174 species for which EVS scores can be calculated) to medium (72; 41.4%), and decreased to high (49; 28.2%). As concluded by Johnson et al. (2015a: 325), "We [also] 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." In the case of Tamaulipas, these sorts of activities should be undertaken as rapidly as possible, given the rate humans are transforming natural habitats.

I. A comparison of the IUCN and EVS categorizations indicates that slightly more than one-fourth the high vulnerability species are placed in the IUCN threat categories, and that about twice the number of low vulnerability species are allocated to the LC category. As previously documented, these two systems of conservation evaluation are at odds with one another.

J. An evaluation of the species placed in the DD, NE, and LC categories by IUCN compared to their respective EVS values indicates that many species in Tamaulipas have been incorrectly placed within the IUCN categories and should be re-categorized.

K. We employed the Relative Herpetofaunal Priority (RHP) measure to ascertain the conservation significance of the seven regional herpetofaunas in Tamaulipas. One means of determining the RHP involves summing the country and state endemics, and by using this method we found the conservation importance of the regional herpetofaunas to be greatest for the Gran Sierra Plegada, next greatest for the Sierra de Tamaulipas and the Llanuras y Lomeríos, the Sierras y Llanuras Occidentales, the Llanura Costera Tamaulipeca, and the Sierra de San Carlos, and finally the Llanuras de Coahuila y Nuevo León. The other means of ascertaining the RHP is based on the number of high vulnerability species, and by employing this method we found the following ranking, from high to low: Gran Sierra Plegada, Llanuras y Lomeríos, Llanura Costera Tamaulipeca, Sierras y Llanuras Occidentales, Sierra de Tamaulipas, Llanuras de Coahuila y Nuevo León, and Sierra de San Carlos.

L. Close to one-third of the herpetofauna of Tamaulipas is comprised of state and country endemic species. Tamaulipas, however, harbors relatively few natural protected areas (NPAs) and none of them was established specifically to protect any portion of the herpetofauna. Of the nine, the oldest protected area in the state is the Reserva de la Biósfera El Cielo and the newest is the Parque Estatal El Refugio. Of the seven physiographic regions recognized in the state, four are represented among the nine NPAs. Management plans are available for only five of the nine NPAs. Complete herpetofaunal surveys generally are not available for these areas. In addition, none of the nine NPAs is provided with a full spectrum of features necessary to adequately protect the resident herpetofaunas.

Kinosternon integrum Le Conte, 1854. The Mexican Mud Turtle is endemic to Mexico and is distributed from central Sonora to Oaxaca and from southwestern Tamaulipas and the central and southern portion of the Mexican Plateau (Lemos-Espinal and Dixon, 2013). This individual was found near Ejido 7 de Noviembre, in the municipality of Victoria. Wilson et al. (2013a) determined its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been assessed as Least Concern by IUCN, and as a species of special protection by SEMARNAT. © Sergio A. Terán-Juárez

Gopherus berlandieri (Agassiz, 1857). The Texas Tortoise occurs from southern Texas and eastern Coahuila southward to southern Tamaulipas (Van Dijk et al., 2014). This individual was encountered near Ignacio Zaragoza, in the municipality of Llera. Wilson et al. (2013a) calculated its EVS as 18, placing it in the upper portion of the high vulnerability category. Its conservation status has been evaluated as Least Concern by IUCN, and as threatened by SEMARNAT. © Sergio A. Terán-Juárez

M. Given the incompleteness of most of the herpetofaunal surveys conducted in the nine NPAs, we gathered the available data for five of these areas. These data demonstrate that 118 of the total of 184 species are represented collectively within these five areas, and that among them are two state endemics, 32 country endemics, 83 non-endemics, and one non-native species.

N. Future efforts at herpetofaunal conservation will require finding places where the remaining 68 species, including 25 state and country endemics, can be protected. Overall, the relative health of populations of species represented in the system of NPAs in Tamaulipas will need to be ascertained.

Recommendations

A. The state of Tamaulipas shares its northern border with the southern portion of the state of Texas, in the United States, and consequently these areas share a significant proportion of their herpetofaunas. Thus, it would appear worthwhile for conservation authorities in these areas to create a bi-national approach for conserving their respective herpetofaunas.

B. One of the persistent problems in herpetofaunal conservation is that government authorities usually do not consider the needs of the herpetofauna when designing systems of protected areas, and the system in Tamaulipas is no exception. Dealing with the conservation needs of these creatures, therefore, typically involves an *ex post facto* game of catch-up. Our analysis demonstrates that less than two-thirds of the state's herpetofauna has been recorded from five of the nine natural protected areas (NPAs) in the state. Thus, 68 species, including 25 state and country endemics, are not under protection in state NPAs. Consequently, we recommend that national and state conservation authorities undertake a comprehensive survey of conservation needs of the herpetofauna, especially with respect to state and national endemic species, as part of an overall survey designed to investigate the ability of established NPAs to meet the conservation needs of the flora and fauna within the borders of Tamaulipas.

C. Given the increase of the state's human population, we recommend that these steps be taken as rapidly as possible.

The last word in ignorance is the man who says of an animal or plant, "What good is it?" If the land mechanism as a whole is good, then every part is good, whether we understand it or not. If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering.

—Aldo Starker Leopold (1938)

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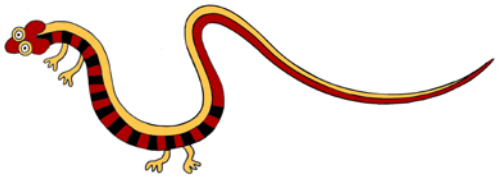

Sergio A. Terán-Juárez earned his bachelor's degree as a biologist at the Instituto Tecnológico de Chetumal in Quintana Roo, Mexico, with a thesis on the helminth parasites of five anuran species from southern Quintana Roo. His master's thesis work was conducted at the Instituto Tecnológico de Ciudad Victoria, in Tamaulipas, Mexico, and focused on the species richness and composition of amphibians in tropical forest fragments. Currently, Sergio is a Ph.D. student at the Instituto Tecnológico de Ciudad Victoria, and conducts research on the effects of adjacent land use on species richness and community composition of lizards in tropical forest. Sergio's interests focus on the ecology and conservation of herpetofauna, particularly the environmental factors that affect their distribution in human-modified landscapes. To date, Sergio has authored or co-authored 13 peer-reviewed scientific publications.

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 on 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 bachelor'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 37 peer-reviewed scientific publications. Currently, he is employed as a formal Curator of Reptiles and Amphibians 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 displayed in several recognized scientific, artistic, and educational books, magazines, and websites. The photo on the left, taken by Noé Vargas-González, shows Elí in a cave in Tamaulipas where he was studying the predation of bats by the ratsnake *Pantherophis bairdi*.

Vicente Mata-Silva is a herpetologist from Río Grande, Oaxaca, Mexico. His interests include ecology, conservation, geographic distribution, and the monitoring of herpetofauna 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 70 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. He also is the Distribution Notes Section Editor for the journal *Mesoamerican Herpetology*.

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Larry David Wilson is a herpetologist with lengthy experience in Mesoamerica. He has authored or co-authored over 330 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," one in 2014 entitled "Snakes of the genus *Tantilla* (Squamata: Colubridae) in Mexico: taxonomy, distribution, and conservation," and four in 2015 entitled "A conservation reassessment of the Central American herpetofauna based on the EVS measure," "The herpetofauna of Oaxaca, Mexico: composition, physiographic distribution, and conservation status," "The herpetofauna of Chiapas, Mexico: compostion, distribution, and conservation," and "A checklist and key to the snakes of the *Tantilla* clade (Squamata: Colubridae), with comments on taxonomy, distribution, and conservation." 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*.