Ophryacus sphenophrys (Smith, 1960). The Broad-horned Pitviper is a "priority one species" that has been assessed an Environmental Vulnerability Score (EVS) of 18 (see the following article), whose distribution is restricted to the Sierra Madre del Sur physiographic region. Grünwald et al. (2015: 407) indicated that this pitviper "has been collected only at the type locality [La Soledad] and one other locality in the same municipality, between La Soledad and Buenavista Loxicha. Both localities lie at moderate elevations on the extremely humid windward slope of the Sierra Madre del Sur of south-central Oaxaca…the known elevational range for this species is 1,340–1,460 m." This individual was found at Portillo del Rayo, in the municipality of Candelaria Loxicha, Oaxaca. © Elí García-Padilla

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The endemic herpetofauna of Mexico: organisms of global significance in severe peril

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Abstract: Life on Earth exists due to the interactions among the atmosphere, hydrosphere, and lithosphere. Humans, however, have created and are faced with the consequences of an interrelated set of problems that impact all of these spheres, including the biosphere. The decline in the diversity of life is a problem of global dimensions resulting from a sixth mass extinction episode created by humans. Endangerment of the herpetofauna has resulted from (1) habitat destruction, alteration, and fragmentation, (2) introduced invasive species, (3) unsustainable use, (4) pollution, (5) disease, and (6) climate change, of which the most serious cause is the first. In this study, we examined the conservation needs of the 789 endemic members of the Mexican herpetofauna, which comprise 61.1% of the herpetofauna of the country. We documented the occurrence of these members among 14 physiographic regions, and identified the Sierra Madre Oriental, the Sierra Madre del Sur, the Meseta Central, the Pacific lowlands from Sonora to western Chiapas (including the Balsas Basin and the Central Depression of Chiapas), and the Sierra Madre Occidental as the five most critical areas of endemism. Individual species occupy from one to eight of the 14 regions, although the largest proportion of species (69.3%) are restricted to single regions. We devised a metric for prioritizing the 789 endemics by combining their EVS values with their physiographic regional occupancy, which resulted in 18 priority levels. The largest proportion of species (490; 62.1%) is allocated to priority level one, and the next largest (101; 12.8%) to priority level two. We posit that this system of conservation priority levels can provide a gauge for evaluating the degree of attention allocated to various endemic herpetofaunal species in future conservation planning. Conservation plans need to proceed as rapidly possible, however, because the human population in Mexico is scheduled to double in the next half-century, which will bring significant environmental threats. We predict that these threats will affect the Mexican endemic species approximately in accordance to the order of their conservation priority status, thereby placing this globally significant herpetofauna in extreme peril. Solutions to the plethora of anthropogenic environmental problems only will come about if humanity is able to build a sustainable society that considers the perpetual needs of the remaining planetary life. We believe this goal is reachable, but only if it occurs within a sufficient time frame and entails a paradigm shift in human attitudes and actions based on reforming universal education.

Key Words: Amphibians, conservation significance, crocodylians, endemism, extinction risk, squamates, turtles

Resumen: La vida en la tierra existe debido a las interacciones entre la atmósfera, la hidrósfera y la litósfera. Los humanos, sin embargo, han creado y se enfrentan con las consecuencias de un conjunto de problemas interrelacionados que impactan estas capas, incluyendo la biósfera. La disminución de la diversidad biológica es un problema de dimensiones globales actualmente creadas por un episodio de la sexta extinción masiva originada por los humanos. Las amenazas a la herpetofauna son generadas por (1) la destrucción, alteración y fragmentación del hábitat, (2) especies introducidas invasoras, (3) uso insostenible de recursos, (4) contaminación, (5) enfermedades y (6) el cambio climático, de los cuales el primero es el agente causal más serio. En este estudio, examinamos las necesidades de conservación de los 789 miembros de la herpetofauna endémica de México, la cual comprende el 61.1% de la herpetofauna del país. Documentamos la presencia de la herpetofauna endémica entre 14 regiones fisiográficas en el país, e identificamos la Sierra Madre Oriental, Sierra Madre del Sur, Meseta Central, Tierras Bajas desde Sonora al oeste de Chiapas (incluyendo la Cuenca del Balsas y la Depresión Central de Chiapas) y la Sierra Madre Occidental como las cinco áreas más críticas de endemismo. Individualmente, las especies ocupan de una a ocho de las 14 regiones, aunque la mayor proporción de especies (69.3%) está restringida a una sola región. Desarrollamos una medida para priorizar las 789 especies endémicas combinando sus valores de EVS y su presencia en las regiones fisiográficas, resultando en 18 niveles de prioridad. La proporción más grande de especies (490; 62.1%) está ubicada en el nivel de prioridad uno, seguida por la proporción (101; 12.8%) ubicada en el nivel de prioridad dos. Postulamos que el sistema de niveles de prioridad de conservación puede proporcionar una medida para evaluar el grado de atención que debería ser asignado a varias especies endémicas en los planes futuros de conservación. Sin embargo, los planes de conservación necesitan proceder los más rápido posible, porque se espera que la población humana mexicana se duplicará en los siguientes 50 años, lo cual traerá amenazas ambientales significativas. Predecimos que estas amenazas afectarán las especies endémicas mexicanas dependiendo de su estatus de conservación prioritaria, consecuentemente dejando esta herpetofauna globalmente importante en peligro extremo. Las soluciones para la plétora de problemas ambientales de origen antropogénico tendrán lugar solamente si la humanidad es capaz de construir una sociedad sostenible que considere las perpetuas necesidades del resto de los seres vivos en el planeta. Creemos que esta meta es alcanzable, pero solamente si ocurre con tiempo suficiente e incluye un cambio de paradigma con respecto a las actitudes y acciones humanas fundado en una reforma de educación universal.

Palabras Claves: Anfibios, cocodrílidos, endemismo, escamosos, importancia de conservación, riesgo de extinción, tortugas

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Each loss of a species is a loss of a companion on the long journey of evolution. —David W. Orr (2016)

INTRODUCTION

All life on planet Earth (i.e., the biosphere) exists at the intersections among the three abiotic spheres, i.e., the atmosphere, hydrosphere, and lithosphere, and is dependent on their interplay for continued existence over time. These four spheres are all interrelated in a huge variety of ways, in a planet-wide system of energy flow and the cycling of materials referred to as the ecosystem. The scientific study of the ecosystem is known as ecology, and the study of the problems in the ecosystem, largely of anthropogenic origin, is termed environmental science. Presently and into the future, the environmental problems of greatest impact are those manifested at the global level, i.e., those that impact the entire surface of the planet. Thus, within the atmosphere, a global environmental problem involves climate change, which presently involves the modification of global climate by anthropogenic impact, primarily by increasing the Earth's average temperature. "Scientists around the world have been researching global warming for the past 50 years. As the evidence has accumulated, those most qualified to address the issue have reached the strong consensus that the 21st century will experience significant climate change and that human activities will have been at least partly responsible for this change" (Raven and Berg, 2004: 461). Of significant importance, this issue rose to the level of global political concern and resulted in the Paris Climate Accord, which "is an agreement within the United National Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020…As of August 2017, 195 UNFCCC members have signed the agreement, 158 of which have ratified it" (www.treaties.un.org; accessed 6 August 2017). Perhaps the most significant backward step in addressing this global environmental concern came when the current president of the United States withdrew the country from this agreement. This move was extraordinarily significant, inasmuch as the per-capita rate of commercial energy consumption in the United States is very high, second only to Canada (Raven and Berg, 2004, Fig. 10.1). Canada, however, is close in size to the United States but its population (2016 census figure) is only 10.8% the size of that country (2017 estimate; www.wikipedia.org; accessed 13 July 2017). Given that the United States is the world's third most populous nation (Population Reference Bureau 2016 World Population Report) and the largest of the highly developed countries, its impact on global environmental problems cannot be underestimated nor dispensed with by denial.

"Life on Earth would be impossible without water, which makes up a substantial part of the mass of most organisms. All life forms, from bacteria to plants and animals, use water as a medium for chemical reactions as well as for the transport of materials within and among cells…Water continuously circulates from the ocean to the atmosphere to the land and back to the ocean. It provides a renewable supply of purified water for terrestrial organisms. This complex cycle, known as the hydrologic cycle, results in a balance between water in the ocean, on the land, and in the atmosphere" (Raven and Berg, 2004: 110–111). "Regardless of its physical form—solid, liquid, or vapor—or location, every molecule of water eventually moves through the hydrological cycle" (Raven and Berg, 2004: 111). Humans impact both the quantity and quality of the water available on the planet. These issues are well known, but frequently are ignored. Interestingly, however, "a 2001 paper published in the journal *Science* by researchers at Scripps Institution of Oceanography suggests a further human-induced effect on the hydrologic cycle. It appears that air pollution may be weakening the global hydrologic cycle. The concern is aerosols, tiny particles of air pollution consisting mostly of sulfates, nitrates, carbon, mineral dusts, and fly ash. These aerosols are produced largely from fossil fuel combustion and the burning of forests. Once in the atmosphere, aerosols enhance the scattering and absorption of sunlight in the atmosphere and cause brighter clouds to form. Both the clouds and the light-scattering effect in the atmosphere cause a warming of the atmosphere and a threefold reduction in the amount of solar radiation reaching Earth's surface, including the ocean. Also, clouds formed in aerosols are less likely to release their precipitation. As a result, scientists think aerosols may affect the availability and quality of water in some regions during the 21st century" (Raven and Berg, 2004: 112).

The land surface of the planet, the soil and rock of Earth's crust, makes up the lithosphere (Raven and Berg, 2004: 66), and for all intents and purposes is where humans make their homes. This also is the region of the planet where the impact of humans is most evident. The relationship that humans have with the land is elemental and right under their feet—the soil. This amazingly thin layer represents the point of interface among the lithosphere (its top layer), the hydrosphere (retained by this layer), the atmosphere (infused into this layer), and the biosphere (living in and on this layer)—the resource upon which agriculture fundamentally depends; this layer also is being lost at an alarming rate. "The USDA [U.S. Department of Agriculture] estimates that about one fifth of U.S. cropland is vulnerable to soil erosion damage, and soil erosion is an even greater problem in some developing nations" (Raven and Berg, 2004: 423).

Fundamentally, we need to understand that life, throughout its existence on Earth, has been completely dependent upon the complex interplay of the atmosphere, hydrosphere, and lithosphere, and that humans have evolved to constitute the most significant invasive species. Anthropogenic impact extends along the same pathways through which energy flows and materials cycle, to cause disruption in the pathways that connect the three non-living spheres to the living one—the biosphere.

Craugastor guerreroensis (Lynch, 1967). The Guerreran Robber Frog is a priority one species with an EVS of 18, which is limited in occurrence to the Sierra Madre del Sur physiographic region. According to Frost (2017), this frog is "known only from the type locality near Agua del Obispo, Guerrero, Mexico, 980 m elevation." This individual came from near the type locality. © Alejandro Calzada-Arciniega

BIODIVERSTIY DECLINE: A GLOBAL ENVIRONMENTAL PROBLEM

The biosphere consists of the world's organisms and their interactions with the non-living spheres (Raven and Berg, 2004), and contains "all the organisms alive in the world at any moment, which together form a thin spherical layer around the planet" (Wilson, 2016: 227). The world's organisms comprise bacteria, archaea, protists, fungi, animals, and plants.

What is not debated is that the diversity of life on Earth is in decline (Wilson, 2016), a phenomenon known as biodiversity decline. Biodiversity encompasses "the total variation in organisms, in past times and present, in locations up to and including the entire planet, and organized at three levels: ecosystems, species comprising the ecosystems, and genes prescribing the traits of the species" (Wilson, 2016: 227). Its decline encompasses a documentable decrease in the total variation of organisms at all three of these levels in the past and present. In the past, biodiversity decline has been most noticeable as a series of mass extinction episodes "in which numerous species disappeared during a relatively short period of geological time" (Raven and Berg, 2004: 355). These episodes have played out against the "continuous, low-level extinction of species" (Raven and Berg, 2004: 355), which has occurred throughout the length of time that organisms have inhabited Earth (Raven and Berg, 2004). One of the strange paradoxes of present-day life, however, is that "the variety of life-forms on Earth remains largely unknown to science. The species discovered and studied well enough to assess, notably the vertebrate animals and flowering plants, are declining in number at an accelerating rate—due almost entirely to human activity" (Wilson, 2016: 5). Notably, the groups not included in the above statement encompass the bulk of Earth's organisms, i.e., the prokaryotic bacteria and archaea, the eukaryotic protists, fungi, non-flowering plants, and the non-vertebrate animals. Biologists understand enough about biodiversity decline among the flowering plants and vertebrate animals to demonstrate that this is an environmental problem of global extent, equivalent in scope to the problems of anthropogenic origin existing in the three abiotic spheres of Earth. The ectothermic tetrapods—the amphibians, crocodylians, squamates, and turtles—are one group of vertebrate animals that has been studied well enough to substantiate the reality of biodiversity decline. Our understanding of biodiversity decline among these animals is most extensive with the amphibians, for which a summary was presented by AmphibiaWeb (www.amphibiaweb.org) in a piece entitled "Worldwide amphibian declines: what is the scope of the problem, what are the causes, and what can be done?" This piece was posted on 13 February 2013 and updated on 3 March 2017. Interestingly, although first written in 2013 and updated in the current year, the supporting literature cited references for publications from 1985 to 2004, and thus the latest was published 13 years ago. Nonetheless, the piece includes five sections dealing with aspects of the overall problem. One of these sections is entitled "Factors Involved in Amphibian Decline," which identifies the factors as: (1) habitat destruction, alteration, and fragmentation; (2) introduced species; (3) over-exploitation; (4) climate change; (5) UV-B radiation; (6) chemical contaminants; (7) disease; (8) deformities; and (9) synergisms. These factors are not mutually exclusive, however, as is obvious by listing synergisms as one of them, i.e., "multiple factors [that] can act together to cause mortality or sublethal effects." Detailing the interactions among the contributing factors is an important activity, but beyond the scope of this study. The first of these factors (i.e., habitat destruction, alteration, and fragmentation) are acknowledged in this section as "probably the most serious causes of current and future amphibian population declines and species extinctions." A 2003 book chapter by Dodd and Smith is cited to support this statement, which appears in the book *Amphibian Conservation*, edited by R. D. Semlitsch. Another reference of substantial importance in addressing this factor is a short piece by Bickford et al. (2008), published initially as a "reader response" to a paper published that year in PloS Biology by Lips et al. (2008). The Bickford et al. (2008) response voiced a fundamentally critical issue by stating that, "the recent review by Lips et al. on climate change triggering chytrid fungus outbreaks in Neotropical amphibians is an excellent investigation. Despite their comprehensive analysis and conclusion that the link between climate change and disease is tenuous, the paper epitomizes a current trend in amphibian extinction research: ignoring the primary factor. Habitat loss is clearly the most important driver of amphibian extinction. While we commend the authors for a rigorous treatment of an interesting and important issue, we must ensure we do not miss the forest for the trees" or in the clever words of the title "missing the forest for the disease." Bickford et al. (2008) go on to say that "recent amphibian research and publications has shifted to topics that attract funding and top-tier publications" and that while they "do not contest that climate change and disease are important drivers of amphibian decline," they "do take issue with lack of recognition that these stressors are of relatively lower priority compared to habitat loss." This statement is supported by their research published in the same year in PloS One (Sodhi et al., 2008). These authors concluded that their "findings that amphibians are more susceptible to decline when they have small geographic ranges and large body sizes are not new; however, [their] discovery that extrinsic forces increase the susceptibility of high-risk species validates the hypothesis that global warming and the increased climatic variability this entails, spell a particular dire future for amphibians. Evidence is mounting that both direct (e.g., habitat destruction) and indirect (e.g., climate change) factors now severely threaten amphibian diversity." They further concluded that, "amphibians with restricted ranges should be urgently targeted for conservation."

These conclusions about amphibians are reflected largely in two important studies published about crocodylians, squamates, and turtles (i.e., the "reptiles"). The earliest of these studies was authored by Gibbons et al. (2000), which deals with the global decline of these creatures and concludes (p.653) that the most significant threats to their populations are "habitat loss and degradation, introduced invasive species, environmental pollutions, disease, unsustainable use, and global climate change." They further stated (p. 663) that "the disappearance of reptiles from the natural world is genuine and should be a matter of concern not simply because of reptiles' perceived associations with amphibians, but because reptile declines, like those of amphibians, are growing and serious in their own right. Current evidence suggests that amphibian and reptile declines, which are exacerbated by burgeoning human populations, constitute a worldwide crisis." A more recent study by Böhm et al. (2013: 372) concluded on the basis of an examination of a "random representative sample of 1500 species" that, "the proportion of threatened reptile species is highest in freshwater environments, tropical regions and on oceanic islands, while data deficiency was highest in tropical areas…and among fossorial reptiles." They emphasized "the need for research attention to be focussed on tropical areas which are experiencing the most dramatic rates of habitat loss, on fossorial reptiles for which there is a chronic lack of data, and on certain taxa such as snakes for which extinction risk may currently be underestimated due to lack of population information. Conservation actions specifically need to mitigate the effects of human-induced habitat loss and harvesting, which are the predominant threat to reptiles."

Although we still understand relatively little about the makeup of the biosphere, humans apparently are the most responsible for creating the problems causing declines in herpetofaunal species around the globe. In this study, we examine the conservation status of the amphibians, crocodylians, squamates, and turtles (collectively, the herpetofauna) known to inhabit the Mesoamerican country of Mexico. We bring together a compendium of information available to assess the current standing of the endemic component of these vertebrate animals in the northern sector of Mesoamerica.

Craugastor mexicanus (Brocchi, 1877). The Mexican Robber Frog is a priority one species with an EVS of 16, whose distribution is restricted to the Sierra Madre Oriental and Sierra Madre del Sur physiographic regions. Frost (2017) indicated that this anuran is distributed in the "highlands of Oaxaca, Puebla, and adjacent Hidalgo and Veracruz, Mexico." Pictured here is an individual from the municipality of Sola de Vega, Oaxaca.

GLOBAL STATUS OF THE MEXICAN HERPETOFAUNA

The Mexican herpetofauna is highly diverse (Table 1), and is comprised of 59 families, 216 genera, and 1,292 species arranged into six orders (Anura, Caudata, Gymnophiona, Crocodylia, Squamata, and Testudines). As a region, Mexico generally is more diverse herpetofaunally than either North America (United States and Canada) or Central America (Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama). The Center for North American Herpetology website lists 650 species in the North American herpetofauna classified in 141 genera and 49 families (www.cnah.com; accessed 6 June 2017). Johnson et al. (2015b) listed 1,052 species for Central America placed in 214 genera and 59 families. Interestingly, the same number of herpetofaunal families is represented in Central America as in Mexico, although some families are found in one area but not the other.

The trend in the increasing total numbers of taxa starting from North America and followed by Central America and then by Mexico is not seen in all the herpetofaunal groups. Such deviation is most obvious among the salamanders, for which the greatest diversity is seen in North America where the numbers of families, genera, and species are eight, 23, and 191, respectively. In Mexico, the respective numbers are four, 19, and 150, and in Central America one, eight, and 159. Another example involves the turtles, where the respective numbers in North America are seven, 22, and 66, in Mexico 10, 18, and 50, and in Central America nine, 14, and 24. Except for families, therefore, a more diverse turtle fauna is represented in North America than in Mexico or Central America.

Table 1. Diversity of the Mexican herpetofauna at the family, genus, and species levels.

Orders	Families	Genera	Species
Anura	11	37	241
Caudata	4	19	150
Gymnophiona	1	2	3
Crocodylia	2	2	3
Squamata	31	138	845
Testudines	10	18	50
Totals	**59**	**216**	**1,292**

Compared with other areas in the world, the Mexican herpetofauna also measures up well. In terms of amphibians (anurans, salamanders, and caecilians), Mexico is the fifth most speciose country, with 394 species (Table 1). The four countries occupying a higher rank in order of priority are as follows (data from www.amphibiaweb.com; accessed 6 June 2017): Brazil (1,040 species, including 1,001 anurans, five salamanders, and 34 caecilians); Colombia (776 species, including 720 anurans, 22 salamanders, and 34 caecilians); Peru (589 species, including 571 anurans, three salamanders, and 15 caecilians); and Ecuador (556 species, including 526 anurans, seven salamanders, and 23 caecilians). Interestingly, since the publication of Stuart et al. (2010), Ecuador and Peru switched positions (at that time they occupied third and fourth).

With respect to the remainder of the herpetofauna, Mexico is the second most speciose country in the world (Flores-Villela and García-Vázquez, 2014), with 898 species (Table 1), after Australia, with 1,091 species (www.reptiledatabase.com; accessed 6 June 2017). Evidently, Mexico is one of the world's most significant centers of herpetofaunal diversity.

ENDEMISM WITHIN THE MEXICAN HERPETOFAUNA

The amount of species-level herpetofaunal endemism found in Mexico is remarkable (Table 2). These endemic species are distributed among 38 of the 59 families (64.4%) represented in the country, and thus 21 families contain no endemic species, including the anurans (Centrolenidae, Leptodactylidae, Microhylidae, Rhinophrynidae, and Scaphiopodidae), the caudates (Salamandridae and Sirenidae), the crocodylians (Alligatoridae and Crocodylidae), the squamates (Corytophanidae, Gymnophthalmidae, Mabuyidae, Sphaerodactylidae, Loxocemidae, Sibynophiidae, and Typhlopidae), and the testudines (Cheloniidae, Chelydridae, Dermatemydidae, Dermochelyidae, and Staurotypidae). These families contain relatively small numbers of species, ranging from one to six. The total number of non-endemic species in these 21 families amounts to 48, with an average of 2.3 species per family.

Craugastor omiltemanus (Günther, 1900). Günther's Robber Frog is a priority one species with an EVS of 16, which is known only from the Sierra Madre del Sur physiographic region. Frost (2017) noted the range of this species as "intermediate elevations (1818–2600 m) of the Sierra Madre del Sur in Guerrero, Mexico." This individual was found at Omiltemi, Guerrero. © Alejandro Calzada-Arciniega

Craugastor pozo (Johnson and Savage, 1995). The Poza Turipache Rainfrog is a priority one species with an EVS of 17, which is known to occur only in the Western Nuclear Central American Highlands physiographic region. Frost (2017) indicated the range of this anuran as "forested localities on the southern edge of the Northern Highlands physiographic region of Chiapas, Mexico, 700–1200 m elevation." This individual was found in a cave in the Centro Ecoturístico El Aguacero, Reserva de la Biósfera Selva El Ocote, Chiapas.
© Bruno Enrique Tellez-Baños

Among the six of 11 anuran families in Mexico containing endemic species, the greatest number and highest percentages of endemism are seen in the Hylidae (65 species; 68.1% endemism), Craugastoridae (26; 65.0%), and Eleutherodactylidae (20; 80.0%). The number of endemic species in these three families is 111 species, 78.2% of the total number (142) of anuran endemics (Table 2).

Of the four salamander families with representatives in Mexico, only two contain endemic species—the Ambystomatidae, with 17 endemic species among a total of 18 (94.4% endemism) and the Plethodontidae, with 107 of 129 endemic (82.9% endemism).

Only three species of caecilians are recorded from Mexico, of which only one is endemic to the country. Thus, the percentage of endemism is 33.3 (Table 2). No crocodylians are endemic to Mexico (Table 2).

Table 2. Degree of endemism of the Mexican herpetofauna at the species level, arranged by family.

Family	Total Number of Species	Number of Endemic Species	Percentage of Endemism
Bufonidae	35	14	40.0
Centrolenidae	1	—	—
Craugastoridae	40	26	65.0
Eleutherodactylidae	25	20	80.0
Hylidae	95	65	68.4
Leptodactylidae	3	—	—
Microhylidae	6	—	—
Phyllomedusidae	3	1	33.3
Ranidae	28	16	57.1
Rhinophrynidae	1	—	—
Scaphiopodidae	4	—	—
Subtotals	**241**	**142**	**58.9**
Ambystomatidae	18	17	94.4
Plethodontidae	129	107	82.9
Salamandridae	1	—	—
Sirenidae	2	—	—
Subtotals	**150**	**124**	**82.7**
Dermophiidae	3	1	33.3
Subtotals	**3**	**1**	**33.3**
Totals	**394**	**267**	**67.8**
Alligatoridae	1	—	—
Crocodylidae	2	—	—
Subtotals	**3**	**—**	**—**
Bipedidae	3	3	100
Subtotals	**3**	**3**	**100**
Anguidae	48	39	81.3
Anniellidae	2	1	50.0
Corytophanidae	6	—	—
Crotaphytidae	10	4	40.0
Dactyloidae	54	35	64.8
Dibamidae	1	1	100
Eublepharidae	7	2	28.6
Gymnophthalmidae	1	—	—
Helodermatidae	4	2	50.0
Iguanidae	19	13	68.4
Mabuyidae	1	—	—

Phrynosomatidae	141	91	64.5
Phyllodactylidae	16	13	81.3
Scincidae	23	15	65.2
Sphaerodactylidae	4	—	—
Sphenomorphidae	6	3	50.0
Teiidae	53	28	52.8
Xantusiidae	25	21	84.0
Xenosauridae	12	11	91.7
Subtotals	**433**	**279**	**64.4**
Boidae	2	1	50.0
Charinidae	3	1	33.3
Colubridae	137	61	43.8
Dipsadidae	128	79	61.7
Elapidae	19	10	52.6
Leptotyphlopidae	16	10	62.5
Loxocemidae	1	—	—
Natricidae	33	22	66.7
Sibynophiidae	1	—	—
Typhlopidae	2	—	—
Viperidae	67	37	55.2
Subtotals	**409**	**221**	**54.0**
Cheloniidae	5	—	—
Chelydridae	1	—	—
Dermatemydidae	1	—	—
Dermochelyidae	1	—	—
Emydidae	16	8	50.0
Geoemydidae	3	1	33.3
Kinosternidae	14	7	50.0
Staurotypidae	3	—	—
Testudinidae	4	2	50.0
Trionychidae	2	1	50.0
Subtotals	**50**	**19**	**38.0**
Totals	**898**	**522**	**58.1**
Sum Totals	**1,292**	**789**	**61.1**

As expected, the bulk of the endemic herpetofaunal species in Mexico are squamates. The current total number of squamate species is 845, of which 503 are endemic, resulting in a percentage of endemism of 59.5% (Table 2). These squamates are divisible into three groups: the amphisbaenians, the lizards, and the snakes. Only three species of amphisbaenians are found in Mexico, and all are endemic to the country (Table 2); all have been assigned to the family Bipedidae and the genus *Bipes*.

Nineteen families of lizards are represented in Mexico, containing a total of 433 species (Table 2). Of these, 279 species are endemic, and thus the percentage of endemism is 64.4. Four families, the Corytophanidae, Gymnophthalmidae, Mabuyidae, and Sphaerodactylidae, contain no endemic species and their representation is limited in the country, with the numbers of species ranging from one to six (Table 2). The numbers of endemic species in the remaining 15 lizard families range from one (in the families Anniellidae and Dibamidae) to 91 (in the Phrynosomatidae). The percentage of endemism per family ranges from 28.6 for the Eublepharidae (seven total species, two endemic) to 100 for the Dibamidae (one species, an endemic). The average number of endemic species for these 15 families is 18.6. The families containing endemic species numbers above this mean figure are the Anguidae (39 of 48 total species), Dactyloidae (35 of 54), Phrynosomatidae (91 of 141), Teiidae (28 of 53), and

Xantusiidae (21 of 25). Thus, the 214 endemic species in these five families comprise 76.7% of the total number of endemic lizard species of 279 (Table 2). The remaining 10 families with endemic species numbers below the mean are the Anniellidae (one of two total species), Crotaphytidae (four of 10), Dibamidae (one of one), Eublepharidae (two of seven), Helodermatidae (two of four), Iguanidae (13 of 19), Phyllodactylidae (13 of 16), Scincidae (15 of 23), Sphenomorphidae (three of six), and Xenosauridae (11 of 12).

With reference to the snakes, 11 families are represented in Mexico, containing a total of 409 species (Table 2). Of these, 221 species are endemic, and thus the percentage of endemism is 54.0. Three families, each containing one or two species, have no endemic representatives. Of the remaining eight families, the numbers of endemic species range from one (in the families Boidae and Charinidae) to 79 (in the family Dipsadidae). The percentage of endemism ranges from 33.3 in the family Charinidae (three total species, one endemic) to 66.7 in the family Natricidae (33 total species, 22 endemic). The mean number of endemic species in these eight families is 27.6. The families with endemic species numbers above this average figure are the Colubridae (61 of 137 total species), Dipsadidae (79 of 128), and Viperidae (37 of 67). Therefore, the 177 endemic species in these three families constitute 80.1% of the entire number of endemic snake species (Table 2). The other five families with endemic species numbers below the mean are the Boidae (one of two total species), Charinidae (one of three), Elapidae (10 of 19), Leptotyphlopidae (10 of 16), and Natricidae (22 of 33).

Of the five ordinal-level herpetofaunal groups in Mexico containing endemic species, the second lowest level of endemism (38.0%) occurs in the turtles, after the caecilians (33.3%). The number of endemic turtle species is 19, of a total number of 50 for the country. One-half of the turtle families represented in Mexico contain no endemic species, including the Cheloniidae, Chelydridae, Dermatemydidae, Dermochelyidae, and Staurotypidae. The remaining turtle families contain from one to eight endemic species, with a mean number of 3.8. Three of the five families, i.e., the Geoemydidae, Testudinidae, and Trionychidae, contain only one or two endemic species. The other two families contain the majority of the endemic turtle species, i.e., the Emydidae, with eight of 16 species, and the Kinosternidae, with seven of 14 species; thus, the percentage of endemism for both of these families is 50.0.

Mexico is recognized as a herpetofaunally megadiverse country, characterized by a high level of endemism (Flores-Villela and García-Vázquez, 2014; Parra-Olea et at., 2014). These two sets of authors reported that the herpetofauna of Mexico contains 56 of 163 total global families (34.4%), 213 of 1,675 genera (12.7%), and 1,240 of 17,021 species (7.3%).

The Mexican herpetofauna also stands out when compared to that of the other components of the North American continent, i.e., Canada and the United States (collectively referred to as North America) and Central America (the seven nations lying between Mexico and South America). As mentioned above, 650 species are recorded from the combined territories of Canada and the United States (www.cnah.org; accessed 6 June 2017). This figure is 50.3% of the total number of species known from Mexico (Table 3). Johnson et al. (2015) indicated the number of species recorded from Central America as 1,052, which represents 81.5% of the number for Mexico (Table 3). The total species richness is highest in Mexico, compared to both Central America and North America, but this pattern not always is maintained at the ordinal level (Table 3) and most obviously is seen among the caecilians (Order Gymnophiona), where no species occur in North America, only three in Mexico, and 15 in Central America. In the Western Hemisphere, the greatest diversity among this group of legless amphibians is in northern South America (Vitt and Caldwell, 2009). Anurans, with 241 species, are the largest group of amphibians in Mexico (compared to the salamanders, with 150 species), which also is the case in Central America, with 319 species (compared to 159 of salamanders) but not in North America, which contains 104 species (compared to 191 salamander species). Interestingly, and contrary to the expected trend (i.e., increase in species numbers in the direction of the tropics), the largest number of salamander species (191) is found in North America, compared to 159 in Central America and 150 in Mexico. As expected, among the remainder of the herpetofauna the largest ordinal-level group in all three regions is the squamates (Table 3). Given the size of this group relative to the other ordinal-level groups, not surprisingly the trend indicated above for the total herpetofaunal numbers also is seen among the squamates (Table 3), with the greatest number in Mexico (845 species), followed by Central America (532), and then by North America (287). The reverse trend is seen among the turtles (Table 3), however, with the largest number occurring in North America (66), followed by Mexico (50), and finally by Central America (24).

Charadrahyla altipotens (Duellman, 1968). The Yellow-bellied Voiceless Treefrog is a priority seven species with an EVS of 12, whose distribution is limited to the Sierra Madre del Sur physiographic region. Frost (2017) stated the range of treefrog as the "Pacific slopes of Sierra Madre del Sur of Oaxaca, Mexico." This individual is from the municipality of Santa Catarina Juquila, Oaxaca.

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Dendropsophus sartori (Smith, 1951). Taylor's Yellow Treefrog is a priority one species with an EVS of 14, which is known to occur only in the physiographic region of the Pacific Lowlands from Sinaloa to northwestern Chiapas, including the Balsas Basin and the Central Depression of Chiapas. Frost (2017) noted the range of this treefrog as the "Pacific slopes of southwestern Mexico (Jalisco to Oaxaca)." These individuals were found in the municipality of San Juan Lachao Oaxaca.

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A significant contributor to the global status bestowed upon the Mexican herpetofauna is its relative level of endemism. We computed the percentages of endemism for the various herpetofaunal groups in Mexico, North America, and Central America and placed these values in Table 3. Of these three areas in the Western Hemisphere, the second highest level of herpetofaunal endemism is in Mexico, at 61.1%. The highest level, interestingly enough, is in North America, at 61.2%, and the lowest in Central America at 55.6%. Although a slightly lower level of relative endemism is found in Mexico, when compared to North America, the latter region is much larger. The total area of Mexico consists of 1,972,550 km^2, whereas that of the United State and Canada, at 19,818,190 km^2, is 10 times larger than that of Mexico; Central America, with a total area of 507,966 km^2, is 25.8% smaller than Mexico (www.wikipedia.org; accessed 13 July 2017). Thus, if one uses an area/species comparison, the relevant figures for the total herpetofauna of the three regions would be 482.9 for Central America, 1,526.7 for Mexico, and 30,489.5 for North America. Based on this metric, Central America contains the most significant herpetofauna, followed by Mexico, and then by North America. If the number of endemic species were used for the comparison, the respective figures would be 55,825.9 for North America, 2,500.1 for Mexico, and 868.3 for Central America; thus, again the most significant herpetofauna based on relative endemism is in Central America. Nonetheless, the herpetofauna of Mexico still is important based both on the total number of species and their degree of endemism.

Table 3. Total number of species, endemic species, and relative endemism within herpetofaunal groups in Mexico, North America (United States and Canada), and Central America. Data for Mexico from J. Johnson (unpublished), for North America from CNAH (www.cnah.org; accessed 21 August 2017), and for Central America from Johnson et al. (2015b).

Herpetofaunal Groups	Total Species in Mexico	Endemic Species in Mexico	Relative Endemism in Mexico (%)	Total Species in North America	Endemic Species in North America	Relative Endemism in North America (%)	Total Species in Central America	Endemic Species in Central America	Relative Endemism in Central America (%)
Anurans	241	142	58.9	104	67	64.4	319	184	57.5
Salamanders	150	124	82.7	191	165	86.4	159	133	83.6
Caecilians	3	1	33.3	—	—	—	15	7	46.7
Subtotals	**394**	**267**	**67.7**	**295**	**232**	**78.6**	**493**	**324**	**65.7**
Crocodylians	3	—	—	2	1	50.0	3	—	—
Squamates	845	503	59.5	287	117	40.8	532	259	48.7
Turtles	50	19	38.0	66	48	72.7	24	2	8.3
Subtotals	**898**	**522**	**58.1**	**355**	**166**	**46.8**	**559**	**261**	**46.7**
Totals	**1,292**	**789**	**61.1**	**650**	**398**	**61.2**	**1,052**	**585**	**55.6**

The fact that the highest degree of endemism is found in North America, compared to both Mexico and Central America, primarily results from the relative prevalence of salamanders in North America (Table 3). Of the 191 species of salamanders known from North America, 165 are endemic (86.4% endemism). Both of these figures are the highest for the three regions. The next highest figures are for Central America (133 of 159; 83.6%), followed by Mexico (124 of 150; 82.6%). Nonetheless, all three figures for relative endemism exceed 80% (Table 3). Contrariwise, the level of endemism for crocodylians, squamates, and turtles found in North America and Central America is relatively low, compared to that for Mexico (Table 3). The figures for North America, Central America, and Mexico, respectively, are as follows (total number of species, number of endemic species, relative endemism): 355, 166, 46.8%; 559, 261, 46.7%; and 898, 522, 58.1%. Thus, the figures for salamanders and squamates tend to offset one another, but not to the extent of allowing Mexico primacy over North America when considering the entire herpetofauna.

PHYSIOGRAPHIC DISTRIBUTION OF THE ENDEMIC MEXICAN HERPETOFAUNA

Given the status of the Mexican herpetofauna with respect to diversity and endemism, a major conservation goal is the protection of this herpetofauna for perpetuity. Consequently, an initial objective is to determine where these endemic creatures are found in the country, as a means of establishing the areas requiring the most conservation attention. In order to identify these areas, we divided the country into the 14 major physiographic regions identified by Wilson and Johnson (2010). We determined the distribution of the 789 endemic species among these regions in Table 4, and summarize these data in Table 5.

The total number of endemic species distributed among the 14 physiographic regions ranges from a low of four in the Pacific lowlands of eastern Chiapas (PC) to 253 in the Sierra Madre Oriental (OR). The mean regional occupancy figure is 86.7 (Table 5). Five of the 14 regions contain total endemic species numbers above the mean value, as follows: the Meseta Central (MC; 195); the Pacific lowlands from Sonora to western Chiapas, including the Balsas Basin and the Central Depression of Chiapas (SC; 137); the Sierra Madre Occidental (OC; 113); the Sierra Madre Oriental (OR; 253); and the Sierra Madre del Sur (SU; 209). Based on these species numbers, these five regions are the most important for implementing conservation actions.

Ambystoma granulosum Taylor, 1944. The Granular Salamander is a priority one species with an EVS of 14, whose distribution is limited to the Meseta Central physiographic region. This salamander is distributed in the "immediate region [on] the northwestern periphery of Toluca, state of México, Mexico, around 3000 m elevation (Frost, 2017). This individual came from Presa Huapango, Estado de México.

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Table 4. Distribution of the endemic herpetofaunal species in Mexico, among 14 physiographic regions. The abbreviations for regions are as follows: BC = Baja California and adjacent islands; SD = Sonoran Desert basins and ranges; NB = Northern Plateau basins and ranges; MC = Meseta Central; EL = subhumid extratropical Lowlands of northeastern Mexico; SC = Pacific lowlands from Sonora to western Chiapas, including the Balsas Basin and Central Depression of Chiapas; OC = Sierra Madre Occidental; OR = Sierra Madre Oriental; TT = Atlantic lowlands from Tamaulipas to Tabasco; LT = Sierra de Los Tuxtlas; SU = Sierra Madre del Sur; YP = Yucatan Platform; WN = western Nuclear Central American highlands; and PC = Pacific lowlands of Chiapas.

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Anura (142 species)															
Bufonidae (14 species)															
Anaxyrus compactilis				+			+								2
Anaxyrus kelloggi						+									1
Anaxyrus mexicanus							+								1
Incilius cavifrons										+					1
Incilius cristatus								+							1
Incilius cycladen											+				1
Incilius gemmifer						+									1
Incilius marmoreus				+		+			+		+		+	+	6
Incilius mazatlanensis						+	+								2
Incilius mccoyi							+								1
Incilius occidentalis				+							+				2
Incilius perplexus				+		+					+				3
Incilius pisinnus						+									1
Incilius spiculatus								+							1
Totals	**—**	**—**	**—**	**4**	**—**	**6**	**4**	**2**	**1**	**1**	**4**	**—**	**1**	**1**	**—**
Craugastoridae (26 species)															
Craugastor batrachylus								+							1
Craugastor berkenbuschii								+	+				+		3
Craugastor decoratus								+							1
Craugastor galacticorhinus								+							1
Craugastor glaucus													+		1
Craugastor guerreroensis											+				1
Craugastor hobartsmithi				+			+								2
Craugastor megalotympanum										+					1
Craugastor mexicanus								+			+				2
Craugastor montanus													+		1
Craugastor occidentalis				+		+	+								3
Craugastor omiltemanus											+				1
Craugastor pelorus													+		1
Craugastor polymniae								+							1
Craugastor pozo													+		1
Craugastor rhodopis								+							1
Craugastor rugulosus						+					+		+		3
Craugastor saltator											+				1
Craugastor silvicola													+		1
Craugastor spatulatus								+							1
Craugastor tarahumaraensis							+								1
Craugastor taylori													+		1
Craugastor uno											+				1
Craugastor vocalis				+		+	+								3

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Craugastor vulcani										+					1
Craugastor yucatanensis												+			1
Totals	**—**	**—**	**—**	**3**	**—**	**3**	**4**	**8**	**1**	**2**	**6**	**1**	**8**	**—**	**—**
Eleutherodactylidae (20 species)															
Eleutherodactylus albolabris											+				1
Eleutherodactylus angustidigitorum				+											1
Eleutherodactylus dennisi								+							1
Eleutherodactylus dilatus											+				1
Eleutherodactylus grandis				+											1
Eleutherodactylus grunwaldi				+											1
Eleutherodactylus interorbitalis						+	+								2
Eleutherodactylus longipes								+							1
Eleutherodactylus maurus				+											1
Eleutherodactylus modestus						+									1
Eleutherodactylus nitidus			+	+		+	+	+			+				6
Eleutherodactylus nivicolimae				+		+									2
Eleutherodactylus pallidus						+									1
Eleutherodactylus rufescens				+											1
Eleutherodactylus saxatilis							+								1
Eleutherodactylus syristes											+				1
Eleutherodactylus teretistes							+								1
Eleutherodactylus verrucipes				+				+							2
Eleutherodactylus verruculatus								+							1
Eleutherodactylus wixarika							+								1
Totals	**—**	**—**	**1**	**8**	**—**	**5**	**5**	**5**	**—**	**—**	**4**	**—**	**—**	**—**	**—**
Hylidae (65 species)															
Bromeliohyla dendroscarta								+		+					2
Charadrahyla altipotens											+				1
Charadrahyla chaneque								+					+		2
Charadrahyla nephila								+		+					2
Charadrahyla taeniopus								+							1
Charadrahyla tecuani											+				1
Charadrahyla trux											+				1
Dendropsophus sartori						+									1
Diaglena spatulata						+									1
Dryophytes arboricola											+				1
Dryophytes euphorbiaceus								+			+				2
Dryophytes eximius			+	+			+	+			+				5
Dryophytes plicatus				+				+			+				3
Duellmanohyla chamulae													+		1
Duellmanohyla ignicolor								+							1
Ecnomiohyla echinata								+							1
Ecnomiohyla valancifer										+					1
Exerodonta abdivita								+							1
Exerodonta bivocata													+		1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Exerodonta chimalapa													+		1
Exerodonta juanitae											+				1
Exerodonta melanomma								+			+				2
Exerodonta pinorum											+				1
Exerodonta smaragdina				+		+									2
Exerodonta sumichrasti						+					+		+		3
Exerodonta xera								+							1
Megastomatohyla mixe								+							1
Megastomatohyla mixomaculata								+							1
Megastomatohyla nubicola								+							1
Megastomatohyla pellita											+				1
Plectrohyla lacertosa													+		1
Plectrohyla pycnochila													+		1
Ptychohyla acrochorda								+							1
Ptychohyla erythromma											+				1
Ptychohyla leonhardschultzei								+			+				2
Ptychohyla zophodes								+							1
Ptychohyla zoque									+				+		2
Rheohyla miotympanum								+	+	+			+		4
Sarcohyla ameibothalame											+				1
Sarcohyla arborescandens								+			+				2
Sarcohyla bistincta				+			+	+			+				4
Sarcohyla calthula								+							1
Sarcohyla calvicollina								+							1
Sarcohyla celata								+							1
Sarcohyla cembra											+				1
Sarcohyla charadricola								+							1
Sarcohyla chryses											+				1
Sarcohyla crassa								+			+				2
Sarcohyla cyanomma								+							1
Sarcohyla cyclada								+							1
Sarcohyla ephemera								+							1
Sarcohyla hazelae								+			+				2
Sarcohyla labedactyla											+				1
Sarcohyla miahuatlanensis											+				1
Sarcohyla mykter											+				1
Sarcohyla pachyderma								+							1
Sarcohyla pentheter											+				1
Sarcohyla psarosema								+							1
Sarcohyla robertsorum								+							1
Sarcohyla sabrina								+							1
Sarcohyla siopela								+							1
Sarcohyla thorectes											+				1
Smilisca dentata				+											1
Tlalocohyla godmani								+							1
Tlalocohyla smithii				+		+	+								3
Totals	—	—	1	6	—	5	3	36	2	4	26	—	9	—	—

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Phyllomedusidae (1 species)															
Agalychnis dacnicolor				+		+	+				+				4
Totals	**—**	**—**	**—**	**1**	**—**	**1**	**1**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**
Ranidae (16 species)															
Lithobates chichicuahutla				+											1
Lithobates dunni				+											1
Lithobates johni								+	+						2
Lithobates lemosespinali							+								1
Lithobates magnaocularis		+		+		+	+								4
Lithobates megapoda				+											1
Lithobates montezumae				+			+								2
Lithobates neovolcanicus							+								1
Lithobates omiltemanus											+				1
Lithobates psilonota				+			+								2
Lithobates pueblae								+							1
Lithobates pustulosus				+		+	+								3
Lithobates sierramadrensis											+				1
Lithobates spectabilis				+				+			+				3
Lithobates tlaloci				+											1
Lithobates zweifeli				+							+				2
Totals	**—**	**1**	**—**	**10**	**—**	**2**	**6**	**3**	**1**	**—**	**4**	**—**	**—**	**—**	**—**
Anuran Totals	**—**	**1**	**2**	**32**	**—**	**22**	**23**	**54**	**5**	**7**	**45**	**1**	**18**	**1**	**—**
Caudata (124 species)															
Ambystomatidae (17 species)															
Ambystoma altamirani				+											1
Ambystoma amblycephalum				+											1
Ambystoma andersoni				+											1
Ambystoma bombypellum				+											1
Ambystoma dumerilii				+											1
Ambystoma flavipiperatum				+											1
Ambystoma granulosum				+											1
Ambystoma leorae				+											1
Ambystoma lermaense				+											1
Ambystoma mexicanum				+											1
Ambystoma ordinarium				+											1
Ambystoma rivulare				+											1
Ambystoma rosaceum		+	+				+								3
Ambystoma silvense							+								1
Ambystoma subsalsum			+	+				+							3
Ambystoma taylori				+											1
Ambystoma velasci			+	+			+	+							4
Totals	**—**	**1**	**3**	**15**	**—**	**—**	**3**	**2**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Plethodontidae (107 species)															
Aquiloeurycea cafetalera								+							1
Aquiloeurycea cephalica				+				+							2
Aquiloeurycea galaenae								+							1
Aquiloeurycea praecellens								+							1
Aquiloeurycea quetzalanensis								+							1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Aquiloeurycea scandens								+							1
Bolitoglossa alberchi									+	+			+		3
Bolitoglossa chinanteca								+							1
Bolitoglossa hermosa											+				1
Bolitoglossa macrinii											+				1
Bolitoglossa oaxacensis											+				1
Bolitoglossa platydactyla								+	+	+			+		4
Bolitoglossa riletti											+				1
Bolitoglossa veracrucis									+				+		2
Bolitoglossa zapoteca											+				1
Chiropterotriton arboreus								+							1
Chiropterotriton cieloensis								+							1
Chiropterotriton chiropterus								+							1
Chiropterotriton chondrostega								+							1
Chiropterotriton cracens								+							1
Chiropterotriton dimidiatus								+							1
Chiropterotriton infernalis								+							1
Chiropterotriton lavae								+							1
Chiropterotriton magnipes								+							1
Chiropterotriton miquihuanus								+							1
Chiropterotriton mosaueri								+							1
Chiropterotriton multidentatus								+							1
Chiropterotriton orculus								+							1
Chiropterotriton priscus								+							1
Chiropterotriton terrestris								+							1
Cryptotriton alvarezdeltoroi													+		1
Dendrotriton megarhinus													+		1
Dendrotriton xolocalcae													+		1
Isthmura bellii				+			+	+			+				4
Isthmura boneti								+			+				2
Isthmura corrugata								+							1
Isthmura gigantea								+							1
Isthmura maxima											+				1
Isthmura sierraoccidentalis							+								1
Ixalotriton niger													+		1
Ixalotriton parvus													+		1
Parvimolge townsendi								+							1
Pseudoeurycea ahuitzotl											+				1
Pseudoeurycea altamontana				+											1
Pseudoeurycea amuzga											+				1
Pseudoeurycea anitae											+				1
Pseudoeurycea aquatica								+							1
Pseudoeurycea aurantia								+							1
Pseudoeurycea cochranae											+				1
Pseudoeurycea conanti											+				1
Pseudoeurycea firscheini								+							1
Pseudoeurycea gadovii				+				+							2
Pseudoeurycea juarezi								+							1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Pseudoeurycea kuautli											+				1
Pseudoeurycea leprosa				+				+							2
Pseudoeurycea lineola								+							1
Pseudoeurycea longicauda				+											1
Pseudoeurycea lynchi								+							1
Pseudoeurycea melanomolga								+							1
Pseudoeurycea mixcoatl											+				1
Pseudoeurycea mixteca											+				1
Pseudoeurycea mystax											+				1
Pseudoeurycea naucampatepetl								+							1
Pseudoeurycea nigromaculata								+							1
Pseudoeurycea obesa								+							1
Pseudoeurycea orchileucos								+							1
Pseudoeurycea orchimelas										+					1
Pseudoeurycea papenfussi								+							1
Pseudoeurycea robertsi				+											1
Pseudoeurycea ruficauda								+							1
Pseudoeurycea saltator								+							1
Pseudoeurycea smithi								+			+				2
Pseudoeurycea tenchalli											+				1
Pseudoeurycea teotepec											+				1
Pseudoeurycea tlahcuiloh											+				1
Pseudoeurycea tlilicxitl				+											1
Pseudoeurycea unguidentis											+				1
Pseudoeurycea werleri										+					1
Thorius adelos								+							1
Thorius arboreus								+							1
Thorius aureus								+							1
Thorius boreas								+							1
Thorius dubitus								+							1
Thorius grandis											+				1
Thorius hankeni											+				1
Thorius infernalis											+				1
Thorius insperatus								+							1
Thorius longicaudus											+				1
Thorius lunaris								+							1
Thorius macdougalli								+							1
Thorius magnipes								+							1
Thorius maxillabrochus								+							1
Thorius minutissimus											+				1
Thorius minydemus								+							1
Thorius munificus								+							1
Thorius narismagnus										+					1
Thorius narisovalis											+				1
Thorius omiltemi											+				1
Thorius papaloae								+							1
Thorius pennatulus								+							1
Thorius pinicola											+				1

Taxa	Physiographic Regions of Mexico														Totals
	BC	**SD**	**NB**	**MC**	**EL**	**SC**	**OC**	**OR**	**TT**	**LT**	**SU**	**YP**	**WN**	**PC**	
Thorius pulmonaris								+							1
Thorius schmidti								+							1
Thorius smithi								+							1
Thorius spilogaster								+							1
Thorius tlaxiacus											+				1
Thorius troglodytes								+							1
Totals	**—**	**—**	**—**	**8**	**—**	**—**	**2**	**64**	**3**	**5**	**31**	**—**	**8**	**—**	**—**
Salamander Totals	**—**	**1**	**3**	**23**	**—**	**—**	**5**	**66**	**3**	**5**	**31**	**—**	**8**	**—**	**—**
Gymnophiona (1 species)															
Dermophiidae (1 species)															
Dermophis oaxacae						+					+		+		3
Totals	**—**	**—**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**	**1**	**—**	**1**	**—**	**—**
Caecilian Totals	**—**	**—**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**	**1**	**—**	**1**	**—**	**—**
Amphibian Totals	**—**	**2**	**5**	**55**	**—**	**23**	**28**	**120**	**8**	**12**	**77**	**1**	**27**	**1**	**—**
Squamata (502 species)															
Bipedidae (3 species)															
Bipes biporus	+														1
Bipes canaliculatus						+									1
Bipes tridactylus						+									1
Totals	**1**	**—**	**—**	**—**	**—**	**2**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Anguidae (39 species)															
Abronia bogerti													+		1
Abronia chiszari										+					1
Abronia cuetzpali											+				1
Abronia deppii				+											1
Abronia fuscolabialis								+							2
Abronia graminea								+							1
Abronia leurolepis													+		1
Abronia martindelcampoi											+				1
Abronia mitchelli								+							1
Abronia mixteca											+				1
Abronia oaxacae								+			+				2
Abronia ornelasi													+		1
Abronia ramirezi													+		1
Abronia reidi										+					1
Abronia smithi													+		1
Abronia taeniata				+				+							2
Barisia herrerae				+											1
Barisia imbricata			+	+			+	+							4
Barisia levicollis							+								1
Barisia planifrons								+			+				2
Barisia rudicollis				+											1
Celestus enneagrammus								+	+				+		3
Celestus ingridae										+					1
Celestus legnotus								+							1
Elgaria cedrosensis	+														1
Elgaria nana	+														1
Elgaria paucicarinata	+														1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Elgaria velazquezi	+														1
Gerrhonotus farri								+							1
Gerrhonotus lazcanoi								+							1
Gerrhonotus lugoi			+												1
Gerrhonotus ophiurus								+	+						2
Gerrhonotus parvus								+							1
Mesaspis antauges				+											1
Mesaspis gadovii											+				1
Mesaspis juarezi								+							1
Mesaspis viridiflava								+							1
Ophisaurus ceroni								+	+						2
Ophisaurus incomptus					+				+						2
Totals	**4**	**—**	**2**	**6**	**1**	**—**	**2**	**16**	**4**	**3**	**6**	**—**	**6**	**—**	**—**
Anniellidae (1 species)															
Anniella geronimensis	+														1
Totals	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Crotaphytidae (4 species)															
Crotaphytus antiquus			+												1
Crotaphytus dickersonae	+	+													2
Crotaphytus grismeri	+														1
Crotaphytus insularis	+														1
Totals	**3**	**1**	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Dactyloidae (35 species)															
Norops alvarezdeltoroi									+				+		2
Norops anisolepis													+		1
Norops barkeri									+	+			+		3
Norops boulengerianus						+									1
Norops carlliebi				+				+							2
Norops compressicauda													+		1
Norops cuprinus													+		1
Norops cymbops								+							1
Norops duellmani										+					1
Norops dunni											+				1
Norops gadovi											+				1
Norops hobartsmithi													+		1
Norops immaculogularis						+									1
Norops liogaster											+				1
Norops macrinii						+					+				2
Norops megapholidotus											+				1
Norops microlepidotus				+							+				2
Norops milleri								+							1
Norops naufragus								+							1
Norops nebuloides						+					+				2
Norops nebulosus				+		+	+				+				4
Norops nietoi											+				1
Norops omiltemanus											+				1
Norops parvicirculatus													+		1
Norops peucephilus											+				1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Norops purpuronectes									+				+		2
Norops pygmaeus													+		1
Norops quercorum								+			+				2
Norops rubiginosus								+							1
Norops sacamecatensis											+				1
Norops schiedii								+							1
Norops stevepoei											+				1
Norops subocularis						+					+				2
Norops taylori						+									1
Norops zapotecorum											+				1
Totals	**—**	**—**	**—**	**3**	**—**	**7**	**1**	**7**	**3**	**2**	**16**	**—**	**9**	**—**	**—**
Dibamidae (1 species)															
Anelytropsis papillosus				+				+							2
Totals	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Eublepharidae (2 species)															
Coleonyx fasciatus						+	+								2
Coleonyx gypsicolus	+														1
Totals	**1**	**—**	**—**	**—**	**—**	**1**	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Helodermatidae (2 species)															
Heloderma horridum						+	+				+				3
Heloderma exasperatum						+	+								2
Totals	**—**	**—**	**—**	**—**	**—**	**2**	**2**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**
Iguanidae (13 species)															
Cachryx defensor									+			+			2
Ctenosaura clarki						+									1
Ctenosaura conspicuosa	+														1
Ctenosaura hemilopha	+														1
Ctenosaura macrolopha						+	+								2
Ctenosaura nolascensis	+														1
Ctenosaura oaxacana						+									1
Ctenosaura pectinata				+		+					+		+		4
Dipsosaurus catalinensis	+														1
Sauromalus hispidus	+	+													2
Sauromalus klauberi	+														1
Sauromalus slevini	+														1
Sauromalus varius	+														1
Totals	**8**	**1**	**—**	**1**	**—**	**4**	**1**	**—**	**1**	**—**	**1**	**1**	**1**	**—**	**—**
Phrynosomatidae (91 species)															
Holbrookia approximans				+			+	+							3
Petrosaurus repens	+														1
Petrosaurus slevini	+														1
Petrosaurus thalassinus	+														1
Phrynosoma braconnieri				+							+				2
Phrynosoma cerroense	+														1
Phrynosoma coronatum	+														1
Phrynosoma ditmarsi							+								1
Phrynosoma orbiculare			+	+			+	+							4
Phrynosoma sherbrookei											+				1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Phrynosoma taurus				+		+					+				3
Phrynosoma wigginsi	+														1
Sceloporus adleri											+				1
Sceloporus aeneus				+			+	+							3
Sceloporus albiventris						+	+								2
Sceloporus anahuacus				+											1
Sceloporus angustus	+														1
Sceloporus asper				+		+									2
Sceloporus aurantius							+								1
Sceloporus aureolus											+				1
Sceloporus bicanthalis				+				+							2
Sceloporus brownorum			+				+								2
Sceloporus bulleri				+			+								2
Sceloporus caeruleus			+												1
Sceloporus cautus			+					+							2
Sceloporus chaneyi								+							1
Sceloporus couchii			+		+										2
Sceloporus cozumelae												+			1
Sceloporus cryptus								+							1
Sceloporus cupreus											+				1
Sceloporus cyanogenys					+			+							2
Sceloporus cyanostictus								+							1
Sceloporus druckercolini											+				1
Sceloporus dugesii						+	+								2
Sceloporus edwardtaylori						+					+				2
Sceloporus exsul								+							1
Sceloporus formosus				+		+					+				3
Sceloporus gadoviae				+		+					+				3
Sceloporus gadsdeni			+												1
Sceloporus goldmani								+							1
Sceloporus grandaevus	+														1
Sceloporus halli											+				1
Sceloporus heterolepis				+							+				2
Sceloporus horridus			+	+			+				+				4
Sceloporus hunsakeri	+														1
Sceloporus insignis				+											1
Sceloporus jalapae				+				+			+				3
Sceloporus lemosespinali							+								1
Sceloporus licki	+														1
Sceloporus lineatulus	+														1
Sceloporus macdougalli						+									1
Sceloporus maculosus			+												1
Sceloporus megalepidurus				+				+			+				3
Sceloporus minor				+				+							2
Sceloporus mucronatus				+				+			+				3
Sceloporus nelsoni			+	+		+	+								4
Sceloporus ochoterenae						+					+				2
Sceloporus omiltemanus				+											1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Sceloporus ornatus			+												1
Sceloporus palaciosi				+											1
Sceloporus parvus			+	+				+							3
Sceloporus pyrocephalus				+		+					+				3
Sceloporus salvini								+		+					2
Sceloporus samcolemani								+							1
Sceloporus scalaris				+			+	+							3
Sceloporus shannonorum							+								1
Sceloporus smithi						+					+		+		3
Sceloporus spinosus			+	+				+			+				4
Sceloporus stejnegeri				+		+									2
Sceloporus subniger				+											1
Sceloporus subpictus											+				1
Sceloporus sugillatus				+											1
Sceloporus tanneri											+				1
Sceloporus torquatus			+	+			+	+							4
Sceloporus unicanthalis							+								1
Sceloporus utiformis				+		+	+								3
Sceloporus zosteromus	+														1
Uma exsul			+												1
Uma paraphygas			+												1
Uma rufopunctata		+													1
Urosaurus auriculatus	+														1
Urosaurus bicarinatus		+	+	+		+	+				+		+		7
Urosaurus clarionensis	+														1
Urosaurus gadovi				+		+		+							3
Urosaurus lahtelai	+														1
Uta encantadae	+														1
Uta lowei	+														1
Uta nolascensis	+														1
Uta palmeri	+														1
Uta squamata	+														1
Uta tumidarostra	+														1
Totals	**21**	**2**	**16**	**32**	**2**	**16**	**18**	**22**	**—**	**1**	**23**	**1**	**2**	**—**	**—**
Phyllodactylidae (13 species)															
Phyllodactylus bordai						+					+				2
Phyllodactylus bugastrolepis	+														1
Phyllodactylus davisi						+									1
Phyllodactylus delcampoi						+									1
Phyllodactylus duellmani						+									1
Phyllodactylus homolepidurus	+	+													2
Phyllodactylus lanei				+		+					+				3
Phyllodactylus muralis						+					+				2
Phyllodactylus papenfussi											+				1
Phyllodactylus partidus	+														1
Phyllodactylus paucituberculatus						+									1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Phyllodactylus unctus	+														1
Phyllodactylus xanti	+														1
Totals	**5**	**1**	**—**	**1**	**—**	**7**	**—**	**—**	**—**	**—**	**4**	**—**	**—**	**—**	**—**
Scincidae (15 species)															
Mesoscincus altamirani				+		+									2
Plestiodon bilineatus							+								1
Plestiodon brevirostris								+			+				2
Plestiodon colimensis						+	+								2
Plestiodon copei				+			+								2
Plestiodon dicei								+							1
Plestiodon dugesii				+			+								2
Plestiodon indubitus				+											1
Plestiodon lagunensis	+														1
Plestiodon lynxe			+	+			+	+							4
Plestiodon multilineatus							+								1
Plestiodon nietoi											+				1
Plestiodon ochoterenae											+				1
Plestiodon parviauriculatus							+								1
Plestiodon parvulus				+		+	+								3
Totals	**1**	**—**	**1**	**6**	**—**	**3**	**8**	**3**	**—**	**—**	**3**	**—**	**—**	**—**	**—**
Sphenomorphidae (3 species)															
Scincella gemmingeri				+				+	+	+			+		5
Scincella kikaapoa			+												1
Scincella silvicola				+				+			+				3
Totals	**—**	**—**	**1**	**2**	**—**	**—**	**—**	**2**	**1**	**1**	**1**	**—**	**1**	**—**	**—**
Teiidae (28 species)															
Aspidoscelis bacata	+														1
Aspidoscelis calidipes						+									1
Aspidoscelis cana	+														1
Aspidoscelis carmenensis	+														1
Aspidoscelis catalinensis	+														1
Aspidoscelis celeripes	+														1
Aspidoscelis ceralbensis	+														1
Aspidoscelis communis				+		+									2
Aspidoscelis costata		+	+	+		+	+				+				6
Aspidoscelis cozumela												+			1
Aspidoscelis danheimae	+														1
Aspidoscelis espiritensis	+														1
Aspidoscelis franciscensis	+														1
Aspidoscelis guttata						+			+	+	+		+	+	6
Aspidoscelis labialis	+														1
Aspidoscelis lineattissima				+		+									2
Aspidoscelis martyris	+														1
Aspidoscelis mexicana											+				1
Aspidoscelis opatae							+								1
Aspidoscelis parvisocia				+							+				2
Aspidoscelis picta	+														1
Aspidoscelis rodecki												+			1

Taxa	Physiographic Regions of Mexico														Totals
	BC	**SD**	**NB**	**MC**	**EL**	**SC**	**OC**	**OR**	**TT**	**LT**	**SU**	**YP**	**WN**	**PC**	
Aspidoscelis sackii						+					+				2
Holcosus amphigrammus					+			+	+	+					4
Holcosus gaigeae												+			1
Holcosus sinister				+		+									2
Holcosus stuarti						+			+			+	+		4
Holcosus undulatus						+					+				2
Totals	**12**	**1**	**1**	**5**	**1**	**9**	**2**	**1**	**3**	**2**	**6**	**4**	**2**	**1**	**—**
Xantusiidae (21 species)															
Lepidophyma chicoasense													+		1
Lepidophyma cuicateca											+				1
Lepidophyma dontomasi											+				1
Lepidophyma gaigeae				+				+							2
Lepidophyma lineri						+					+				2
Lepidophyma lipetzi													+		1
Lepidophyma lowei											+				1
Lepidophyma micropholis								+							1
Lepidophyma occulor								+							1
Lepidophyma pajapanense									+	+					2
Lepidophyma radula											+				1
Lepidophyma sylvaticum				+				+	+						3
Lepidophyma tarascae				+		+									2
Lepidophyma tuxtlae								+	+	+			+		4
Lepidophyma zongolica								+							1
Xantusia bolsonae			+												1
Xantusia extorris			+												1
Xantusia gilberti	+														1
Xantusia jaycolei		+													1
Xantusia sanchezi				+											1
Xantusia sherbrookei	+														1
Totals	**2**	**1**	**2**	**4**	**—**	**2**	**—**	**6**	**3**	**2**	**5**	**—**	**3**	**—**	**—**
Xenosauridae (11 species)															
Xenosaurus agrenon						+		+			+				3
Xenosaurus arboreus													+		1
Xenosaurus grandis						+		+							2
Xenosaurus mendozai								+							1
Xenosaurus newmanorum								+							1
Xenosaurus penai											+				1
Xenosaurus phalaroanthereon											+				1
Xenosaurus platyceps								+							1
Xenosaurus rectocollaris				+							+				2
Xenosaurus sanmartinensis										+					1
Xenosaurus tzacualtipantecus								+							1
Totals	**—**	**—**	**—**	**1**	**—**	**2**	**—**	**6**	**—**	**1**	**4**	**—**	**1**	**—**	**—**
Lizard Totals	**59**	**7**	**24**	**62**	**4**	**55**	**35**	**64**	**15**	**12**	**70**	**6**	**25**	**1**	**—**
Boidae (1 species)															
Boa sigma						+	+				+				3
Totals	**—**	**—**	**—**	**—**	**—**	**1**	**1**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Charinidae (1 species)															
Exiliboa placata								+							1
Totals	—	—	—	—	—	—	—	**1**	—	—	—	—	—	—	—
Colubridae (61 species)															
Arizona pacata	+														1
Chilomeniscus savagei	+														1
Conopsis acuta				+				+			+				3
Conopsis amphisticha				+							+				2
Conopsis biserialis				+			+								2
Conopsis lineata				+		+	+	+			+				5
Conopsis megalodon											+				1
Conopsis nasus				+			+								2
Ficimia hardyi								+							1
Ficimia olivacea				+				+	+	+					4
Ficimia ramirezi													+		1
Ficimia ruspator											+				1
Ficimia variegata									+	+					2
Geagras redimitus						+									1
Lampropeltis catalinensis	+														1
Lampropeltis herrerae	+														1
Lampropeltis mexicana			+	+			+	+							4
Lampropeltis polyzona		+		+		+	+		+						5
Lampropeltis ruthveni				+											1
Lampropeltis webbi							+								1
Leptophis diplotropis				+		+	+	+			+		+		6
Masticophis anthonyi	+														1
Masticophis aurigulus	+														1
Masticophis barbouri	+														1
Masticophis slevini	+														1
Mastigodryas cliftoni							+								1
Pituophis deppei			+	+			+	+							4
Pituophis insulanus	+														1
Pituophis vertebralis	+														1
Pseudelaphe phaescens												+			1
Pseudoficimia frontalis				+		+	+				+				4
Rhinocheilus antonii						+	+								2
Rhinocheilus etheridgei	+														1
Salvadora bairdi				+			+								2
Salvadora intermedia											+				1
Salvadora lemniscata						+							+	+	3
Salvadora mexicana				+		+					+				3
Sonora aemula				+			+								2
Sonora michoacanensis				+		+	+				+				4
Sonora mutabilis				+			+								2
Symphimus leucostomus						+					+		+		3
Sympholis lippiens				+		+	+								3
Tantilla bocourti			+	+		+	+	+			+				6
Tantilla briggsi									+						1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Tantilla calamarina				+		+									2
Tantilla cascadae				+											1
Tantilla ceboruca							+								1
Tantilla coronadoi											+				1
Tantilla deppei				+											1
Tantilla flavilineata											+				1
Tantilla johnsoni													+		1
Tantilla oaxacae											+				1
Tantilla robusta								+							1
Tantilla sertula						+									1
Tantilla shawi								+							1
Tantilla slavensi										+					1
Tantilla striata						+					+				2
Tantilla tayrae													+		1
Tantilla triseriata								+			+				2
Trimorphodon paucimaculatus						+	+								2
Trimorphodon tau		+	+	+	+	+	+	+			+				8
Totals	**11**	**2**	**4**	**23**	**1**	**17**	**20**	**12**	**4**	**3**	**18**	**1**	**6**	**1**	—
Dipsadidae (79 species)															
Adelphicos latifasciatum													+		1
Adelphicos newmanorum								+	+						2
Adelphicos nigrilatum													+		1
Chersodromus liebmanni								+							1
Chersodromus rubriventris				+				+							2
Coniophanes alvarezi													+		1
Coniophanes lateritius				+		+	+								3
Coniophanes melanocephalus						+									1
Coniophanes meridanus												+			1
Coniophanes michoacanensis						+									1
Coniophanes sarae				+											1
Coniophanes taylori						+					+				2
Conophis morai										+					1
Cryophis hallbergi								+							1
Dipsas gaigeae						+									1
Enulius oligostichus				+		+									2
Geophis anocularis								+							1
Geophis bicolor				+											1
Geophis blanchardi								+							1
Geophis chalybeus								+							1
Geophis dubius								+			+				2
Geophis duellmani								+							1
Geophis dugesii				+		+	+								3
Geophis incomptus				+											1
Geophis isthmicus						+									1
Geophis juarezi								+							1
Geophis juliai										+					1
Geophis laticinctus								+					+		2
Geophis laticollaris											+				1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Geophis latifrontalis								+							1
Geophis lorancai								+							1
Geophis maculiferus				+											1
Geophis mutitorques								+							1
Geophis nigrocinctus				+											1
Geophis occabus											+				1
Geophis omiltemanus											+				1
Geophis petersi				+			+								2
Geophis pyburni				+											1
Geophis russatus											+				1
Geophis sallei											+				1
Geophis semidoliatus								+		+					2
Geophis sieboldi				+							+				2
Geophis tarascae				+											1
Geophis turbidus								+							1
Hypsiglena affinis				+											1
Hypsiglena catalinae	+														1
Hypsiglena slevini	+														1
Hypsiglena tanzeri								+							1
Hypsiglena torquata						+									1
Hypsiglena unalocularis	+														1
Leptodeira punctata			+	+		+									3
Leptodeira splendida			+	+		+	+	+			+				6
Leptodeira uribei						+									1
Manolepis putnami						+					+		+		3
Pseudoleptodeira latifasciata						+					+				2
Rhadinaea bogertorum											+				1
Rhadinaea cuneata								+							1
Rhadinaea forbesi								+							1
Rhadinaea fulvivittis								+			+				2
Rhadinaea gaigeae				+				+							2
Rhadinaea hesperia				+		+	+				+				4
Rhadinaea laureata			+	+			+								3
Rhadinaea macdougalli								+					+		2
Rhadinaea marcellae								+							1
Rhadinaea montana			+					+							2
Rhadinaea myersi											+				1
Rhadinaea omiltemana											+				1
Rhadinaea quinquelineata								+							1
Rhadinaea taeniata				+			+				+				3
Rhadinella donaji											+				1
Rhadinella kanalchutchan													+		1
Rhadinella schistosa								+							1
Rhadinophanes monticola											+				1
Sibon linearis										+					1
Tantalophis discolor											+				1
Tropidodipsas annulifera				+		+	+				+				4
Tropidodipsas philippii						+					+				2

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Tropidodipsas repleta							+								1
Tropidodipsas zweifeli				+							+				2
Totals	**3**	**—**	**4**	**22**	**—**	**17**	**9**	**27**	**1**	**4**	**23**	**1**	**7**	**—**	**—**
Elapidae (10 species)															
Micrurus bernadi								+	+						2
Micrurus bogerti						+							+		2
Micrurus distans				+		+	+								3
Micrurus ephippifer						+					+				2
Micrurus laticollaris				+		+									2
Micrurus limbatus									+	+					2
Micrurus nebularis											+				1
Micrurus pachecogili				+											1
Micrurus proximans						+									1
Micrurus tamaulipensis								+							1
Totals	**—**	**—**	**—**	**3**	**—**	**5**	**1**	**2**	**2**	**1**	**2**	**—**	**1**	**—**	**—**
Leptotyphlopidae (10 species)															
Epictia bakewelli				+		+					+				3
Epictia resetari					+			+	+	+					4
Epictia schneideri											+				1
Epictia vindumi												+			1
Epictia wynni								+							1
Rena boettgeri	+														1
Rena bressoni				+											1
Rena iversoni					+										1
Rena maxima				+		+									2
Rena myopica								+	+						2
Totals	**1**	**—**	**—**	**3**	**2**	**2**	**—**	**3**	**2**	**1**	**2**	**1**	**—**	**—**	**—**
Natricidae (21 species)															
Adelophis copei				+											1
Adelophis foxi							+								1
Storeria hidalgoensis								+							1
Storeria storerioides			+	+		+	+				+				5
Thamnophis bogerti											+				1
Thamnophis chrysocephalus								+			+				2
Thamnophis conanti				+				+							2
Thamnophis errans			+				+								2
Thamnophis exsul								+							1
Thamnophis godmani											+				1
Thamnophis lineri								+							1
Thamnophis melanogaster			+	+			+								3
Thamnophis mendax								+							1
Thamnophis nigronuchalis							+								1
Thamnophis postremus						+									1
Thamnophis pulchrilatus			+	+			+	+			+				5
Thamnophis rossmani				+											1
Thamnophis scalaris				+			+	+							3
Thamnophis scaliger				+			+								2
Thamnophis sumichrasti								+							1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Thamnophis unilabialis			+				+								2
Thamnophis validus	+					+	+								3
Totals	**1**	**—**	**5**	**8**	**—**	**3**	**10**	**9**	**—**	**—**	**5**	**—**	**—**	**—**	**—**
Viperidae (37 species)															
Agkistrodon taylori								+	+						2
Atropoides nummifer								+	+				+		3
Bothriechis rowleyi													+		1
Cerrophidion petlalcalensis								+							1
Cerrophidion tzotzilorum														+	1
Crotalus angelensis	+														1
Crotalus aquilus				+				+							2
Crotalus armstrongi				+			+								2
Crotalus basiliscus		+		+		+	+								4
Crotalus campbelli				+											1
Crotalus catalinensis	+														1
Crotalus culminatus				+		+					+				3
Crotalus enyo	+														1
Crotalus ericsmithi											+				1
Crotalus estebanensis	+														1
Crotalus intermedius				+			+	+			+				4
Crotalus lannomi				+											1
Crotalus lorenzoensis	+														1
Crotalus morulus								+							1
Crotalus polystictus				+			+	+							3
Crotalus pusillus				+			+								2
Crotalus ravus				+				+			+				3
Crotalus stejnegeri							+								1
Crotalus tancitarensis				+											1
Crotalus tlaloci				+											1
Crotalus totonacus								+	+						2
Crotalus transversus				+											1
Crotalus triseriatus				+				+							2
Mixcoatlus barbouri											+				1
Mixcoatlus browni											+				1
Mixcoatlus melanurus				+							+				2
Ophryacus smaragdinus								+							1
Ophryacus sphenophrys											+				1
Ophryacus undulatus								+			+				2
Porthidium dunni						+							+		2
Porthidium hespere						+									1

Taxa	Physiographic Regions of Mexico														Totals
	BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC	
Porthidium yucatanicum												+			1
Totals	**5**	**1**	**—**	**15**	**—**	**4**	**6**	**12**	**3**	**—**	**9**	**1**	**3**	**1**	**—**
Snake Totals	**21**	**3**	**13**	**74**	**3**	**49**	**47**	**66**	**12**	**9**	**60**	**4**	**17**	**2**	**—**
Squamate Totals	**80**	**10**	**37**	**136**	**7**	**104**	**82**	**130**	**27**	**21**	**130**	**10**	**43**	**3**	**—**
Testudines (19 species)															
Emydidae (8 species)															
Terrapene coahuila			+												1
Terrapene mexicana					+			+	+						3
Terrapene nelsoni				+		+									2
Terrapene yucatana												+			1
Trachemys nebulosa	+					+									2
Trachemys ornata						+									1
Trachemys taylori			+												1
Trachemys yaquia						+	+								2
Totals	**1**	**—**	**2**	**1**	**1**	**4**	**1**	**1**	**1**	**—**	**—**	**1**	**—**	**—**	**—**
Geoemydidae (1 species)															
Rhinoclemmys rubida				+		+					+				3
Totals	**—**	**—**	**—**	**1**	**—**	**1**	**—**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**
Kinosternidae (7 species)															
Kinosternon alamosae		+				+									2
Kinosternon chimalhuaca						+									1
Kinosternon creaseri												+			1
Kinosternon durangoense			+												1
Kinosternon herrerai				+	+			+	+						4
Kinosternon integrum			+	+		+	+	+			+				6
Kinosternon oaxacae						+									1
Totals	**—**	**1**	**2**	**2**	**1**	**4**	**1**	**2**	**1**	**—**	**1**	**1**	**—**	**—**	**—**
Testudinidae (2 species)															
Gopherus evgoodei		+				+	+								3
Gopherus flavomarginatus			+												1
Totals	**—**	**1**	**1**	**—**	**—**	**1**	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Trionychidae (1 species)															
Apalone atra			+												1
Totals	**—**	**—**	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Turtle Totals	**1**	**2**	**6**	**4**	**2**	**10**	**3**	**3**	**2**	**—**	**2**	**2**	**—**	**—**	**—**
Herpetofaunal Totals	**81**	**14**	**48**	**195**	**9**	**137**	**113**	**253**	**37**	**33**	**209**	**13**	**69**	**4**	**—**

Bolitoglossa oaxacensis Parra-Olea, García-París, and Wake, 2002. The Atoyac Salamander is a priority one species with an EVS of 17, which is known only from the Sierra Madre del Sur physiographic region. Frost (2017) indicated the distribution of this species as "specifically from the mountains south of Sola de Vega, to immediately south of the Atoyac River Basin, in the vicinity of Puerto Portillo, Oaxaca." This individual was found in the Sierra Madre del Sur, Oaxaca. © Elí García-Padilla

The nine areas with total species numbers below the mean of 86.6 illustrate a range of these numbers from four (in the PC region) to 81 (in Baja California and adjacent islands [BC]). Even though these numbers are relatively low compared to the five regions with values above the mean figure, they still require considerable scrutiny when planning for conservation actions.

Clearly, the 789 Mexican endemic species are unevenly distributed throughout the physiographic regions in the country (Table 5); at the individual species level, their numbers also vary in these regions. One way to examine these varying distributions is to calculate the total number of regions occupied by the species within the given physiographic regions. To illustrate this variation, we constructed a table for calculating the total number of regions inhabited by the species found in each of the 14 physiographic regions (Table 6). We list these regions in Table 6 based on the size of their herpetofaunal content, ranging from four endemic species in the PC region to 253 in the OR region. The number of physiographic regions inhabited by these species ranges from one to eight, out of 14 (Table 6). The number of species distributed within these regions decreases, with some variation, from one region to eight regions (Table 6). Thus, 547 species occupy a single region, with the numbers ranging from one in the PC, EL (subhumid extratropical lowlands of northeastern Mexico), and TT (Atlantic lowlands from Tamaulipas to Tabasco) regions to 151 in the OR region. At the other extreme, one species (*Urosaurus bicarinatus*) inhabits seven regions and another (*Trimorphodon tau*) is found in eight regions. Interestingly, the single-region endemic species often are the largest number of species found among the various physiographic regions; they are the largest number for the YP (Yucatan Platform), LT (Sierra de Los Tuxtlas), NB (Northern Plateau basins and ranges), WN (Western Nuclear Central American highlands), BC, MC, SU, and OR regions, but not for the remaining six regions (TT, SD [Sonoran Desert basins and ranges], EL, SC, OC, PC). Nonetheless, the 547 species known only from single physiographic regions are of the greatest conservation concern, especially because collectively they comprise 69.3% of the 789 endemic species currently known from Mexico (Table 6). The next largest number of species occupies two physiographic regions, which amounts to 136.5 species, i.e., 273/2. Thus, 683 of 789 species (86.6%) are distributed in one or two physiographic regions (Table 6). The prevalence of these restricted distributions among the Mexican endemic species is of tremendous conservation significance, and we discuss this situation in greater detail below.

Isthmura boneti (Alvarez and Martin, 1967). The Oaxacan False Brook Salamander is a priority two species with an EVS of 17, whose distribution is limited to the Sierra Madre Oriental and Sierra Madre del Sur physiographic regions. Frost (2017) gave the range of this species as "high elevation…upper cloud forest and pine forest of north-central Oaxaca." This individual was found in the Sierra de Juárez or Sierra Madre de Oaxaca (Mata-Silva et al., 2015b). © César Mayoral-Halla.

Table 5. Distributional summary of herpetofaunal families containing endemic species in Mexico, among 14 physiographic regions. See Table 4 for explanation of abbreviations.

Families	Number of Species	Physiographic Regions													
		BC	SD	NB	MC	EL	SC	OC	OR	TT	LT	SU	YP	WN	PC
Bufonidae	14	—	—	—	4	—	6	4	2	1	1	4	—	1	1
Craugastoridae	26	—	—	—	3	—	3	4	8	1	2	6	1	8	—
Eleutherodactylidae	20	—	—	1	8	—	5	5	5	—	—	4	—	—	—
Hylidae	65	—	—	1	6	—	5	3	36	2	4	26	—	9	—
Phyllomedusidae	1	—	—	—	1	—	1	1	—	—	—	1	—	—	—
Ranidae	16	—	1	—	10	—	2	6	3	1	—	4	—	—	—
Subtotals	**142**	**—**	**1**	**2**	**32**	**—**	**22**	**23**	**54**	**5**	**7**	**45**	**1**	**18**	**1**
Ambystomatidae	17	—	1	3	15	—	—	3	2	—	—	—	—	—	—
Plethodontidae	107	—	—	—	8	—	—	2	64	3	5	31	—	8	—
Subtotals	**124**	**—**	**1**	**3**	**23**	**—**	**—**	**5**	**66**	**3**	**5**	**31**	**—**	**8**	**—**
Dermophiidae	1	—	—	—	—	—	1	—	—	—	—	1	—	1	—
Subtotals	**1**	**—**	**—**	**—**	**—**	**—**	**1**	**—**	**—**	**—**	**—**	**1**	**—**	**1**	**—**
Totals	**267**	**—**	**2**	**5**	**55**	**—**	**23**	**28**	**120**	**7**	**12**	**77**	**1**	**27**	**1**
Bipedidae	3	1	—	—	—	—	2	—	—	—	—	—	—	—	—
Subtotals	**3**	**1**	**—**	**—**	**—**	**—**	**2**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Anguidae	39	4	—	2	6	1	—	2	16	4	3	6	—	6	—
Anniellidae	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—
Crotaphytidae	4	3	1	1	—	—	—	—	—	—	—	—	—	—	—
Dactyloidae	35	—	—	—	3	—	7	1	7	3	2	16	—	9	—
Dibamidae	1	—	—	—	1	—	—	—	1	—	—	—	—	—	—
Eublepharidae	2	1	—	—	—	—	1	1	—	—	—	—	—	—	—
Helodermatidae	2	—	—	—	—	—	2	2	—	—	—	1	—	—	—
Iguanidae	13	8	1	—	1	—	4	1	—	1	—	1	1	1	—
Phrynosomatidae	91	21	2	16	32	2	16	18	22	—	1	23	1	2	—
Phyllodactylidae	13	5	1	—	1	—	7	—	—	—	—	4	—	—	—
Scincidae	15	1	—	1	6	—	3	8	3	—	—	3	—	—	—
Sphenomorphidae	3	—	—	1	2	—	—	—	2	1	1	1	—	1	—
Teiidae	28	12	1	1	5	1	9	2	1	3	2	6	4	2	1
Xantusiidae	21	2	1	2	4	—	2	—	6	3	2	5	—	3	—
Xenosauridae	11	—	—	—	1	—	2	—	6	—	1	4	—	1	—
Subtotals	**279**	**59**	**7**	**24**	**63**	**3**	**52**	**35**	**64**	**15**	**11**	**70**	**6**	**24**	**1**
Boidae	1	—	—	—	—	—	1	1	—	—	—	1	—	—	—
Charinidae	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Colubridae	61	11	2	4	23	1	17	20	12	4	3	18	1	6	1
Dipsadidae	79	3	—	4	22	—	17	9	27	1	4	23	1	7	—
Elapidae	10	—	—	—	3	—	5	1	2	2	1	2	—	1	—
Leptotyphlopidae	10	1	—	—	3	2	2	—	3	2	1	2	1	—	—
Natricidae	22	1	—	5	8	—	3	10	9	—	—	5	—	—	—
Viperidae	37	5	1	—	15	—	4	6	12	3	—	9	1	3	1
Subtotals	**221**	**21**	**3**	**13**	**74**	**3**	**49**	**47**	**66**	**12**	**9**	**60**	**4**	**17**	**2**
Totals	**503**	**80**	**10**	**37**	**136**	**7**	**104**	**82**	**130**	**27**	**21**	**130**	**10**	**42**	**3**
Emydidae	8	1	—	2	1	1	4	1	1	1	—	—	1	—	—
Geoemydidae	1	—	—	—	1	—	1	—	—	—	—	1	—	—	—
Kinosternidae	7	—	1	2	2	1	4	1	2	1	—	1	1	—	—
Testudinidae	2	—	1	1	—	—	1	1	—	—	—	—	—	—	—
Trionychidae	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Subtotals	**19**	**1**	**2**	**6**	**4**	**2**	**10**	**3**	**3**	**2**	**—**	**2**	**2**	**—**	**—**
Totals	**522**	**81**	**12**	**43**	**140**	**9**	**114**	**85**	**133**	**29**	**21**	**132**	**12**	**42**	**3**
Sum Totals	**789**	**81**	**14**	**48**	**195**	**9**	**137**	**113**	**253**	**37**	**33**	**209**	**13**	**69**	**4**

Ixalotriton niger Wake and Johnson, 1989. The Jumping Salamander is a priority one species with an EVS of 18, whose distribution is restricted to the Western Nuclear Central American Highlands physiographic region. This species is "known only from the montane rainforest in the immediate vicinity of the type locality, near Berriozábal in northwestern Chiapas, Mexico, 1200 m elevation" (Frost, 2017). This individual was found in the Zona de Protección Ecológica La Pera, Berriozabal, Chiapas. © Jesús Ernesto Pérez-Sánchez

Table 6. Number of endemic species in Mexico in each of 14 physiographic regions inhabited. See Table 4 for explanation of abbreviations.

Physiographic Regions	Number of Physiographic Regions Inhabited								Totals
	1	2	3	4	5	6	7	8	
PC	1	—	1	—	—	2	—	—	**4**
EL	1	3	1	3	—	—	—	1	**9**
YP	11	1	—	1	—	—	—	—	**13**
SD	2	4	2	2	1	1	1	1	**14**
LT	16	7	2	6	1	1	—	—	**33**
TT	1	17	7	8	2	2	—	—	**37**
NB	16	6	6	10	3	5	1	1	**48**
WN	38	9	12	5	1	3	1	—	**69**
BC	76	4	1	—	—	—	—	—	**81**
OC	27	30	23	20	5	6	1	1	**113**
SC	34	45	34	11	3	8	1	1	**137**
MC	59	56	41	24	6	7	1	1	**195**
SU	114	41	28	12	4	8	1	1	**209**
OR	151	52	22	18	4	5	—	1	**253**
Totals	**547**	**273**	**180**	**120**	**30**	**48**	**7**	**8**	**—**

Pseudoeurycea conanti Bogert, 1967. Conant's Salamander is a priority one species with an EVS of 16, whose distribution is limited to the Sierra Madre del Sur physiographic region. Frost (2017) indicated that this salamander is "known only from the type locality (Oaxaca, Mexico)." Pictured here is an individual from Santa Catarina Juquila, Oaxaca, Mexico. © Elí García-Padilla

Bipes biporus (Cope, 1894). The Five-toed Worm Lizard or "Ajolote" is priority one species with an EVS of 14, which only is known from the physiographic region of Baja California and adjacent islands. Grismer (2002: 254) indicated that this worm lizard "ranges throughout the western portion of the southern half of Baja California, west of the Peninsular Ranges, from approximately 17 km north of Jesús María, where the Sierra Columbia contacts the Pacific coast, south to Cabo San Lucas." This individual was photographed at La Paz, Baja California Sur. © Matt Cage

Bipes tridactylus (Duges, 1894). The Three-toed Worm Lizard is a priority one species with an EVS of 14, whose distribution is limited to the physiographic region extending along the Pacific lowlands from Sonora to northwestern Chiapas, including the Balsas Basin and the Central Depression of Chiapas. Canseco-Márquez et al. (2007) stated that the distribution of this worm lizard "appears to be restricted to a small area close to the Rio Tecpan, in coastal Guerrero State, Mexico." This individual was found 2.7 km to the SW of Tecpan de Galeana, Guerrero.
© Victor H. Jiménez-Arcos

Abronia fuscolabialis (Tihen, 1944). The Mount Zempoaltepec Arboreal Alligator Lizard is a priority two species with an EVS of 18, whose distribution is limited to the Sierra Madre Oriental and Sierra Madre del Sur physiographic regions. Campbell and Frost (1993: 42) stated that this arboreal species is distributed "on the Atlantic versant of Oaxaca in the Sierra Juárez and Sierra Mixe." Pictured here is an individual from the Sierra Juárez or Sierra Madre de Oaxaca (Mata-Silva et al., 2015b). © César Mayoral-Halla

Abronia mixteca Bogert and Porter, 1967. The Mixtecan Arboreal Alligator Lizard is a priority one species with an EVS of 18, found only in the Sierra Madre del Sur physiographic region. This species is known from the Montañas y Valles del Occidente physiographic subregion in Oaxaca, and another locality in Sierra Madre del Sur in Guerrero (both of which lie within the Sierra Madre del Sur), in oak forest and pine-oak forest at elevations 2,134 to 2,465 m (Boger and Porter, 1967; Canseco-Márquez and Gutiérrez-Mayen, 2010; Wilson and Johnson, 2010; Martin-Regalado et al., 2012; Mata-Silva et al., 2015b; García-Padilla et al., 2016; Ibarra-Contreras and García-Padilla, 2016). Pictured here is an individual from Santa Inés del Monte, in the municipality of Santa Inés del Monte, Oaxaca.

© Brenda Fernanda Montiel-Altamirano

Abronia oaxacae (Günther, 1885). The Oaxacan Arboreal Alligator Lizard is a priority one species with an EVS of 17, whose distribution is restricted to the Sierra Madre del Sur and Sierra Madre Oriental physiographic regions. Campbell (2007) indicated that this arboreal species is "endemic to the Variance highlands in central Oaxaca State, Oaxaca" and that "it has been recorded at elevation of 2,100 to 2,743 m asl." This individual was found in the Sierra de Juárez or Sierra Madre de Oaxaca (Mata-Silva et al., 2015b). © Fernando Martínez-Belmar

CONSERVATION STATUS OF THE ENDEMIC MEXICAN HERPETOFAUNA

In evaluating the conservation status of segments of the Mesoamerican herpetofauna, varying combinations of the authors of this paper, as well as other workers, employed the system of Environmental Vulnerability Scores (EVS) first developed for use with the herpetofauna of Honduras by Wilson and McCranie (2004). These various authors used this system in a series of papers collectively termed the Mexican Conservation Series (Alvarado-Díaz et al., 2013; Mata-Silva et al., 2015b; Johnson et al., 2015a; Terán-Juárez et al., 2016; Woolrich-Piña et al., 2016; Nevárez de los Reyes et al., 2016; Cruz-Sáenz et al., 2017; González-Sánchez et al., 2017), a pair of papers on the amphibian and reptile components of the Mexican herpetofauna (Wilson et al., 2013a, b), and a study of the Central American herpetofauna (Johnson et al., 2015b).

Herein we used this same system to assess the conservation status of the 789 herpetofaunal species endemic to Mexico. In determining the EVS values for these species, we used some of the scores calculated by Wilson et al. (2013a, b), and by ourselves for the species not listed in, or updated scores from, the two aforementioned studies (Table 7). We present the total scores for all the endemic species in Table 8.

Table 7. Environmental Vulnerability Scores (EVS) for the endemic members of the Mexican herpetofauna not included in Wilson et al. (2013a, b) or requiring recalculation.

Taxa	Environmental Vulnerability Score (EVS)			
	Geographic Distribution	Ecological Distribution	Reproductive Mode/Degree of Persecution	Total Score
Eleutherodactylus grunwaldi	5	7	4	16
Eleutherodactylus wixarika	6	8	4	18
Ptychohyla zoque	5	8	1	14
Chiropterotriton cieloensis	6	7	4	17
Chiropterotriton infernalis	6	8	4	18
Chiropterotriton miquihuanus	6	8	4	18
Isthmura corrugata	6	8	4	18
Isthmura sierraoccidentalis	5	6	4	15
Pseudoeurycea kuautli	6	8	4	18
Thorius hankeni	6	8	4	18
Thorius longicaudus	5	8	4	17
Thorius maxillabrochus	6	8	4	18
Thorius pinicola	5	7	4	16
Thorius tlaxiacus	5	7	4	16
Abronia cuetzpali	5	8	4	17
Gerrhonotus lazcanoi	6	8	3	17
Norops boulengerianus	5	7	3	15
Norops carlliebi	5	7	3	15
Norops immaculogularis	5	8	3	16
Norops nietoi	5	7	3	15
Norops peucephilus	6	7	3	16
Norops purpuronectes	5	8	3	16
Norops rubiginosus	5	8	3	16
Norops sacamecatensis	5	8	3	16
Norops stevepoei	5	6	3	14
Norops zapotecorum	5	7	3	15
Heloderma exasperatum	5	7	5	17

Phrynosoma sherbrookei	5	8	3	16
Sceloporus aurantius	5	8	3	16
Sceloporus aureolus	5	7	3	15
Sceloporus brownorum	5	6	3	14
Sceloporus caeruleus	5	8	3	16
Sceloporus gadsdeni	6	8	3	17
Sceloporus omiltemanus	5	8	3	16
Sceloporus unicanthalis	5	8	3	16
Phyllodactylus papenfussi	6	7	3	17
Holcosus amphigrammus	5	3	3	11
Holcosus gaigeae	5	7	3	15
Holcosus sinister	5	5	3	13
Holcosus stuarti	5	4	3	12
Holcosus undulatus	5	7	3	15
Xenosaurus agrenon	5	7	3	15
Xenosaurus arboreus	6	8	3	17
Xenosaurus grandis	5	6	3	14
Xenosaurus mendozai	6	8	3	17
Xenosaurus newmanorum	6	7	3	16
Xenosaurus penai	6	8	3	17
Xenosaurus phalaroanthereon	5	7	3	15
Xenosaurus platyceps	5	6	3	14
Xenosaurus rectocollaris	5	7	3	15
Xenosaurus sanmartinensis	6	7	3	16
Xenosaurus tzacualtipantecus	6	8	3	17
Boa sigma	5	4	6	15
Exiliboa placata	5	8	2	15
Lampropeltis polyzona	5	1	5	11
Geophis lorancai	5	7	2	14
Geophis turbidus	5	8	2	15
Hypsiglena catalinae	6	8	2	16
Hypsiglena unaocularus	6	8	2	16
Rhadinella donaji	6	8	2	16
Epictia bakewelli	5	6	1	12
Epictia resetari	5	7	1	13
Epictia schneideri	5	7	1	13
Epictia vindumi	5	8	1	14
Epictia wynni	5	6	1	12
Rena iversoni	5	7	1	13
Thamnophis unilabialis	5	7	4	16
Crotalus armstrongi	5	8	5	18
Crotalus campbelli	5	7	5	17
Crotalus morulus	5	6	5	16
Crotalus tlaloci	5	7	5	17
Ophryacus smaragdinus	3	6	5	14
Ophryacus sphenophrys	5	8	5	18
Gopherus evgoodei	5	7	6	18

Abronia smithi Campbell and Frost, 1993. Smith's Arboreal Alligator Lizard is a priority one species with an EVS of 17, whose distribution is limited to the Western Nuclear Central American Highlands. Campbell and Frost (1993: 34) noted that this species is "known only from cloud forest of the Sierra Madre de Chiapas" with an "elevational distribution [of] 1800–2500 m." This individual was found in the Reserva de la Biósfera El Triunfo, Chiapas. © Elí García-Padilla

Norops immaculogularis (Köhler, Trejo Pérez, Petersen, and Méndez de la Cruz, 2014). This anole is a priority one species with an EVS of 16, which occurs in the physiographic region of the Pacific Lowlands from Sinaloa to northwestern Chiapas, including the Balsas Basin and the Central Depression of Chiapas. Köhler et al. (2014: 103) restricted the distribution of this anole to the "Pacific versant of the Mexican State of Oaxaca from about the town of Huatulco to at least the region of Puerto Escondido at elevations between 10 and 230 m." This individual was found in the municipality of Villa de Tututepec de Melchor Ocampo, Oaxaca. © Vicente Mata-Silva

Ctenosaura oaxacana Köhler and Hasbun, 2001. The Oaxacan Spiny-tailed Iguana is a priority one species with an EVS of 19 (the highest score for a Mexican endemic species), which is found only in the physiographic region of the Pacific Lowlands from Sinaloa to northwestern Chiapas, including the Balsas Basin and the Central Depression of Chiapas. Köhler (2008) stated that the distribution of this species is "restricted to the Pacific versant of the Isthmus of Tehuantepec, Oaxaca, Mexico." This individual was found near Barra de la Cruz in the municipality of Santiago Astata, Oaxaca. © Vicente Mata-Silva

Table 8. Environmental Vulnerability Scores (EVS) for the endemic members of the Mexican herpetofauna.

Taxa	EVS	Taxa	EVS
Anaxyrus compactilis	14	*Sceloporus cryptus*	14
Anaxyrus kelloggi	14	*Sceloporus cupreus*	16
Anaxyrus mexicanus	13	*Sceloporus cyanogenys*	16
Incilius cavifrons	13	*Sceloporus cyanostictus*	16
Incilius cristatus	14	*Sceloporus druckercolini*	14
Incilius cycladen	14	*Sceloporus dugesii*	13
Incilius gemmifer	15	*Sceloporus edwardtaylori*	14
Incilius marmoreus	11	*Sceloporus exsul*	17
Incilius mazatlanensis	12	*Sceloporus formosus*	15
Incilius mccoyi	14	*Sceloporus gadoviae*	11
Incilius occidentalis	11	*Sceloporus gadsdeni*	17
Incilius perplexus	11	*Sceloporus goldmani*	15
Incilius pisinnus	15	*Sceloporus grandaevus*	16
Incilius spiculatus	13	*Sceloporus halli*	17
Craugastor batrachylus	18	*Sceloporus heterolepis*	14
Craugastor berkenbuschii	14	*Sceloporus horridus*	11
Craugastor decoratus	15	*Sceloporus hunsakeri*	14
Craugastor galacticorhinis	15	*Sceloporus insignis*	16
Craugastor glaucus	18	*Sceloporus jalapae*	13
Craugastor guerreroensis	18	*Sceloporus lemosespinali*	16
Craugastor hobartsmithi	15	*Sceloporus licki*	13
Craugastor megalotympanum	18	*Sceloporus lineatulus*	17
Craugastor mexicanus	16	*Sceloporus macdougalli*	16
Craugastor montanus	18	*Sceloporus maculosus*	16
Craugastor occidentalis	13	*Sceloporus megalepidurus*	14
Craugastor omiltemanus	16	*Sceloporus minor*	14
Craugastor pelorus	15	*Sceloporus mucronatus*	13
Craugastor polymniae	18	*Sceloporus nelsoni*	13
Craugastor pozo	17	*Sceloporus ochoterenae*	12
Craugastor rhodopis	14	*Sceloporus omiltemanus*	16
Craugastor rugulosus	13	*Sceloporus ornatus*	16
Craugastor saltator	15	*Sceloporus palaciosi*	15
Craugastor silvicola	18	*Sceloporus parvus*	15
Craugastor spatulatus	16	*Sceloporus pyrocephalus*	12
Craugastor tarahumaraensis	17	*Sceloporus salvini*	15
Craugastor taylori	18	*Sceloporus samcolemani*	15
Craugastor uno	17	*Sceloporus scalaris*	12
Craugastor vocalis	13	*Sceloporus shannonorum*	15
Craugastor vulcani	17	*Sceloporus smithi*	15
Craugastor yucatanensis	17	*Sceloporus spinosus*	12
Eleutherodactylus albolabris	17	*Sceloporus stejnegeri*	13
Eleutherodactylus angustidigitorum	17	*Sceloporus subniger*	15
Eleutherodactylus dennisi	18	*Sceloporus subpictus*	16
Eleutherodactylus dilatus	17	*Sceloporus sugillatus*	16
Eleutherodactylus grandis	18	*Sceloporus tanneri*	16
Eleutherodactylus grunwaldi	16	*Sceloporus torquatus*	11
Eleutherodactylus interorbitalis	15	*Sceloporus unicanthalis*	16
Eleutherodactylus longipes	15	*Sceloporus utiformis*	15
Eleutherodactylus maurus	17	*Sceloporus zosteromus*	12

Taxa	EVS	Taxa	EVS
Eleutherodactylus modestus	16	*Uma exsul*	16
Eleutherodactylus nitidus	12	*Uma paraphygas*	17
Eleutherodactylus nivicolimae	17	*Uma rufopunctata*	16
Eleutherodactylus pallidus	17	*Urosaurus auriculatus*	16
Eleutherodactylus rufescens	17	*Urosaurus bicarinatus*	12
Eleutherodactylus saxatilis	17	*Urosaurus clarionensis*	17
Eleutherodactylus syristes	16	*Urosaurus gadovi*	12
Eleutherodactylus teretistes	16	*Urosaurus lahtelai*	16
Eleutherodactylus verrucipes	16	*Uta encantadae*	17
Eleutherodactylus verruculatus	18	*Uta lowei*	17
Eleutherodactylus wixarika	18	*Uta nolascensis*	17
Bromeliohyla dendroscarta	17	*Uta palmeri*	17
Charadrahyla altipotens	12	*Uta squamata*	17
Charadrahyla chaneque	13	*Uta tumidarostra*	17
Charadrahyla nephila	13	*Phyllodactylus bordai*	13
Charadrahyla taeniopus	13	*Phyllodactylus bugastrolepis*	17
Charadrahyla tecuani	15	*Phyllodactylus davisi*	16
Charadrahyla trux	14	*Phyllodactylus delcampoi*	16
Dendropsophus sartori	14	*Phyllodactylus duellmani*	16
Diaglena spatulata	13	*Phyllodactylus homolepidurus*	15
Dryophytes arboricola	12	*Phyllodactylus lanei*	15
Dryophytes euphorbiaceus	13	*Phyllodactylus muralis*	14
Dryophytes eximius	10	*Phyllodactylus papenfussi*	17
Dryophytes plicatus	11	*Phyllodactylus partidus*	16
Duellmanohyla chamulae	13	*Phyllodactylus paucituberculatus*	16
Duellmanohyla ignicolor	14	*Phyllodactylus unctus*	15
Ecnomiohyla echinata	19	*Phyllodactylus xanti*	15
Ecnomiohyla valancifer	18	*Mesoscincus altamirani*	14
Exerodonta abdivita	15	*Plestiodon bilineatus*	13
Exerodonta bivocata	15	*Plestiodon brevirostris*	11
Exerodonta chimalapa	12	*Plestiodon colimensis*	14
Exerodonta juanitae	14	*Plestiodon copei*	14
Exerodonta melanomma	11	*Plestiodon dicei*	12
Exerodonta pinorum	13	*Plestiodon dugesii*	16
Exerodonta smaragdina	12	*Plestiodon indubitus*	15
Exerodonta sumichrasti	9	*Plestiodon lagunensis*	15
Exerodonta xera	14	*Plestiodon lynxe*	10
Megastomatohyla mixe	15	*Plestiodon multilineatus*	16
Megastomatohyla mixomaculata	14	*Plestiodon nietoi*	17
Megastomatohyla nubicola	14	*Plestiodon ochoterenae*	13
Megastomatohyla pellita	14	*Plestiodon parviauriculatus*	15
Plectrohyla lacertosa	14	*Plestiodon parvulus*	15
Plectrohyla pycnochila	15	*Scincella gemmingeri*	11
Ptychohyla acrochorda	14	*Scincella kikaapoa*	17
Ptychohyla erythromma	13	*Scincella silvicola*	12
Ptychohyla leonhardschultzei	12	*Aspidoscelis bacata*	17
Ptychohyla zophodes	13	*Aspidoscelis calidipes*	14
Ptychohyla zoque	14	*Aspidoscelis cana*	16
Rheohyla miotympanum	9	*Aspidoscelis carmenensis*	17
Sarcohyla ameibothalame	15	*Aspidoscelis catalinensis*	17
Sarcohyla arborescandens	11	*Aspidoscelis celeripes*	15

Taxa	EVS	Taxa	EVS
Sarcohyla bistincta	9	*Aspidoscelis ceralbensis*	17
Sarcohyla calthula	14	*Aspidoscelis communis*	14
Sarcohyla calvicollina	14	*Aspidoscelis costata*	11
Sarcohyla celata	14	*Aspidoscelis cozumela*	16
Sarcohyla cembra	14	*Aspidoscelis danheimae*	16
Sarcohyla charadricola	14	*Aspidoscelis espiritensis*	16
Sarcohyla chryses	14	*Aspidoscelis franciscensis*	17
Sarcohyla crassa	14	*Aspidoscelis guttata*	12
Sarcohyla cyanomma	14	*Aspidoscelis labialis*	15
Sarcohyla cyclada	14	*Aspidoscelis lineattissima*	14
Sarcohyla ephemera	15	*Aspidoscelis martyris*	17
Sarcohyla hazelae	12	*Aspidoscelis mexicana*	14
Sarcohyla labedactyla	15	*Aspidoscelis opatae*	16
Sarcohyla miahuatlanensis	15	*Aspidoscelis parvisocia*	15
Sarcohyla mykter	13	*Aspidoscelis picta*	17
Sarcohyla pachyderma	15	*Aspidoscelis rodecki*	16
Sarcohyla pentheter	13	*Aspidoscelis sackii*	14
Sarcohyla psarosema	15	*Holcosus amphigrammus*	11
Sarcohyla robertsorum	13	*Holcosus gaigeae*	15
Sarcohyla sabrina	14	*Holcosus sinister*	13
Sarcohyla siopela	15	*Holcosus stuarti*	12
Sarcohyla thorectes	13	*Holcosus undulatus*	15
Smilisca dentata	14	*Lepidophyma chicoasense*	16
Tlalocohyla godmani	13	*Lepidophyma cuicateca*	16
Tlalocohyla smithii	11	*Lepidophyma dontomasi*	14
Agalychnis dacnicolor	13	*Lepidophyma gaigeae*	13
Lithobates chichicuahutla	15	*Lepidophyma lineri*	15
Lithobates dunni	14	*Lepidophyma lipetzi*	16
Lithobates johni	14	*Lepidophyma lowei*	16
Lithobates lemosespinali	14	*Lepidophyma micropholis*	15
Lithobates magnaocularis	12	*Lepidophyma occulor*	14
Lithobates megapoda	14	*Lepidophyma pajapanense*	13
Lithobates montezumae	13	*Lepidophyma radula*	13
Lithobates neovolcanicus	13	*Lepidophyma sylvaticum*	11
Lithobates omiltemanus	13	*Lepidophyma tarascae*	14
Lithobates psilonota	14	*Lepidophyma tuxtlae*	11
Lithobates pueblae	15	*Lepidophyma zongolica*	16
Lithobates pustulosus	9	*Xantusia bolsonae*	17
Lithobates sierramadrensis	13	*Xantusia extorris*	15
Lithobates spectabilis	12	*Xantusia gilberti*	16
Lithobates tlaloci	15	*Xantusia jaycolei*	16
Lithobates zweifeli	11	*Xantusia sanchezi*	16
Ambystoma altamirani	13	*Xantusia sherbrookei*	16
Ambystoma amblycephalum	13	*Xenosaurus agrenon*	15
Ambystoma andersoni	15	*Xenosaurus arboreus*	17
Ambystoma bombypellum	15	*Xenosaurus grandis*	14
Ambystoma dumerilii	15	*Xenosaurus mendozai*	17
Ambystoma flavipiperatum	14	*Xenosaurus newmanorum*	16
Ambystoma granulosum	14	*Xenosaurus penai*	17
Ambystoma leorae	15	*Xenosaurus phalaroanthereon*	15
Ambystoma lermaense	15	*Xenosaurus platyceps*	14

Taxa	EVS	Taxa	EVS
Ambystoma mexicanum	15	*Xenosaurus rectocollaris*	15
Ambystoma ordinarium	13	*Xenosaurus sanmartinensis*	16
Ambystoma rivulare	13	*Xenosaurus tzacualtipantecus*	17
Ambystoma rosaceum	14	*Boa sigma*	15
Ambystoma silvense	14	*Exiliboa placata*	15
Ambystoma subsalsum	14	*Arizona pacata*	14
Ambystoma taylori	15	*Chilomeniscus savagei*	15
Ambystoma velasci	10	*Conopsis acuta*	14
Aquiloeurycea cafetalera	17	*Conopsis amphisticha*	15
Aquiloeurycea cephalica	14	*Conopsis biserialis*	13
Aquiloeurycea galaenae	18	*Conopsis lineata*	13
Aquiloeurycea praecellens	18	*Conopsis megalodon*	14
Aquiloeurycea quetzalanensis	17	*Conopsis nasus*	11
Aquiloeurycea scandens	17	*Ficimia hardyi*	13
Bolitoglossa alberchi	15	*Ficimia olivacea*	9
Bolitoglossa chinanteca	18	*Ficimia ramirezi*	16
Bolitoglossa hermosa	16	*Ficimia ruspator*	16
Bolitoglossa macrinii	15	*Ficimia variegata*	14
Bolitoglossa oaxacensis	17	*Geagras redimitus*	14
Bolitoglossa platydactyla	15	*Lampropeltis catalinensis*	17
Bolitoglossa riletti	16	*Lampropeltis herrerae*	17
Bolitoglossa veracrucis	17	*Lampropeltis mexicana*	15
Bolitoglossa zapoteca	18	*Lampropeltis polyzona*	11
Chiropterotriton arboreus	18	*Lampropeltis ruthveni*	16
Chiropterotriton cieloensis	17	*Lampropeltis webbi*	16
Chiropterotriton chiropterus	16	*Leptophis diplotropis*	14
Chiropterotriton chondrostega	17	*Masticophis anthonyi*	17
Chiropterotriton cracens	17	*Masticophis aurigulus*	13
Chiropterotriton dimidiatus	17	*Masticophis barbouri*	17
Chiropterotriton infernalis	18	*Masticophis slevini*	17
Chiropterotriton lavae	18	*Mastigodryas cliftoni*	14
Chiropterotriton magnipes	16	*Pituophis deppei*	14
Chiropterotriton miquihuanus	18	*Pituophis insulanus*	16
Chiropterotriton mosaueri	18	*Pituophis vertebralis*	12
Chiropterotriton multidentatus	15	*Pseudelaphe phaescens*	16
Chiropterotriton orculus	18	*Pseudoficimia frontalis*	13
Chiropterotriton priscus	16	*Rhinocheilus antonii*	16
Chiropterotriton terrestris	18	*Rhinocheilus etheridgei*	16
Cryptotriton alvarezdeltoroi	18	*Salvadora bairdi*	15
Dendrotriton megarhinus	17	*Salvadora intermedia*	16
Dendrotriton xolocalcae	18	*Salvadora lemniscata*	15
Isthmura bellii	12	*Salvadora mexicana*	15
Isthmura boneti	17	*Sonora aemula*	16
Isthmura corrugata	18	*Sonora michoacanensis*	14
Isthmura gigantea	16	*Sonora mutabilis*	14
Isthmura maxima	17	*Symphimus leucostomus*	14
Isthmura sierraoccidentalis	15	*Sympholis lippiens*	14
Ixalotriton niger	18	*Tantilla bocourti*	9
Ixalotriton parvus	18	*Tantilla briggsi*	16
Parvimolge townsendi	16	*Tantilla calamarina*	12
Pseudoeurycea ahuitzotl	18	*Tantilla cascadae*	16

Taxa	EVS	Taxa	EVS
Pseudoeurycea altamontana	17	*Tantilla ceboruca*	16
Pseudoeurycea amuzga	18	*Tantilla coronadoi*	15
Pseudoeurycea anitae	18	*Tantilla deppei*	13
Pseudoeurycea aquatica	18	*Tantilla flavilineata*	14
Pseudoeurycea aurantia	18	*Tantilla johnsoni*	16
Pseudoeurycea cochranae	17	*Tantilla oaxacae*	15
Pseudoeurycea conanti	16	*Tantilla robusta*	16
Pseudoeurycea firscheini	18	*Tantilla sertula*	16
Pseudoeurycea gadovii	13	*Tantilla shawi*	15
Pseudoeurycea juarezi	17	*Tantilla slavensi*	14
Pseudoeurycea kuautli	18	*Tantilla striata*	14
Pseudoeurycea leprosa	16	*Tantilla tayrae*	15
Pseudoeurycea lineola	14	*Tantilla triseriata*	13
Pseudoeurycea longicauda	17	*Trimorphodon paucimaculatus*	15
Pseudoeurycea lynchi	17	*Trimorphodon tau*	13
Pseudoeurycea melanomolga	16	*Adelphicos latifasciatum*	15
Pseudoeurycea mixcoatl	17	*Adelphicos newmanorum*	12
Pseudoeurycea mixteca	17	*Adelphicos nigrilatum*	14
Pseudoeurycea mystax	18	*Chersodromus liebmanni*	12
Pseudoeurycea naucampatepetl	17	*Chersodromus rubriventris*	14
Pseudoeurycea nigromaculata	17	*Coniophanes alvarezi*	17
Pseudoeurycea obesa	18	*Coniophanes lateritius*	13
Pseudoeurycea orchileucos	18	*Coniophanes melanocephalus*	14
Pseudoeurycea orchimelas	17	*Coniophanes meridanus*	15
Pseudoeurycea papenfussi	17	*Coniophanes michoacanensis*	17
Pseudoeurycea robertsi	18	*Coniophanes sarae*	16
Pseudoeurycea ruficauda	18	*Coniophanes taylori*	16
Pseudoeurycea saltator	18	*Conophis morai*	17
Pseudoeurycea smithi	15	*Cryophis hallbergi*	14
Pseudoeurycea tenchalli	17	*Dipsas gaigeae*	17
Pseudoeurycea teotepec	18	*Enulius oligostichus*	15
Pseudoeurycea tlahcuiloh	17	*Geophis anocularis*	16
Pseudoeurycea tlilicxitl	17	*Geophis bicolor*	15
Pseudoeurycea unguidentis	17	*Geophis blanchardi*	15
Pseudoeurycea werleri	17	*Geophis chalybeus*	15
Thorius adelos	18	*Geophis dubius*	13
Thorius arboreus	18	*Geophis duellmani*	15
Thorius aureus	17	*Geophis dugesii*	13
Thorius boreas	18	*Geophis incomptus*	16
Thorius dubitus	16	*Geophis isthmicus*	16
Thorius grandis	15	*Geophis juarezi*	16
Thorius hankeni	18	*Geophis juliai*	13
Thorius infernalis	18	*Geophis laticinctus*	11
Thorius insperatus	18	*Geophis laticollaris*	16
Thorius longicaudus	17	*Geophis latifrontalis*	14
Thorius lunaris	18	*Geophis lorancai*	14
Thorius macdougalli	16	*Geophis maculiferus*	16
Thorius magnipes	17	*Geophis mutitorques*	13
Thorius maxillabrochus	18	*Geophis nigrocinctus*	15
Thorius minutissimus	17	*Geophis occabus*	16
Thorius minydemus	18	*Geophis omiltemanus*	15

Taxa	EVS	Taxa	EVS
Thorius munificus	18	*Geophis petersi*	15
Thorius narismagnus	18	*Geophis pyburni*	16
Thorius narisovalis	17	*Geophis russatus*	16
Thorius omiltemi	18	*Geophis sallei*	15
Thorius papaloae	17	*Geophis semidoliatus*	13
Thorius pennatulus	15	*Geophis sieboldi*	13
Thorius pinicola	16	*Geophis tarascae*	15
Thorius pulmonaris	17	*Geophis turbidus*	15
Thorius schmidti	17	*Hypsiglena affinis*	14
Thorius smithi	17	*Hypsiglena catalinae*	16
Thorius spilogaster	17	*Hypsiglena slevini*	11
Thorius tlaxiacus	16	*Hypsiglena tanzeri*	15
Thorius troglodytes	16	*Hypsiglena torquata*	8
Dermophis oaxacae	12	*Hypsiglena unaocularus*	16
Bipes biporus	14	*Leptodeira punctata*	17
Bipes canaliculatus	12	*Leptodeira splendida*	14
Bipes tridactylus	14	*Leptodeira uribei*	17
Abronia bogerti	18	*Manolepis putnami*	13
Abronia chiszari	17	*Pseudoleptodeira latifasciata*	14
Abronia cuetzpali	17	*Rhadinaea bogertorum*	16
Abronia deppii	16	*Rhadinaea cuneata*	15
Abronia fuscolabialis	18	*Rhadinaea forbesi*	15
Abronia graminea	15	*Rhadinaea fulvivittis*	11
Abronia leurolepis	18	*Rhadinaea gaigeae*	12
Abronia martindelcampoi	15	*Rhadinaea hesperia*	10
Abronia mitchelli	18	*Rhadinaea laureata*	12
Abronia mixteca	18	*Rhadinaea macdougalli*	12
Abronia oaxacae	17	*Rhadinaea marcellae*	12
Abronia ornelasi	18	*Rhadinaea montana*	14
Abronia ramirezi	18	*Rhadinaea myersi*	12
Abronia reidi	18	*Rhadinaea omiltemana*	15
Abronia smithi	17	*Rhadinaea quinquelineata*	15
Abronia taeniata	15	*Rhadinaea taeniata*	13
Barisia herrerae	15	*Rhadinella donaji*	16
Barisia imbricata	14	*Rhadinella kanalchutchan*	16
Barisia levicollis	15	*Rhadinella schistosa*	13
Barisia planifrons	15	*Rhadinophanes monticola*	15
Barisia rudicollis	15	*Sibon linearis*	16
Celestus enneagrammus	14	*Tantalophis discolor*	14
Celestus ingridae	17	*Tropidodipsas annulifera*	13
Celestus legnotus	14	*Tropidodipsas philippii*	14
Elgaria cedrosensis	16	*Tropidodipsas repleta*	17
Elgaria nana	16	*Tropidodipsas zweifeli*	16
Elgaria paucicarinata	13	*Micrurus bernadi*	15
Elgaria velazquezi	14	*Micrurus bogerti*	17
Gerrhonotus farri	17	*Micrurus distans*	14
Gerrhonotus lazcanoi	17	*Micrurus ephippifer*	15
Gerrhonotus lugoi	17	*Micrurus laticollaris*	14
Gerrhonotus ophiurus	12	*Micrurus limbatus*	17
Gerrhonotus parvus	17	*Micrurus nebularis*	18
Mesaspis antauges	16	*Micrurus pachecogili*	18

Taxa	EVS	Taxa	EVS
Mesaspis gadovii	14	*Micrurus proximans*	18
Mesaspis juarezi	15	*Micrurus tamaulipensis*	19
Mesaspis viridiflava	16	*Epictia bakewelli*	12
Ophisaurus ceroni	14	*Epictia resetari*	13
Ophisaurus incomptus	15	*Epictia schneideri*	13
Anniella geronimensis	13	*Epictia vindumi*	14
Crotaphytus antiquus	16	*Epictia wynni*	12
Crotaphytus dickersonae	16	*Rena boettgeri*	14
Crotaphytus grismeri	16	*Rena bressoni*	14
Crotaphytus insularis	16	*Rena iversoni*	13
Norops alvarezdeltoroi	17	*Rena maxima*	11
Norops anisolepis	15	*Rena myopica*	13
Norops barkeri	15	*Adelophis copei*	15
Norops boulengerianus	15	*Adelophis foxi*	16
Norops carlliebi	15	*Storeria hidalgoensis*	13
Norops compressicauda	15	*Storeria storerioides*	11
Norops cuprinus	16	*Thamnophis bogerti*	16
Norops cymbops	17	*Thamnophis chrysocephalus*	14
Norops duellmani	17	*Thamnophis conanti*	17
Norops dunni	16	*Thamnophis errans*	16
Norops gadovi	16	*Thamnophis exsul*	16
Norops hobartsmithi	15	*Thamnophis godmani*	14
Norops immaculogularis	16	*Thamnophis lineri*	17
Norops liogaster	14	*Thamnophis melanogaster*	15
Norops macrinii	16	*Thamnophis mendax*	14
Norops megapholidotus	16	*Thamnophis nigronuchalis*	12
Norops microlepidotus	15	*Thamnophis postremus*	15
Norops milleri	14	*Thamnophis pulchrilatus*	15
Norops naufragus	13	*Thamnophis rossmani*	18
Norops nebuloides	14	*Thamnophis scalaris*	14
Norops nebulosus	13	*Thamnophis scaliger*	15
Norops nietoi	15	*Thamnophis sumichrasti*	15
Norops omiltemanus	15	*Thamnophis unilabialis*	16
Norops parvicirculatus	16	*Thamnophis validus*	12
Norops peucephilus	16	*Agkistrodon taylori*	17
Norops purpuronectes	16	*Atropoides nummifer*	13
Norops pygmaeus	16	*Bothriechis rowleyi*	16
Norops quercorum	16	*Cerrophidion petlalcalensis*	18
Norops rubiginosus	16	*Cerrophidion tzotzilorum*	19
Norops sacamecatensis	16	*Crotalus angelensis*	18
Norops schiedii	16	*Crotalus aquilus*	16
Norops stevepoei	14	*Crotalus armstrongi*	18
Norops subocularis	15	*Crotalus basiliscus*	16
Norops taylori	16	*Crotalus campbelli*	17
Norops zapotecorum	15	*Crotalus catalinensis*	19
Anelytropsis papillosus	10	*Crotalus culminatus*	15
Coleonyx fasciatus	17	*Crotalus enyo*	13
Coleonyx gypsicolus	18	*Crotalus ericsmithi*	18
Heloderma horridum	11	*Crotalus estebanensis*	19
Heloderma exasperatum	17	*Crotalus intermedius*	15
Cachryx defensor	15	*Crotalus lannomi*	19

Taxa	EVS	Taxa	EVS
Ctenosaura clarki	15	*Crotalus lorenzoensis*	19
Ctenosaura conspicuosa	16	*Crotalus morulus*	16
Ctenosaura hemilopha	18	*Crotalus polystictus*	16
Ctenosaura macrolopha	19	*Crotalus pusillus*	18
Ctenosaura nolascensis	17	*Crotalus ravus*	14
Ctenosaura oaxacana	19	*Crotalus stejnegeri*	17
Ctenosaura pectinata	15	*Crotalus tancitarensis*	19
Dipsosaurus catalinensis	17	*Crotalus tlaloci*	17
Sauromalus hispidus	14	*Crotalus totonacus*	17
Sauromalus klauberi	16	*Crotalus transversus*	17
Sauromalus slevini	16	*Crotalus triseriatus*	16
Sauromalus varius	16	*Mixcoatlus barbouri*	15
Holbrookia approximans	14	*Mixcoatlus browni*	17
Petrosaurus repens	13	*Mixcoatlus melanurus*	17
Petrosaurus slevini	16	*Ophryacus smaragdinus*	14
Petrosaurus thalassinus	13	*Ophryacus sphenophrys*	18
Phrynosoma braconnieri	15	*Ophryacus undulatus*	15
Phrynosoma cerroense	16	*Porthidium dunni*	16
Phrynosoma coronatum	12	*Porthidium hespere*	18
Phrynosoma ditmarsi	16	*Porthidium yucatanicum*	17
Phrynosoma orbiculare	12	*Terrapene coahuila*	19
Phrynosoma sherbrookei	16	*Terrapene mexicana*	19
Phrynosoma taurus	12	*Terrapene nelsoni*	18
Phrynosoma wigginsi	16	*Terrapene yucatana*	18
Sceloporus adleri	15	*Trachemys nebulosa*	18
Sceloporus aeneus	13	*Trachemys ornata*	19
Sceloporus albiventris	16	*Trachemys taylori*	19
Sceloporus anahuacus	15	*Trachemys yaquia*	19
Sceloporus angustus	16	*Rhinoclemmys rubida*	14
Sceloporus asper	14	*Kinosternon alamosae*	14
Sceloporus aurantius	16	*Kinosternon chimalhuaca*	16
Sceloporus aureolus	15	*Kinosternon creaseri*	15
Sceloporus bicanthalis	13	*Kinosternon durangoense*	16
Sceloporus brownorum	14	*Kinosternon herrerai*	14
Sceloporus bulleri	15	*Kinosternon integrum*	11
Sceloporus caeruleus	16	*Kinosternon oaxacae*	15
Sceloporus cautus	15	*Gopherus evgoodei*	18
Sceloporus chaneyi	15	*Gopherus flavomarginatus*	19
Sceloporus couchii	15	*Apalone atra*	20
Sceloporus cozumelae	15		

In order to examine the distribution of the resulting EVS values, we provide a summary by family in Table 9, which shows the scores ranging from 8 to 20. The lowest (8) and highest (20) scores are found in a single species each (*Hypsiglena torquata* and *Apalone atra*, respectively). When arranging the EVS scores according to the low (3–9), medium (10–13), and high (14–20) categories of vulnerability, the number of species involved increases markedly from seven in the low category, through 149 in the medium category, to 633 in the high category. The EVS scores ranged from 14 to 20 in 633 (80.2%) of the 789 Mexican endemic species, which is of extremely high conservation significance. These data are featured prominently in the scheme for conservation prioritization we developed below.

Phrynosoma cerroense Stejneger, 1893. The Central Baja California Horned Lizard is a priority one species with an EVS of 16, which is known only from the physiographic region of Baja California and adjacent islands. Leaché et al. (2009: 12,419) indicated this species is "distributed across the Vizcaino Desert, and the Central Gulf Coast and into the southern portion of the California Floristic Province to Colonia Guerrero." This individual came from the Reserva de la Biósfera Valle de los Cirios, Ejido el Costeño, Ensenada, Baja California. © Bruno Enrique Tellez-Baños

Sceloporus aureolus Smith, 1942. The Southern Crevice Spiny Lizard is a priority one species with an EVS of 15, whose distribution is limited to the Sierra Madre del Sur and Sierra Madre Oriental physiographic regions. Information in The Reptile Database (www.reptile-database.org; accessed 4 August 2017) indicates that this species occurs in west-central Veracruz, southern Puebla, and Oaxaca. This individual was found in the Sierra Madre del Sur, Oaxaca. © Elí García-Padilla

Sceloporus cryptus Smith and Lynch, 1967. The Sierra Juarez Spiny Lizard is a priority one species with an EVS of 14, whose distribution is restricted to the Sierra Madre Oriental physiographic region. This species is known only from the drier portions of the Sierra de Juárez or Sierra Madre de Oaxaca, in northeastern Oaxaca (Flores-Villela and Campbell, 2007; Mata-Silva et al., 2015b). Pictured here is an individual from the Sierra de Juárez, Oaxaca. © Alejandro Calzada-Arciniega

Xenosaurus phalaroanthereon Nieto Montes de Oca, Campbell, and Flores-Villela, 2001. The Chin-spotted Knob-scaled Lizard is a priority one species with an EVS of 16, which is known only from the Sierra Madre del Sur physiographic region. This species is distributed "in the Montañas y Valles del Centro and Sierra Madre del Sur physiographic provinces at elevations from 1,670 … to 2,185 m" (Mata-Silva et al., 2015b: 5). Pictured here is an individual from San Pedro Totolapa, Oaxaca. © Elí García-Padilla.

Table 9. Summary of EVS values for the endemic species in Mexico, arranged by family. Shaded area on left = low vulnerability scores; shaded area on right = high vulnerability scores.

Families	Number of Species	Environmental Vulnerability Scores												
		8	9	10	11	12	13	14	15	16	17	18	19	20
Bufonidae	14				3	1	3	5	2					
Craugastoridae	26						3	2	5	3	5	8		
Eleutherodactylidae	20					1			2	5	8	4		
Hylidae	65		3	1	4	6	14	22	12		1	1	1	
Phyllomedusidae	1						1							
Ranidae	16		1		1	2	4	5	3					
Subtotals	**142**		**4**	**1**	**8**	**10**	**25**	**34**	**24**	**8**	**14**	**13**	**1**	
Ambystomatidae	17			1			4	5	7					
Plethodontidae	107					1	1	2	8	15	38	42		
Subtotals	**124**			**1**		**1**	**5**	**7**	**15**	**15**	**38**	**42**		
Dermophiidae	1					1								
Subtotals	**1**					**1**								
Totals	**267**		**4**	**2**	**8**	**12**	**30**	**41**	**39**	**23**	**52**	**55**	**1**	
Bipedidae	3					1		2						
Subtotals	**3**					**1**		**2**						
Anguidae	39					1	1	6	9	5	9	8		
Anniellidae	1						1							
Dibamidae	1			1										
Crotaphytidae	4									4				
Dactyloidae	35						2	4	11	15	3			
Eublepharidae	2										1	1		
Helodermatidae	2				1						1			
Iguanidae	13							1	3	4	2	1	2	
Phrynosomatidae	91				3	10	10	10	19	27	12			
Phyllodactylidae	13						1	1	4	5	2			
Scincidae	15			1	1	1	2	2	5	2	1			
Sphenomorphidae	3				1	1					1			
Teiidae	28				2	2	1	5	5	6	7			
Xantusiidae	21				2		3	3	3	9	1			
Xenosauridae	11							2	3	2	4			
Subtotals	**279**			**2**	**10**	**15**	**21**	**34**	**62**	**79**	**44**	**10**	**2**	
Boidae	1								1					
Charinidae	1								1					
Colubridae	61		2		2	2	8	15	11	16	5			
Dipsadidae	79	1		1	3	7	11	12	19	18	7			
Elapidae	10							2	2		2	3	1	
Leptotyphlopidae	10				1	2	4	3						
Natricidae	22				1	2	1	4	6	5	2	1		
Viperidae	37						2	2	4	7	9	7	6	
Subtotals	**221**	**1**	**2**	**1**	**7**	**13**	**26**	**38**	**44**	**46**	**25**	**11**	**7**	
Emydidae	8											3	5	
Geoemydidae	1							1						
Kinosternidae	7				1			2	2	2				
Testudinidae	2											1	1	
Trionychidae	1													1
Subtotals	**19**				**1**			**3**	**2**	**2**		**4**	**6**	**1**
Totals	**522**	**1**	**2**	**3**	**18**	**30**	**47**	**76**	**106**	**129**	**66**	**25**	**15**	**1**
Sum Totals	**789**	**1**	**6**	**5**	**26**	**41**	**77**	**118**	**147**	**150**	**121**	**80**	**16**	**1**
Category Totals	**789**	**7**		**149**				**633**						

PRIORITY LISTING FOR MEXICAN ENDEMIC HERPETOFAUNAL SPECIES

We developed a simple system for prioritizing the conservation significance of the 789 endemic species in Mexico by combining the data on their physiographic distribution and EVS group categorization, which resulted in 24 theoretical priority groupings, of which we employed 18 (Table 10). Of these, we identified six high vulnerability priority groupings, eight medium vulnerability groupings, and four low vulnerability groupings (Table 10).

The high vulnerability species are arranged into six groups based on the number of physiographic regions they occupy, ranging from one to six (Table 10). The numbers of species in these six groups decrease markedly and relatively consistently, as follows: Priority One (490 species); Priority Two (101); Priority Three (30); Priority Four (9); Priority Five (1); and Priority Six (2). The most important conclusion of this study is that these 633 species constitute 80.2% of the 789 endemic herpetofaunal species distributed in Mexico. We further concluded that it becomes increasingly difficult to protect high vulnerability species as the number of physiographic regions they occupy decreases. Since the number of species involved increases dramatically as the priority group number decreases, the relative difficulty of protecting them for perpetuity accelerates commensurately.

Xenosaurus tzacualtipantecus Woolrich-Piña and Smith, 2012. The Zacualtipán Knob-scaled Lizard is a priority one species with an EVS of 17, whose distribution is limited to the Sierra Madre Oriental physiographic region. This species is "restricted to the Sierra Madre Oriental in the state[s] of Hidalgo and Veracruz" (Ramírez-Bautista et al., 2014; translation ours). This individual was found at Alumbres, in the municipality of Zacualtipán de Ángeles, Hidalgo. © Cristian Raúl Olvera-Olvera

Tantilla sertula Wilson and Campbell, 2000. The Garland Centipede Snake is a priority one species with an EVS of 16, which is known only from the physiographic region of the Pacific Lowlands from Sinaloa to northwestern Chiapas, including the Balsas Basin and the Central Depression of Chiapas. This species is "known to occur along the lower flanks of the Sierra Madre del Sur from southwestern Guerrero to southwestern Oaxaca, at elevations from near sea level to 487 m" (Rocha et al., 2016). Pictured here is an individual from Cerro del Rey, in the municipality of Santa Catarina Juquila, Oaxaca. © Vicente Mata-Silva

Geophis sallei Boulenger, 1894. Salle's Earthsnake is a priority one species with an EVS of 15, whose distribution is restricted to the Sierra Madre del Sur physiographic region. This species is known only from the municipalities of Pluma Hidalgo, San Juan Lachao, and Santa Catarina Juquila in the Sierra Madre del Sur of Oaxaca, Mexico (Mata-Silva et al., 2015a). This individual was found in the municipality of San Juan Lachao, Oaxaca. © Vicente Mata-Silva

Table 10. Conservation priority list of endemic herpetofaunal species in Mexico based on the EVS categorization and the range of physiographic occurrence.

Priority One: High Vulnerability Species in a Single Physiographic Region (490 species)	
Anaxyrus kelloggi	*Norops rubiginosus*
Incilius cristatus	*Norops sacamecatensis*
Incilius cycladen	*Norops schiedii*
Incilius gemmifer	*Norops stevepoei*
Incilius mccoyi	*Norops taylori*
Incilius pisinnus	*Norops zapotecorum*
Craugastor batrachylus	*Coleonyx gypsicolus*
Craugastor decoratus	*Ctenosaura clarki*
Craugastor galacticorhinis	*Ctenosaura conspicuosa*
Craugastor glaucus	*Ctenosaura hemilopha*
Craugastor guerreroensis	*Ctenosaura nolascensis*
Craugastor megalotympanum	*Ctenosaura oaxacana*
Craugastor montanus	*Dipsosaurus catalinensis*
Craugastor omiltemanus	*Sauromalus klauberi*
Craugastor pelorus	*Sauromalus slevini*
Craugastor polymniae	*Sauromalus varius*
Craugastor pozo	*Petrosaurus slevini*
Craugastor rhodopis	*Phrynosoma cerroense*
Craugastor saltator	*Phrynosoma ditmarsi*
Craugastor silvicola	*Phrynosoma sherbrookei*
Craugastor spatulatus	*Phrynosoma wigginsi*
Craugastor tarahumaraensis	*Sceloporus adleri*
Craugastor taylori	*Sceloporus anahuacus*
Craugastor uno	*Sceloporus angustus*
Craugastor vulcani	*Sceloporus aurantius*
Craugastor yucatanensis	*Sceloporus aureolus*
Eleutherodactylus albolabris	*Sceloporus caeruleus*
Eleutherodactylus angustidigitorum	*Sceloporus chaneyi*
Eleutherodactylus dennisi	*Sceloporus cozumelae*
Eleutherodactylus dilatus	*Sceloporus cryptus*
Eleutherodactylus grandis	*Sceloporus cupreus*
Eleutherodactylus grunwaldi	*Sceloporus cyanostictus*
Eleutherodactylus longipes	*Sceloporus druckercolini*
Eleutherodactylus maurus	*Sceloporus exsul*
Eleutherodactylus modestus	*Sceloporus gadsdeni*
Eleutherodactylus pallidus	*Sceloporus goldmani*
Eleutherodactylus rufescens	*Sceloporus grandaevus*
Eleutherodactylus saxatilis	*Sceloporus halli*
Eleutherodactylus syristes	*Sceloporus hunsakeri*
Eleutherodactylus teretistes	*Sceloporus insignis*
Eleutherodactylus verruculatus	*Sceloporus lemosespinali*
Eleutherodactylus wixarika	*Sceloporus lineatulus*
Charadrahyla tecuani	*Sceloporus macdougalli*
Charadrahyla trux	*Sceloporus maculosus*
Dendropsophus sartori	*Sceloporus omiltemanus*
Duellmanohyla ignicolor	*Sceloporus ornatus*
Ecnomiohyla echinata	*Sceloporus palaciosi*
Ecnomiohyla valancifer	*Sceloporus samcolemani*
Exerodonta abdivita	*Sceloporus shannonorum*
Exerodonta bivocata	*Sceloporus subniger*
Exerodonta juanitae	*Sceloporus subpictus*
Exerodonta xera	*Sceloporus sugillatus*
Megastomatohyla mixe	*Sceloporus tanneri*
Megastomatohyla mixomaculata	*Sceloporus unicanthalis*
Megastomatohyla nubicola	*Uma exsul*
Megastomatohyla pellita	*Uma paraphygas*
Plectrohyla lacertosa	*Uma rufopunctata*

Priority One: High Vulnerability Species in a Single Physiographic Region (490 species) (*continued*)	
Plectrohyla pycnochila	*Urosaurus auriculatus*
Ptychohyla acrochorda	*Urosaurus clarionensis*
Ptychohyla erythromma	*Urosaurus lahtelai*
Sarcohyla ameibothalame	*Uta encantadae*
Sarcohyla calthula	*Uta lowei*
Sarcohyla calvicollina	*Uta nolascensis*
Sarcohyla celata	*Uta palmeri*
Sarcohyla cembra	*Uta squamata*
Sarcohyla charadricola	*Uta tumidarostra*
Sarcohyla chryses	*Phyllodactylus bugastrolepis*
Sarcohyla cyanomma	*Phyllodactylus davisi*
Sarcohyla cyclada	*Phyllodactylus delcampoi*
Sarcohyla ephemera	*Phyllodactylus duellmani*
Sarcohyla labedactyla	*Phyllodactylus papenfussi*
Sarcohyla miahuatlanensis	*Phyllodactylus partidus*
Sarcohyla pachyderma	*Phyllodactylus paucituberculatus*
Sarcohyla psarosema	*Phyllodactylus unctus*
Sarcohyla sabrina	*Phyllodactylus xanti*
Sarcohyla siopela	*Plestiodon indubitus*
Smilisca dentata	*Plestiodon lagunensis*
Lithobates chichicuahutla	*Plestiodon multilineatus*
Lithobates dunni	*Plestiodon nietoi*
Lithobates lemosespinali	*Plestiodon parviauriculatus*
Lithobates megapoda	*Scincella kikaapoa*
Lithobates pueblae	*Aspidoscelis bacata*
Lithobates tlaloci	*Aspidoscelis calidipes*
Ambystoma andersoni	*Aspidoscelis cana*
Ambystoma bombypellum	*Aspidoscelis carmenensis*
Ambystoma dumerilii	*Aspidoscelis catalinensis*
Ambystoma flavipiperatum	*Aspidoscelis celeripes*
Ambystoma granulosum	*Aspidoscelis ceralbensis*
Ambystoma leorae	*Aspidoscelis cozumela*
Ambystoma lermaense	*Aspidoscelis danheimae*
Ambystoma mexicanum	*Aspidoscelis espiritensis*
Ambystoma silvense	*Aspidoscelis franciscensis*
Ambystoma taylori	*Aspidoscelis labialis*
Aquiloeurycea cafetalera	*Aspidoscelis martyris*
Aquiloeurycea galaenae	*Aspidoscelis mexicana*
Aquiloeurycea praecellens	*Aspidoscelis opatae*
Aquiloeurycea quetzalanensis	*Aspidoscelis picta*
Aquiloeurycea scandens	*Aspidoscelis rodecki*
Bolitoglossa chinanteca	*Holcosus gaigeae*
Bolitoglossa hermosa	*Lepidophyma chicoasense*
Bolitoglossa macrinii	*Lepidophyma cuicateca*
Bolitoglossa oaxacensis	*Lepidophyma dontomasi*
Bolitoglossa riletti	*Lepidophyma lipetzi*
Bolitoglossa zapoteca	*Lepidophyma lowei*
Chiropterotriton arboreus	*Lepidophyma micropholis*
Chiropterotriton chiropterus	*Lepidophyma occulor*
Chiropterotriton cieloensis	*Lepidophyma zongolica*
Chiropterotriton chondrostega	*Xantusia bolsonae*
Chiropterotriton cracens	*Xantusia extorris*
Chiropterotriton dimidiatus	*Xantusia gilberti*
Chiropterotriton infernalis	*Xantusia jaycolei*
Chiropterotriton lavae	*Xantusia sanchezi*
Chiropterotriton magnipes	*Xantusia sherbrookei*
Chiropterotriton miquihuanus	*Xenosaurus arboreus*
Chiropterotriton mosaueri	*Xenosaurus mendozai*
Chiropterotriton multidentatus	*Xenosaurus newmanorum*
Chiropterotriton orculus	*Xenosaurus penai*
Chiropterotriton priscus	*Xenosaurus phalaroanthereon*

Priority One: High Vulnerability Species in a Single Physiographic Region (490 species) (*continued*)	
Chiropterotriton terrestris	*Xenosaurus platyceps*
Cryptotriton alvarezdeltoroi	*Xenosaurus sanmartinensis*
Dendrotriton megarhinus	*Xenosaurus tzacualtipantecus*
Dendrotriton xolocalcae	*Exiliboa placata*
Isthmura corrugata	*Arizona pacata*
Isthmura gigantea	*Conopsis megalodon*
Isthmura maxima	*Ficimia ramirezi*
Isthmura sierraoccidentalis	*Ficimia ruspator*
Ixalotriton niger	*Geagras redimitus*
Ixalotriton parvus	*Lampropeltis catalinensis*
Parvimolge townsendi	*Lampropeltis herrerae*
Pseudoeurycea ahuitzotl	*Lampropeltis ruthveni*
Pseudoeurycea altamontana	*Lampropeltis webbi*
Pseudoeurycea amuzga	*Masticophis anthonyi*
Pseudoeurycea anitae	*Masticophis barbouri*
Pseudoeurycea aquatica	*Masticophis slevini*
Pseudoeurycea aurantia	*Mastigodryas cliftoni*
Pseudoeurycea cochranae	*Pituophis insulanus*
Pseudoeurycea conanti	*Pseudelaphe phaescens*
Pseudoeurycea firscheini	*Rhinocheilus etheridgei*
Pseudoeurycea juarezi	*Salvadora intermedia*
Pseudoeurycea kuautli	*Tantilla briggsi*
Pseudoeurycea lineola	*Tantilla cascadae*
Pseudoeurycea longicauda	*Tantilla ceboruca*
Pseudoeurycea lynchi	*Tantilla coronadoi*
Pseudoeurycea melanomolga	*Tantilla flavilineata*
Pseudoeurycea mixcoatl	*Tantilla johnsoni*
Pseudoeurycea mixteca	*Tantilla oaxacae*
Pseudoeurycea mystax	*Tantilla robusta*
Pseudoeurycea naucampatepetl	*Tantilla sertula*
Pseudoeurycea nigromaculata	*Tantilla shawi*
Pseudoeurycea obesa	*Tantilla slavensi*
Pseudoeurycea orchileucos	*Tantilla tayrae*
Pseudoeurycea orchimelas	*Adelphicos latifasciatum*
Pseudoeurycea papenfussi	*Adelphicos nigrilatum*
Pseudoeurycea robertsi	*Coniophanes alvarezi*
Pseudoeurycea ruficauda	*Coniophanes melanocephalus*
Pseudoeurycea saltator	*Coniophanes meridanus*
Pseudoeurycea tenchalli	*Coniophanes michoacanensis*
Pseudoeurycea teotepec	*Coniophanes sarae*
Pseudoeurycea tlahcuiloh	*Conophis morai*
Pseudoeurycea tlilicxitl	*Cryophis hallbergi*
Pseudoeurycea unguidentis	*Dipsas gaigeae*
Pseudoeurycea werleri	*Geophis anocularis*
Thorius adelos	*Geophis bicolor*
Thorius arboreus	*Geophis blanchardi*
Thorius aureus	*Geophis chalybeus*
Thorius boreas	*Geophis duellmani*
Thorius dubitus	*Geophis incomptus*
Thorius grandis	*Geophis isthmicus*
Thorius hankeni	*Geophis juarezi*
Thorius infernalis	*Geophis laticollaris*
Thorius insperatus	*Geophis latifrontalis*
Thorius longicaudus	*Geophis lorancai*
Thorius lunaris	*Geophis maculiferus*
Thorius macdougalli	*Geophis nigrocinctus*
Thorius magnipes	*Geophis occabus*
Thorius maxillabrochus	*Geophis omiltemanus*
Thorius minutissimus	*Geophis pyburni*
Thorius minydemus	*Geophis russatus*
Thorius munificus	*Geophis sallei*

Priority One: High Vulnerability Species in a Single Physiographic Region (490 species) (*continued*)	
Thorius narismagnus	*Geophis tarascae*
Thorius narisovalis	*Geophis turbidus*
Thorius omiltemi	*Hypsiglena affinis*
Thorius papaloae	*Hypsiglena catelinae*
Thorius pennatulus	*Hypsiglena tanzeri*
Thorius pinicola	*Hypsiglena unaocularis*
Thorius pulmonaris	*Leptodeira uribei*
Thorius schmidti	*Rhadinaea bogertorum*
Thorius smithi	*Rhadinaea cuneata*
Thorius spilogaster	*Rhadinaea forbesi*
Thorius tlaxiacus	*Rhadinaea omiltemana*
Thorius troglodytes	*Rhadinaea quinquelineata*
Bipes biporus	*Rhadinella donaji*
Bipes tridactylus	*Rhadinella kanalchutchan*
Abronia bogerti	*Rhadinophanes monticola*
Abronia chiszari	*Sibon linearis*
Abronia cuetzpali	*Tantalophis discolor*
Abronia deppei	*Tropidodipsas repleta*
Abronia graminea	*Micrurus nebularis*
Abronia leurolepis	*Micrurus pachecogili*
Abronia martindelcampoi	*Micrurus proximans*
Abronia mitchelli	*Micrurus tamaulipensis*
Abronia mixteca	*Epictia vindumi*
Abronia oaxacae	*Rena boettgeri*
Abronia ornelasi	*Rena bressoni*
Abronia ramirezi	*Adelophis copei*
Abronia reidi	*Adelophis foxi*
Abronia smithi	*Thamnophis bogerti*
Barisia herrerae	*Thamnophis exsul*
Barisia levicollis	*Thamnophis godmani*
Barisia planifrons	*Thamnophis lineri*
Barisia rudicollis	*Thamnophis mendax*
Celestus ingridae	*Thamnophis postremus*
Celestus legnotus	*Thamnophis rossmani*
Elgaria cedrosensis	*Thamnophis sumichrasti*
Elgaria nana	*Bothriechis rowleyi*
Elgaria velazquezi	*Cerrophidion petlalcalensis*
Gerrhonotus farri	*Cerrophidion tzotzilorum*
Gerrhonotus lazcanoi	*Crotalus angelensis*
Gerrhonotus lugoi	*Crotalus campbelli*
Gerrhonotus parvus	*Crotalus catalinensis*
Mesaspis antauges	*Crotalus ericsmithi*
Mesaspis gadovii	*Crotalus estebanensis*
Mesaspis juarezi	*Crotalus lannomi*
Mesaspis viridiflava	*Crotalus lorenzoensis*
Crotaphytus antiquus	*Crotalus morulus*
Crotaphytus grismeri	*Crotalus stejnegeri*
Crotaphytus insularis	*Crotalus tancitarensis*
Norops anisolepis	*Crotalus tlaloci*
Norops boulengerianus	*Crotalus transversus*
Norops compressicauda	*Mixcoatlus barbouri*
Norops cuprinus	*Mixcoatlus browni*
Norops cymbops	*Ophryacus smaragdinus*
Norops duellmani	*Ophryacus sphenophrys*
Norops dunni	*Porthidium hespere*
Norops gadovi	*Porthidium yucatanicum*
Norops hobartsmithi	*Terrapene coahuila*
Norops immaculogularis	*Terrapene yucatana*
Norops liogaster	*Trachemys ornata*
Norops megapholidotus	*Trachemys taylori*

Priority One: High Vulnerability Species in a Single Physiographic Region (490 species) (*continued*)	
Norops milleri *Norops nietoi* *Norops omiltemanus* *Norops parvicirculatus* *Norops peucephilus* *Norops pygmaeus*	*Kinosternon chimalhuaca* *Kinosternon creaseri* *Kinosternon durangoense* *Kinosternon oaxacae* *Gopherus flavomarginatus* *Apalone atra*

Priority Two: High Vulnerability Species in Two Physiographic Regions (101)	
Anaxyrus compactilis *Craugastor hobartsmithi* *Craugastor mexicanus* *Eleutherodactylus interorbitalis* *Eleutherodactylus nivicolimae* *Eleutherodactylus verrucipes* *Bromeliohyla dendroscarta* *Ptychohyla zoque* *Sarcohyla crassa* *Lithobates johni* *Lithobates psilonota* *Aquiloeurycea cephalica* *Bolitoglossa veracrucis* *Isthmura boneti* *Pseudoeurycea leprosa* *Pseudoeurycea smithi* *Abronia fuscolabialis* *Abronia taeniata* *Ophisaurus ceroni* *Ophisaurus incomptus* *Crotaphytus dickersonae* *Norops alvarezdeltoroi* *Norops barkeri* *Norops carlliebi* *Norops macrinii* *Norops microlepidotus* *Norops nebuloides* *Norops purpuronectes* *Norops quercorum* *Norops subocularis* *Coleonyx fasciatus* *Heloderma exasperatum* *Cachryx defensor* *Ctenosaura macrolopha* *Sauromalus hispidus* *Phrynosoma braconnieri* *Sceloporus albiventris* *Sceloporus asper* *Sceloporus brownorum* *Sceloporus bulleri* *Sceloporus cautus* *Sceloporus couchii* *Sceloporus cyanogenys* *Sceloporus edwardtaylori* *Sceloporus heterolepis* *Sceloporus minor* *Sceloporus salvini* *Phyllodactylus homolepidurus* *Phyllodactylus muralis* *Mesoscincus altamirani* *Plestiodon colimensis*	*Plestiodon copei* *Plestiodon dugesii* *Aspidoscelis communis* *Aspidoscelis lineattissima* *Aspidoscelis parvisocia* *Aspidoscelis sackii* *Holcosus undulatus* *Lepidophyma lineri* *Lepidophyma tarascae* *Xenosaurus grandis* *Xenosaurus rectocollaris* *Conopsis amphisticha* *Ficimia variegata* *Rhinocheilus antonii* *Salvadora bairdi* *Sonora aemula* *Sonora mutabilis* *Tantilla striata* *Trimorphodon paucimaculatus* *Chersodromus rubriventris* *Coniophanes taylori* *Enulius oligostichus* *Geophis petersi* *Pseudoleptodeira latifasciata* *Rhadinaea montana* *Tropidodipsas philippii* *Tropidodipsas zweifeli* *Micrurus bernadi* *Micrurus bogerti* *Micrurus ephippifer* *Micrurus laticollaris* *Micrurus limbatus* *Thamnophis chrysocephalus* *Thamnophis conanti* *Thamnophis errans* *Thamnophis scaliger* *Thamnophis unilabialis* *Agkistrodon taylori* *Crotalus aquilus* *Crotalus armstrongi* *Crotalus pusillus* *Crotalus totonacus* *Crotalus triseriatus* *Mixcoatlus melanurus* *Ophryacus undulatus* *Porthidium dunni* *Terrapene nelsoni* *Trachemys nebulosa* *Trachemys yaquia* *Kinosternon alamosae*

Priority Three: High Vulnerability Species in Three Physiographic Regions (30)	
Craugastor berkenbuschii *Ambystoma rosaceum* *Ambystoma subsalsum* *Bolitoglossa alberchi* *Celestus enneagrammus* *Holbrookia approximans* *Sceloporus formosus* *Sceloporus megalepidurus* *Sceloporus parvus* *Sceloporus smithi* *Sceloporus utiformis* *Phyllodactylus lanei* *Plestiodon parvulus* *Xenosaurus agrenon* *Boa sigma*	*Conopsis acuta* *Salvadora lemniscata* *Salvadora mexicana* *Symphimus leucostomus* *Sympholis lippiens* *Leptodeira punctata* *Micrurus distans* *Thamnophis melanogaster* *Thamnophis scalaris* *Crotalus culminatus* *Crotalus polystictus* *Crotalus ravus* *Terrapene mexicana* *Rhinoclemmys rubida* *Gopherus evgoodei*
Priority Four: High Vulnerability Species in Four Physiographic Regions (9)	
Bolitoglossa platydactyla *Barisia imbricata* *Ctenosaura pectinata* *Lampropeltis mexicana* *Pituophis deppei*	*Sonora michoacanensis* *Crotalus basiliscus* *Crotalus intermedius* *Kinosternon herrerai*
Priority Five: High Vulnerability Species in Five Physiographic Regions (1)	
Thamnophis pulchrilatus	
Priority Six: High Vulnerability Species in Six Physiographic Regions (2)	
Leptophis diplotropis	*Leptodeira splendida*
Priority Seven: Medium Vulnerability Species in Single Physiographic Region (54)	
Anaxyrus mexicanus *Incilius cavifrons* *Incilius spiculatus* *Charadrahyla altipotens* *Charadrahyla taeniopus* *Diaglena spatulata* *Dryophytes arboricola* *Duellmanohyla chamulae* *Exerodonta chimalapa* *Exerodonta pinorum* *Ptychohyla erythromma* *Ptychohyla zophodes* *Sarcohyla mykter* *Sarcohyla pentheter* *Sarcohyla robertsorum* *Sarcohyla thorectes* *Tlalocohyla godmani* *Lithobates neovolcanicus* *Lithobates omiltemanus* *Lithobates sierramadrensis* *Ambystoma altamirani* *Ambystoma amblycephalum* *Ambystoma ordinarium* *Ambystoma rivulare* *Bipes canaliculatus* *Elgaria paucicarinata* *Anniella geronimensis*	*Norops naufragus* *Petrosaurus repens* *Petrosaurus thalassinus* *Phrynosoma coronatum* *Sceloporus licki* *Sceloporus zosteromus* *Plestiodon bilineatus* *Plestiodon dicei* *Plestiodon ochoterenae* *Lepidophyma radula* *Ficimia hardyi* *Masticophis aurigulus* *Pituophis vertebralis* *Tantilla deppei* *Chersodromus liebmanni* *Geophis juliai* *Geophis mutitorques* *Hypsiglena slevini* *Hypsiglena torquata* *Rhadinaea marcellae* *Rhadinaea myersi* *Rhadinella schistosa* *Epictia schneideri* *Epictia wynni* *Rena iversoni* *Thamnophis nigronuchalis* *Crotalus enyo*

Priority Eight: Medium Vulnerability Species in Two Physiographic Regions (38)	
Incilius mazatlanensis	*Phyllodactylus bordai*
Incilius occidentalis	*Plestiodon brevirostris*
Charadrahyla chaneque	*Holcosus sinister*
Charadrahyla nephila	*Lepidophyma gaigeae*
Dryophytes euphorbiaceus	*Lepidophyma pajapanense*
Exerodonta melanomma	*Conopsis biserialis*
Exerodonta smaragdina	*Conopsis nasus*
Ptychohyla leonhardschultzei	*Tantilla calamarina*
Sarcohyla arborescandens	*Tantilla triseriata*
Sarcohyla hazelae	*Geophis dubius*
Lithobates montezumae	*Geophis laticinctus*
Lithobates zweifeli	*Geophis semidoliatus*
Pseudoeurycea gadovii	*Geophis sieboldi*
Gerrhonotus ophiurus	*Rhadinaea fulvivittis*
Anelytropsis papillosus	*Rhadinaea gaigeae*
Sceloporus bicanthalis	*Rhadinaea macdougalli*
Sceloporus dugesii	*Rena maxima*
Sceloporus ochoterenae	*Rena myopica*
Sceloporus stejnegeri	*Storeria hidalgoensis*

Priority Nine: Medium Vulnerability Species in Three Physiographic Regions (28)	
Incilius perplexus	*Sceloporus pyrocephalus*
Craugastor occidentalis	*Sceloporus scalaris*
Craugastor rugulosus	*Urosaurus gadovi*
Craugastor vocalis	*Scincella silvicola*
Dryophytes plicatus	*Lepidophyma sylvaticum*
Tlalocohyla smithii	*Xenosaurus agrenon*
Lithobates spectabilis	*Coniophanes lateritius*
Dermophis oaxacae	*Geophis dugesi*
Heloderma horridum	*Manolepis putnami*
Phrynosoma taurus	*Rhadinaea laureata*
Sceloporus aeneus	*Rhadinaea taeniata*
Sceloporus gadoviae	*Epictia bakewelli*
Sceloporus jalapae	*Thamnophis validus*
Sceloporus mucronatus	*Atropoides nummifer*

Priority Ten: Medium Vulnerability Species in Four Physiographic Regions (18)	
Agalychnis dacnicolor	*Sceloporus torquatus*
Lithobates magnaocularis	*Plestiodon lynxe*
Ambystoma velasci	*Holcosus amphigrammus*
Isthmura bellii	*Holcosus stuarti*
Norops nebulosus	*Lepidophyma tuxtlae*
Phrynosoma orbiculare	*Pseudoficimia frontalis*
Sceloporus horridus	*Rhadinaea hesperia*
Sceloporus nelsoni	*Tropidodipsas annulifera*
Sceloporus spinosus	*Epictia resetari*

Priority Eleven: Medium Vulnerability Species in Five Physiographic Regions (5)	
Dryophytes eximius	*Lampropeltis polyzona*
Scincella gemmingeri	*Storeria storerioides*
Conopsis lineata	

Priority Twelve: Medium Vulnerability Species in Six Physiographic Regions (5)	
Incilius marmoreus	*Aspidoscelis guttata*
Eleutherodactylus nitidus	*Kinosternon integrum*
Aspidoscelis costata	

Priority Thirteen: Medium Vulnerability Species in Seven Physiographic Regions (1)	
Urosaurus bicarinatus	
Priority Fourteen: Medium Vulnerability Species in Eight Physiographic Regions (1)	
Trimorphodon tau	
Priority Fifteen: Low Vulnerability Species in Single Physiographic Region (1)	
Hypsiglena torquata	
Priority Sixteen: Low Vulnerability Species in Three Physiographic Regions (2)	
Exerodonta sumichrasti	*Lithobates pustulosus*
Priority Seventeen: Low Vulnerability Species in Four Physiographic Regions (3)	
Sarcohyla bistincta *Rheohyla miotympanum*	*Ficimia olivacea*
Priority Eighteen: Low Vulnerability Species in Six Physiographic Regions (1)	
Tantilla bocourti	

The medium vulnerability species are organized into eight groups, on the same basis as those in the high vulnerability group (Table 10). Fewer species are included in these eight groups, and thus they are expected to decrease less dramatically than those in the high vulnerability group, as follows: Priority Seven (54); Priority Eight (38); Priority Nine (28); Priority Ten (18); Priority Eleven (5); Priority Twelve (5); Priority Thirteen (1); and Priority Fourteen (1). Consequently, the next most important conclusion of our study is that these 150 species comprise 19.0% of the Mexican endemic species. When considered together, the medium and high vulnerability species in 14 of 19 priority groups include 783 species (99.2%) of the endemic species in Mexico. When examined relative to the number of physiographic regions inhabited, the results are as follows: one region (490+54+1 = 545); two regions (101+38 = 139); three regions (30+28+2 = 60); four regions (9+18+3 = 30); five regions (1+5 = 6); six regions (2+5+1 = 8); seven regions (1); and eight regions (1). The 545 single region species amount to 69.1% of the total number of Mexican endemic species, and thus they constitute the greatest major challenge for protecting the herpetofaunal diversity of Mexico. In general, protecting the remaining 30.9% of the 789 species can be expected to be correspondingly easier as the number of regions these 244 species inhabit increases.

As expected, relatively few low vulnerability species, among the Mexican endemics, are arranged in relatively few priority groups. The total number of these species is seven, and they are allocated to four priority groups (Table 10). By way of comparison, protecting these seven species will be easy.

Our analysis demonstrates that most of the 789 endemic members of the Mexican herpetofauna exhibit high vulnerability to environmental stressors (based on the application of the EVS measure), and also that they occupy relatively few physiographic regions in the country. The endemic component of the Mexican herpetofauna obviously is of global significance, both in terms of diversity and endemicity, and is comprised of a large group of somewhat narrowly distributed species. The protection of this herpetofauna constitutes a major challenge to conservation herpetologists working within this portion of Mesoamerica, and below we explore the parameters of this challenge.

PROGNOSIS FOR THE ENDEMIC MEXICAN HERPETOFAUNA

We stress that efforts to conserve the endemic elements of the Mexican herpetofauna have to be pursued within the framework of a set of cascading environmental problems of global extent and anthropogenic origin, if they are to have a long-lasting impact. We briefly reviewed these global environmental problems in the introduction of this paper, and they can be explored in greater detail in the references cited therein. What makes these problems so intransigent and difficult to approach is their widespread connectivity in the natural world (i.e., all of its components are interrelated by energy flow and the cycling of materials), and the linear approach often taken by humans to resolve these issues can be relatively ineffective, if not counterproductive.

Hypsiglena tanzeri Dixon and Lieb, 1972. Tanzer's Nightsnake is a priority one species with an EVS of 15, which is known only from the Sierra Madre Oriental physiographic region. This species "ranges at moderate elevations (700–1,800 m) from south-central San Luis Potosí through the Río Jalapa valley of northeastern Querétaro southward to northwestern Hidalgo" (Heimes, 2016). This individual was found at Metztitlán, in the municipality of Metztitlán, Hidalgo. © Cristian Raúl Olvera-Olvera

Fundamentally, humans have created and maintain these environmental problems because of their capacity for rational thought, i.e., their ability to connect cause to effect through the passing of time, and adopting an anthropocentric worldview that stresses the exploitation of the world's resources to support the burgeoning human population. Such a worldview contrasts markedly with that of environmentalists, who have adopted "a worldview that helps us make sense of how the environment works, our place in the environment, and right and wrong environmental behaviors" (Raven and Berg, 2004: G-6). Obviously, the present anthropocentric worldview held by most people represents the fundamental reason why these environmental problems exist, and continued human population growth allows them to worsen over time.

Understanding how the world's human population grows is essential for understanding the impact of this problem on the integrity of Earth's life-support systems. In this respect, the Population Reference Bureau (PRB) provides an annual report entitled the World Population Data Sheet, of which the latest was published in 2016, which indicated that the human population then stood at 7.4 billion people. The PRB home page, however, provides a world population clock, which advances at the approximate rate of 165 people per minute. Thus, at the time of this writing the world's population stands at 7,504,220,332, and by this time next year it will have grown by about 86,724,000 to a total of 7,590,944,334.

The 2016 World Population Data Sheet (WPDS) indicates that Mexico is the tenth most populous nation in the world, with a population of 129 million. Interestingly, by the year 2050, Mexico (along with Russia) will have "fallen off" the top 10 list, because of the higher growth rates now seen in a pair of African nations. The 2016 WPDS indicates that the population of Mexico will have risen to 163.8 million by the year 2050, based on a current birth rate of 19/1,000 and a death rate of 5/1,000. Based on these figures, this population grows at the rate of 1.4% per year (19 – 5 = 14/10 = 1.4) and doubles every 50 years (70/1.4). Thus, the 2016 population of 129 million is expected to grow to 258 million by the year 2066, assuming that no change in the growth rate occurs over that span of time. The current density level of 61/km^2 (www.wikipedia.org; accessed 26 July 2017) will double to 122/km^2 in the next half-century. Interestingly, the current percentage of urban occupancy is 79. This figure has risen by five percentage points from the 2002 figure of 74% (2002 WPDS). Obviously, the urban percentage for the Mexican population will be expected to increase. Whether the increase seen over the past 14 years will occur commensurately over the next 50 years remains to be seen, but if it does the percentage would be expected to rise to about 97. Some of this projected growth could be offset if the percentage of women aged 15–49 using contraceptives were to increase, as it has been since 2002 when it was 69% for the use of all methods and 60% for the use of modern methods; the corresponding 2016 figures are 72% and 66%.

Even under the best-case scenario, human population growth and the habitat modification it engenders will continue to occur, which will provide the most significant threat to the continued sustainability of herpetofaunal populations, including those of the endemic species. In addition to habitat modification, several other environmental threats have arisen in Mexico as a result of unregulated human population growth. These threats have been discussed in an array of papers in the so-called Mexican Conservation Series (González-Sánchez et al., 2017), which have dealt with the composition, distribution, and conservation status of the herpetofaunas of Nayarit (Woolrich-Piña et al., 2016), Nuevo León (Nevárez-de los Reyes et al., 2016), Jalisco (Cruz-Sáenz et al., 2017), and the Mexican Yucatan Peninsula (González-Sánchez et al., 2017). The compendium of threats identified in these four papers are organized into several general categories, as used by Gibbons et al. (2000) and Stuart et al. (2010), as follows: (a) habitat loss and degradation resulting from conversion for agriculture and ranching, urbanization, infrastructure development; illegal logging, and tourism (Woolrich-Piña et al., 2016; Nevárez-de los Reyes et al., 2016; Cruz–Sáenz et al., 2017; González-Sánchez et al., 2017); (b) environmental pollution (Nevárez-de los Reyes et al., 2016; Cruz-Sáenz et al., 2017; González-Sánchez et al., 2017); (c) invasive species (González-Sánchez et al., 2017); (d) infectious diseases (González-Sánchez et al., 2017); (e) unsustainable use and illegal collecting (Nevárez-de los Reyes et al., 2016; Cruz-Sáenz et al., 2017; González-Sánchez et al., 2017); (f) global climate change (Woolrich-Piña et al., 2016; Cruz-Sáenz et al., 2017; González-Sánchez et al., 2017); and (g) direct and incidental killing (Nevárez-de los Reyes et al., 2016; González-Sánchez et al., 2017). González-Sánchez et al. (2017) also discussed the impact of hurricanes and other tropical storms.

The environmental threats identified above can be expected to increase in both severity and prevalence in Mexico, along with the projected growth of the human population. We predict that these environmental threats will have their greatest and most immediate impact on the endemic herpetofaunal species in the order of their conservation priority status (Table 10). In the previous section we noted that the first six priority groups (the high vulnerability ones) amount to 633 of 789 species (80.2%). If these 789 species are organized according to the number of physiographic regions occupied, that number amounts to 490+54+1 = 545 species, which is 69.2% of the 789 Mexican endemic species. No matter how the numbers are calculated, our prognosis is that the globally significant Mexican endemic herpetofauna is in grave peril due to the plethora of environmental threats emanating from the fundamental, underlying problem of unregulated human population growth, which is predicted to double in size in just a half century. Additionally, these threats will be exacerbated from forces outside of Mexico, as the country is one of the top exporters of produce; its productivity likely will increase amid an ever-growing demand by the global human population (www.worldstopexports.com/mexicos-top-exports; accessed 7 August 2017).

The conservation issues we have discussed that involve the endemic component of the Mexican herpetofauna are but a limited consideration of the larger issues impacting life in all of its manifestations on our planet. Ceballos et al. (2017: 7) examined the conservation status of a significantly larger component of organisms, i.e., a sample of 27,600 vertebrate species examined from the perspective of the IUCN categorizations. Although still a relatively small number of species examined (from a global perspective), their findings are startling. These authors conclude that "population extinctions are orders of magnitude more frequent than species extinctions," as the former is a preamble to species extinctions, and that "human overpopulation, continued population growth, and overconsumption, especially by the rich" are the ultimate drivers of biotic destruction.

We emphasize that the study of Ceballos et al. (2017) dealt only with vertebrate animal species, which comprise only a small proportion of the known life on Earth. Wilson (2016) noted that the number of species in the Eukarya can be estimated to amount to 8.7 million, plus or minus one million. Using that figure, the Ceballos et al. (2017) sample then would comprise only 0.3% of the total estimate. Since we only know about a small portion of the life we suspect occurs on our planet (Wilson, 2016), however, our understanding of the true dimensions of the problem of biodiversity decline is orders of magnitude remote from our grasp.

Crotalus catalinensis Cliff, 1954. The Santa Catalina Island Rattlesnake is a priority one species with an EVS of 19 (the next highest score for a Mexican endemic species), whose distribution is restricted to the physiographic region of Baja California California and adjacent islands. Heimes (2016: 438) noted this rattlesnake as "endemic to Isla Santa Catalina of the east[ern] coast of Baja California Sur, in the Gulf of California." This individual was photographed on Isla Santa Catalina, Baja California Sur. © Elí García-Padilla

Crotalus morulus Klauber, 1952. The Tamaulipan Rock Rattlesnake is a priority one species with an EVS of 16, whose distribution is restricted to the Sierra Madre Oriental physiographic region. Heimes (2016: 454) stated that this rattlesnake "occupies a relatively small area in the northern part of the Sierra Madre Oriental, ranging at about 1,190 to 2,600 m elevation from extreme southeastern Coahuila through central Nuevo León to adjacent southwestern Tamaulipas." This individual was found in the Reserva de la Biósfera El Cielo, Tamaulipas. © Eli García-Padilla

SEARCHING FOR ULTIMATE SOLUTIONS

We demonstrated that the Mexican endemic herpetofauna is of global biodiversity significance, but that it is in severe peril due to the impact of an admixture of interacting global environmental problems. These problems have exacerbated and will continue to intensify over time at a rate commensurate with the increasing human population.

Wilson and Townsend (2010: 774–777) addressed these problems in the context of attempting to protect the entire Mesoamerican herpetofauna, and erected a set of six recommendations for providing long-lasting (ultimate) solutions for protecting biodiversity. Seven years later, their recommendations still strike at the heart of the matter. Briefly, Wilson and Townsend (2010) stated the following: (1) "any serious, long-term approach to issues relating to conservation biology must be predicated on the understanding the biodiversity decline ultimately is created by uncontrolled human reproduction as measured against a fixed planetary resource base, which has produced an unsustainable existence for our species"; (2) "several symptoms arise from human overpopulation and the lack of societal sustainability, which interact to create species endangerment…and biodiversity decline," including "habitat destruction, fragmentation, degradation, invasive species, pollution, and overexploitation"; (3) "protected area design generally consists of identifying a 'nuclear zone' surrounded by a 'buffer zone," which "should be established by assessing the biological resources of the proposed zone…"; (4) once the biotic reserves are "designed and established in the fashion indicated"…, "the biological value of the protected areas" can be documented further; (5) "for the above approach to be successful in protected areas, governmental agencies need to establish cooperative agreements with local stakeholders that would provide them with sufficient autonomy to develop and sustain them"; and, finally (6) these steps need to be taken "with all dispatch possible."

Wilson and Townsend's (2010) recommendations were focused on the Mesoamerican herpetofauna, but they placed their conservation concerns in the context of the larger issue of protecting all of Earth's life from further decimation. Wilson (2016) proposed that this global environmental problem could be dealt with satisfactorily by devoting one-half of the Earth's surface to the support of life, apart from human life. In the last chapter of his book *Half-Earth: Our Planet's Fight for Life* (p. 209) he stated that, "in a world gaining so swiftly in biotechnology and rational capacity, it is entirely reasonable to envision a global network of inviolable reserves that cover half the surface of Earth." He went on to say (p. 211) that "we should forever bear in mind that the beautiful world our species inherited took the biosphere 3.8 billion years to build. The intricacy of its species we know only in part, and the way they work together to create a sustainable balance we have only recently begun to grasp. Like it or not, and prepared or not, we are the mind and stewards of the living world. Our own ultimate future depends upon that understanding. We have come a very long way through the barbaric period in which we still live, and now I believe we've learned enough to adopt a transcendental moral precept concerning the rest of life. It is simple and easy to say: Do no further harm to the biosphere."

Wilson's elegant and thoughtful conclusion to his latest book should appeal to any scientist worthy of his education, but the "Half-Earth" concept has engendered considerable controversy, to which E. O. Wilson is no stranger (witness the sociobiology imbroglio of the 1970s). Kopnina (2016) addressed this controversy and the arguments that have arisen against the "Half-Earth" movement in the wake of the publication of Wilson's 2016 book. She agrees that, "preserving global biodiversity depends upon designating many more large terrestrial and marine areas as strictly protected areas." She further examined the four principal objections to Wilson's thesis, and concluded that they have arisen out of a dedication to the anthropocentric worldview adopted by most humans, including some, if not many scientists. She concludes by stating (p. 183) that rather than "making excuses for conservationists and asserting that they do serve humans after all (as they certainly do), [that] the environmental cause is better served by a rebuttal question: what justifies rampant anthropocentrism that condemns species and individuals within species to use, abuse, displacement and in some cases even extinction? The correct answer to critics of conservation should not be defensive or apologetic, but similar to what the leaders of earlier human liberation movements have done: a frontal confrontation with the underlying morality of oppressive regimes."

As extreme as Kopnina's (2016) opinion would appear to many, she simply is stating that if humans can claim a commitment to justice for all, then the "all" should include all life. Her well-examined opinion lies at the core of any effort to construct a sustainable existence for humanity on planet Earth. Sustainability or environmental sustainability, as it also is called, is a very simple concept that Raven and Berg (2004: G-15) defined as follows: "the ability to meet humanity's current needs without compromising the ability of future generations to meet their needs; sustainability implies that the environment can function indefinitely without going into a decline from the stresses imposed by human society on natural systems such as fertile soil, water, and air." The principles for sustainable living are well known, if generally not followed by most humans. As discussed by Raven and Berg (2004: 572–581), they are as follows: principle 1 (Building a Sustainable Society); principle 2 (Respecting and Caring for the Community of Life); principle 3 (Improving the Quality of Human Life); principle 4 (Conserving Earth's Vitality and Biological Diversity); principle 5 (Keeping within Earth's Carrying Capacity); principle 6 (Changing Personal Attitudes and Practices); principle 7 (Enabling Communities to Care for Their Own Environments); principle 8 (Building a National Framework for Integrating Development and Conservation); and principle 9 (Creating a Global Alliance).

Our opinion is that humans have the rational capacity to design a sustainable world through cooperative action, but our species' attitudes and actions will have to change. Our preparedness will have to improve as well. Such change will have to be based on realistic, fact-based appraisals of where we are now and where we want to be in the future. Biologists will have to commit to helping the rest of us understand why the protection of biodiversity is critical to enjoying a sustainable world. Cultural anthropologists also will have to assist humanity at large understand why the maintenance of cultural diversity also is essential to living sustainably. Educational reform will have to be central to such efforts, to help people learn how to think and act critically and base decisions on the way things really are, and not how we might wish them to be by denying reality. The devotion humans have for structuring beliefs on little or no evidence, essentially reversing the benefit of rationality, will have to surrender to critical-thinking education established by top-to-bottom educational reform.

Mixcoatlus melanurus (Müller, 1923). The Black-tailed Horned Pitviper is a priority two species with an EVS of 17, which is known only from the Meseta Central and Sierra Madre del Sur physiographic regions. Heimes (2016: 416, 418) stated that this pitviper "ranges at intermediate elevations (1,500 to 2,400 m) from the Tehuacán and Zapotitlán valleys in southwestern Puebla southward into the northern portion of the Mixteca Alta in northwestern Oaxaca." This individual was encountered at Valle de Tehuacán, Puebla. © Evan Arambul

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

A. The complex interplay among the atmosphere, hydrosphere, and lithosphere allows for the existence of life on planet Earth.

B. Humans are faced with the consequences of an interrelated amalgam of global problems of their own making, which impact the atmosphere, hydrosphere, lithosphere, and biosphere. These problems are sufficiently grave to threaten the continued existence of life.

C. Biodiversity decline is a problem of global dimensions. This decline impacts life at all levels: from the ecosystem, through the species comprising these ecosystems, to the genes prescribing the traits of these species.

D. Throughout its history, life has been subjected to a series of mass extinction episodes that have preceded the current sixth episode of humanity's design.

E. The best evidence for a sixth extinction episode comes from studies on flowering plants and vertebrate animals, including the ectothermic tetrapods.

F. To date, the endangerment of the herpetofauna has been documented best among the amphibians, but as a result of the same factors it also is known to impact species of crocodylians, squamates, and turtles. These factors include (1) habitat destruction, alteration, and fragmentation (2) introduced invasive species; (3) unsustainable use; (4) environmental pollution; (5) disease, and (6) climate change. The first of these factors is considered to be the most serious causal agent. These impacts also are acknowledged to arise from human activities.

G. The purpose of this study is to examine the conservation needs of the endemic component of the herpetofaunal species in Mexico. In general, the herpetofauna of this country is highly diverse and presently consists of 59 families, 215 genera, and 1,292 species. In terms of amphibians, Mexico is the fifth most speciose country in the world, and the second most speciose in terms of crocodylians, squamates, and turtles, as a group.

H. The endemic herpetofauna of Mexico currently consists of 789 species, 61.1% of the 1,292 species comprising the entire herpetofauna. These 789 species include 142 anurans, 124 salamanders, one caecilian, 503 squamates, and 19 turtles. Most of the anurans are classified in the families Bufonidae (14 species), Craugastoridae (26), Eleutherodactylidae (20), Hylidae (65), and Ranidae (16). All of the endemic salamanders are placed in two families, the Ambystomatidae (17 species) and the Plethodontidae (107 species). The endemic squamates, in large part, are in the families Anguidae (39 species), Dactyloidae (35), Iguanidae (13), Phrynosomatidae (91), Phyllodactylidae (13), Scincidae (15), Teiidae (28), Xantusiidae (21), Colubridae (61), Dipsadidae (79), Elapidae (10), Leptotyphlopidae (10), Natricidae (22), and Viperidae (37). Most of the turtles are assigned to the Emydidae (8 species) and Kinosternidae (7).

I. The Mexican endemic herpetofauna compares favorably to that of the United States and Canada, as well as that of Central America. The total level of herpetofaunal endemism decreases gradually from the United States and Canada (61.2%) through Mexico (61.1%) to Central America (55.6%).

J. Given the prevalence of endemic species within the Mexican herpetofauna, a major conservation goal is to protect this component for perpetuity. In order to identify the areas where the 789 endemic species are found, we placed them in a table and indicated their distribution among 14 physiographic regions. Upon completion we summarized these data, which demonstrate that five regions contain total endemic species numbers above the mean occupancy figure of 86.7. These regions are, in order of endemic species occupancy, the Sierra Madre Oriental (253 species), the Sierra Madre del Sur (209), the Meseta Central (195), the Pacific Lowlands from Sonora to western Chiapas, including the Balsas Basin and Central Depression of Chiapas (137), and the Sierra Madre Occidental (113). The nine regions containing species numbers below the mean occupancy figure, again in numerical order, are Baja California and the adjacent islands (81 species), the western Nuclear Central American highlands (69), the Northern Plateau basins and ranges (48), the Atlantic lowlands from Tamaulipas to Tabasco

(37), the Sierra de Los Tuxtlas (33), the Sonoran Desert basins and ranges (14), the Yucatan Platform (13), the subhumid extratropical lowlands of northeastern Mexico (9), and the Pacific lowlands of eastern Chiapas (4).

K. The 789 Mexican endemic species are distributed among a varying number of physiographic regions, ranging from one to eight out of 14. The number of species occupying a single region is 547. Decreasing numbers of the remaining species inhabit the number of regions, from two through eight. The majority of the species inhabit either one or two regions (683 of 789; 86.6%).

L. In devising a means for evaluating the conservation status of the Mexican endemic herpetofauna, we determined their EVS values and allocated them to the three traditional vulnerability groups (high, medium, and low). Accordingly, 633 of the 789 endemic species are placed in the high vulnerability category (EVS of 14–20), 149 in the medium vulnerability category (10–13), and seven in the low vulnerability category (3–9).

M. We combined the resulting EVS values with their physiographic region occupancy figure. In doing so, we recognized 18 priority levels ranging from high vulnerability species inhabiting single regions, to low vulnerability species occupying six regions. Of these 18 priority levels, six are high vulnerability levels, eight are medium vulnerability levels, and four are low vulnerability levels. The number of species allocated to the high vulnerability levels (one through six) decreases markedly from 490 in level one to one in level five, and two in level six. The number of species placed in the medium vulnerability levels (seven through 14) also decreases from 54 in level seven to one in level 14. Finally, the number of species assigned to the low vulnerability levels (15 through 18) ranges from one to three.

N. We conclude that our recognition of 18 conservation priority levels provides a gauge for evaluating the degree of attention given to members of the endemic Mexican herpetofauna in future conservation planning.

O. The human population in Mexico is growing at such a rate that it is expected to double in size in the next 50 years. A series of significant environmental threats emanate from such uncontrolled growth, including (1) habitat loss and degradation; (2) environmental pollution; (3) invasive species; (4) infectious diseases; (5) unsustainable use and illegal collecting; (6) global climate change; and (7) direct and incidental killing.

P. We predict that these threats will impact the globally significant Mexican endemic herpetofauna approximately in the order of their conservation priority status, thereby placing it in extreme peril.

Q. The threats impacting the Mexican endemic herpetofauna involve only a limited examination of the larger issues impacting all planetary life. Even recent work that examines the ongoing sixth mass extinction episode deals with only a small proportion of the full spectrum of life on Earth, i.e., the vertebrates assessed by the IUCN.

R. Biodiversity decline is only one of the global environmental problems known to environmental scientists. Finding workable and long-lasting solutions to this worldwide problem will have to occur within the context of dealing with the underlying issue of uncontrolled human reproduction, as measured against a fixed planetary resource base.

S. Designing ultimate solutions for global environmental problems will require building a sustainable society for humanity, based upon the implementation of a set of acknowledged principles, which also will allow for the preservation of sufficient living space for the remainder of the Earth's creatures, both known and unknown.

T. In theory, we believe that such a goal of sustainability for planet Earth is achievable; in practice, however, this will require a major paradigm shift like never before seen in human history. Reforming the educational process will entail adopting a critical thinking approach based on a fact-based analysis, to determine what kind of Earth we wish to inhabit now and in the future.

Kinosternon oaxacae Berry and Iverson, 1980. The Oaxaca Mud Turtle is a priority one species with an EVS of 15, whose distribution is limited to the physiographic region of the Pacific Lowlands from Sinaloa to northwestern Chiapas, including the Balsas Basin and the Central Depression of Chiapas. This species "has a small range in Pacific drainages of Oaxaca and eastern Guerrero" (Legler and Vogt, 2013: 35), at elevations from sea level to 800 m (Casas-Andreu et al., 1996). This individual was found at La Soledad, in the municipality of Villa de Tututepec de Melchor Ocampo, Oaxaca. © Vicente Mata-Silva

Recommendations

A. Our most fundamental recommendation is that intergovernmental, governmental, and non-governmental entities, such as the United Nations (including the United Nations Educational, Scientific, and Cultural Organization, the United Nations Environment Programme, and the World Health Organization), the International Union for Conservation of Nature, the International Renewable Energy Agency, and all others with a global and regional reach, need to firm up alliances that will allow for the construction and implementation of a global program for sustainability in the 21st century based on cooperation, fair representation, and mutual understanding and respect.

B. We recommend that one of the fundamental principles for such an international super-organization should be the understanding that human life depends on non-human life, and that in turn all life depends on a fully-functioning abiotic environment.

C. Under such an all-encompassing umbrella, it would make sense to emphasize the development of a global plan to document all of Earth's inhabitants within the 21st century, and to provide for their perpetual protection.

D. If such a plan can be implemented during this century, we believe that Mexico's endemic herpetofauna can be understood in all of its dimensions, and that this information can be used to establish a countrywide system of sustainable reserves for its protection, along with the remainder of the country's biota.

E. We suggest that our system of prioritization can help determine how funding for such a countrywide system of reserves should be allocated for protecting the endemic herpetofauna. Time, however, is of the essence.

"We need to be the change we wish to see in the world." —Attributed to: Mahatma Mohandas Karamchand Gandhi

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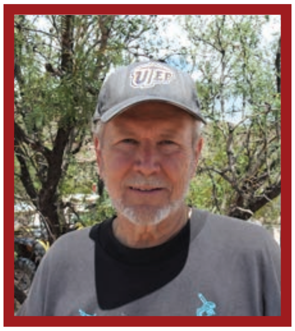

Jerry D. Johnson is Professor of Biological Sciences at The University of Texas at El Paso, and has extensive experience studying the herpetofauna of Mesoamerica, especially that of southern Mexico. Jerry is the Director of the 40,000-acre "Indio Mountains Research Station," was a co-editor on *Conservation of Mesoamerican Amphibians and Reptiles* and co-author of four of its chapters. He also is the senior author of the recent paper "A conservation reassessment of the Central American herpetofauna based on the EVS measure" and is Mesoamerica/Caribbean editor for Geographic Distribution section of *Herpetological Review*. Johnson has authored or co-authored over 117 peer-reviewed papers, including two 2010 articles, "Geographic distribution and conservation of the herpetofauna of southeastern Mexico" and "Distributional patterns of the herpetofauna of Mesoamerica, a Biodiversity Hotspot." One species, *Tantilla johnsoni*, has been named in his honor. Presently, he is an Associate Editor and Co-chair of the Taxonomic Board for the journal *Mesoamerican Herpetology*.

Larry David Wilson is a herpetologist with lengthy experience in Mesoamerica. He has authored or co-authored over 385 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," 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: composition, distribution, and conservation," and "A checklist and key to the snakes of the *Tantilla* clade (Squamata: Colubridae), with comments on taxonomy, distribution, and conservation," and three in 2016 entitled "The herpetofauna of Tamaulipas: composition, distribution, and conservation," "The herpetofauna of Nayarit: composition, distribution, and conservation status," and "The herpetofauna of Nuevo León: composition, distribution, and conservation." He also is a co-author of two 2017 papers entitled "The herpetofauna of Jalisco, Mexico: composition, distribution, and conservation status" and "The herpetofauna of the Mexican Yucatan Peninsula: composition, distribution, and conservation status." 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 71 currently recognized herpetofaunal species, and seven species have been named in his honor, including the anuran *Craugastor lauraster*, the lizard *Norops wilsoni*, and the snakes *Oxybelis wilsoni*, *Myriopholis wilsoni*, and *Cerrophidion wilsoni*. Currently, Larry is an Associate Editor and Co-chair of the Taxonomic Board for the journal *Mesoamerican Herpetology*.

Vicente Mata-Silva is a herpetologist born in Río Grande, Oaxaca, Mexico. His interests include ecology, conservation, natural history, and geographic distribution of the herpetofaunas of Mexico (particularly Oaxaca) 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 at the University of Texas at El Paso (UTEP) 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 also at UTEP, was on the ecology of the rock rattlesnake, *Crotalus lepidus*, in the northern Chihuahuan Desert. To date, Vicente has authored or co-authored over 100 peer-reviewed scientific publications. Currently, he is a researcher and departmental advisor at the University of Texas at El Paso. He also is the Distribution Notes Section Editor for the journal *Mesoamerican Herpetology*.

Elí García-Padilla is a herpetologist primarily focused on the study of the ecology and natural history of the Mexican herpetofauna. His research efforts have centered 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* (*Crotalus pyrrhus*), and *C. tortugensis* (*C. atrox*) in the Gulf of California. For his Bachelor's degree he presented a thesis on the ecology of *Crotalus muertensis* (*Crotalus pyrrhus*) on Isla El Muerto, Baja California, Mexico. To date, he has authored or co-authored 75 peer-reviewed scientific publications. Currently, he is employed as a formal Curator of Reptiles from Mexico in the electronic platform "Naturalista" of the Comisión Nacional para el Uso y Conocimiento de la Biodiversidad (CONABIO; www.naturalista.mx). One of his main passions is environmental education, and for several years he has been working on a variety of projects that include the use of audiovisual media as a powerful tool to reach large audiences and to promote the importance of the knowledge, protection, and conservation of biodiversity in Mexico. Elí's interests include wildlife and conservation photography, and his art has been published in several recognized scientific, artistic, and educational books, magazines, and websites.

Dominic L. DeSantis is currently a Ph.D. candidate and National Science Foundation-Graduate Research Fellow at the University of Texas at El Paso in the Ecology and Evolutionary Biology program. He received his Bachelor's degree at Texas State University, where he also completed multiple research projects on the antipredator behavior of the critically endangered Barton Springs Salamander (*Eurycea sosorum*). His ongoing dissertation research integrates radio-telemetry with recent advances in animal biotelemetry technologies to study movement and behavioral ecology in Western Diamond-backed Rattlesnakes (*Crotalus atrox*). Dominic accompanied Vicente Mata-Silva, Elí García-Padilla, and Larry David Wilson on survey and collecting trips to Oaxaca in 2015, 2016, and 2017, and is a co-author on numerous natural history publications that were produced from those visits. Overall, Dominic has authored or co-authored over 40 peer-reviewed scientific publications.