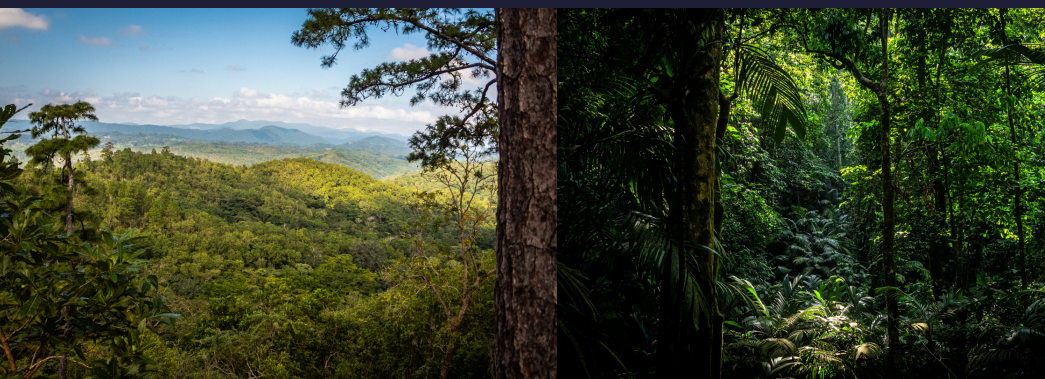


THE AMPHIBIANS AND REPTILES OF THE LOS CHIMALAPAS REGION, ISTHMUS OF TEHUANTEPEC, OAXACA, MEXICO: COMPOSITION, DISTRIBUTIONAL CATEGORIZATION, CONSERVATION STATUS, AND BIODIVERSITY SIGNIFICANCE



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DEDICATION



We are pleased to dedicate this paper to the memory of Thomas MacDougall (1898–1973), a professional herpetologist, horticulturist, botanical explorer, and scientific collector of plant specimens for herbarium and propagation purposes. Born in Scotland, he graduated from the New York State College of Forestry, in Ithaca. Starting in 1930, he made extremely important mammal and herpetological collections in Mexico. In the Isthmus of Tehuantepec, he was known as “Don Tomás,” and he became a naturalized citizen of Mexico, and from the 1940’s to 1970’s he became a naturalist pioneer and formally explored the mythical region of the Los Chimalapas. His epic expeditions in this region, the most biodiverse in Mexico, were immortalized in his article “The Chima Wilderness” (1971). Among the many botanical species new to science that he encountered during his explorations, Don Tomás was the first (and last) person to formally document the presence of the Resplendent Quetzal (*Pharomachrus mocinno*) in the region. Near a site called “La Gloria,” he also discovered the type specimen of the enigmatic Rowley’s Palm Pitviper (*Bothriechis rowleyi*), originally described by the late Hobart M. Smith as *Bothrops nigroviridis macdougalli* in his honor (Figs. 1, 2).

ABSTRACT

Given the unceasing momentum of the ongoing global biodiversity crisis, we placed an elevated sense of urgency on documenting and reporting the occurrence and distribution of species, and the threats to their persistence. Further, this urgency is enhanced when dealing with secretive species from understudied regions. Herein, we present an updated taxonomic list of the 155 species of amphibians and reptiles found in the Los Chimalapas region of the Isthmus of Tehuantepec, Oaxaca, Mexico. We also include data on the geographic and ecological distribution and conservation status of the species involved, which includes 44 anurans, eight salamanders, one caecilian, one crocodylian, 93 squamates, and eight turtles. The Chimalapas stand out as a high biodiversity region for amphibians and reptiles.

RESUMEN

Dado el incesante impulso de la actual crisis mundial de la biodiversidad, existe una gran urgencia en documentar y reportar la ocurrencia y distribución de especies, y las amenazas para su persistencia. Esta urgencia aumenta aún más cuando se trata de especies secretivas de regiones poco estudiadas. Presentamos una lista taxonómica actualizada de las 155 especies de anfibios y reptiles de la región de Los Chimalapas en el Istmo de Tehuantepec, Oaxaca, México. También incluimos datos sobre la distribución geográfica, ecológica y el estado de conservación de las especies involucradas, incluyendo 44 anuros, ocho salamandras, un cecílido, un cocodrilo, 93 escamosos y ocho tortugas.

Keywords: Community conservation; conservation status; distribution status; endemism; herpetofaunal update; high-priority regions; tropical evergreen forest, and montane cloud forest.



“SINCE 1930 I HAVE SPENT EVERY WINTER VACATION IN THE MEXICAN STATES OF OAXACA AND CHIAPAS. THIS ENTIRE REGION IS RICH IN RARE AND UNKNOWN SPECIES OF PLANTS AND ANIMALS, BUT IT WAS YEARS BEFORE I DISCOVERED THAT IT ALSO INCLUDES A TREMENDOUS UNITARY AREA OF UNINHABITED PRIMEVAL FOREST, VIRTUALLY UNTOUCHED... THE CHIMAS, AS THE INHABITANTS ARE KNOWN LOCALLY, STATE POSSESSION OF AN IMMENSE TERRITORY... LEGEND MAKES THIS REGION THE LAST REFUGE OF THE BINI DANI, THE ZAPOTEC NAME FOR ANCIENT PEOPLES WHO FLED TO THE MOUNTAINS RATHER THAN ACCEPT SPANISH CULTURE AND RELIGION.”

-THOMAS MACDOUGALL (1971).

INTRODUCTION

Globally, Mexico is ranked second and fifth in terms of the extent of reptile and amphibian biodiversity, respectively (Johnson *et al.*, 2017). Of the 32 federal entities in Mexico, Oaxaca stands out as the first in biological diversity and amount of endemism in this group of terrestrial vertebrates (Mata-Silva *et al.*, 2021). The region of the Los Chimalapas is located in the eastern portion of the state of Oaxaca, on the Isthmus of Tehuantepec. This region is a bastion of biodiversity of about 1 million hectares (= ha) in extent and also is known as the Gran Selva Zoque, including the immediate vicinities of Veracruz and Chiapas. This vast territory, mostly of communal tenure land (no private property is involved), is mostly under the legitimate and ancestral custody of the *Ang p̄on* or Zoque-Chimalapa of San Miguel and Santa María Chimalapa municipalities.

The Chimalapas region is known to harbor the second largest remnant of tropical forests in Mesoamerica, after the Gran Selva Maya in southeastern Mexico and northern Guatemala and Belize. The Zoque-Chimalapa people, even while being in a situation of dispossession and territorial invasion, maintain to date close to 600,000 ha of a mosaic of tropical forests, which includes tropical evergreen forest and montane cloud forest, of which ca. 400,000 ha are in an excellent state of conservation after more than 3,000 years of proven occupation (García-Aguirre, 2013). The biodiversity in the Los Chimalapas region is impressive. A checklist of terrestrial vertebrate species in this region reported at least 35 species of amphibians, 68 species of reptiles (Mata-Silva *et al.*, 2015), 464 species of birds (Peterson *et al.*, 2003), and 149 species of mammals (Lira-Torres *et al.*, 2012). These numbers represent 8.8 and 7.5% of the amphibians and reptiles in Mexico (Johnson *et al.*, 2017), 41.3% of the birds (Navarro-Sigüenza *et al.*, 2014), and 30.0% of the mammals (Ramírez-Pulido *et al.*, 2014).

To date, scientific exploration in this region has not been adequate, and important gaps in knowledge persist for various zoological, botanical, and fungal groups. Recent surveys, however, have shown that herpetofaunal biodiversity has been overlooked. For example, Aguilar-López *et al.*, (2016) reported 51 species for the Uxpanapa-Chimalapa regions, including the municipality of Uxpanapa in southern Veracruz, Los Chimalapas in Oaxaca, and the adjacent vicinity of Las Choapas in northwestern Chiapas, thereby illustrating a high proportion of endemic and threatened species. In the case of reptiles, the same authors provided a

list consisting of 141 species for Uxpanapa-Chimalapa-Choapas (Aguilar López *et al.*, 2021). Consequently, a herpetofaunal checklist for high-biodiversity regions, such as the Los Chimalapas, is required for the specific municipalities inside the state of Oaxaca (San Miguel and Santa María Chimalapa) to be used as a baseline for developing conservation plans at the state level.

DESCRIPTION OF THE LOS CHIMALAPAS REGION

The region of the Los Chimalapas is located in the eastern part of the state of Oaxaca, and is bordered to the north by Veracruz, to the east by Chiapas (leaving a small portion of the communal territory in the current municipalities of Cintalapa and Ocozocoautla), to the west by the Colonia Agrícola y Ganadera Cuauhtémoc, and the municipalities of Santa María Petapa and Matías Romero, and to the south by the municipalities of Santo Domingo Ingenio, Santiago Niltepec, Santo Domingo Zanatepec, and San Pedro Tapanatepec; all are in the state of Oaxaca (Fig. 3).

The Chimalapas region is located in the heart of the Isthmus of Tehuantepec. This vast region of 594,000 ha is the ancestral property of two agrarian communities of Zoque Olmec origin: Santa María Chimalapa to the north, on the Gulf slope (460,000 ha), and San Miguel Chimalapa to the south, on the Pacific slope (134,000 ha). This area is ancestral indigenous territory, occupied for many centuries before the states of Oaxaca and Chiapas existed. This region is of significant ecological relevance in Mexico and Mesoamerica because of its rugged topography, which ranges from the coastal plains to elevations of 200 meters (= m) above sea level (= masl) to mountain ranges reaching 2,300 masl, and harbors a vast diversity of tropical ecosystems. The initial impression one might have of this region is that it is composed of a uniform area of tropical rainforest, which is not the case because it actually consists of a varied mosaic of natural vegetation, including tropical evergreen forest, medium sub-evergreen forest, montane cloud forest, pine forest, pine-oak forest, low deciduous and sub-deciduous forest, and two unusual ecosystems called *chaparrera* and Andean *páramo*. All of these vegetational types are intermingled in an approximate area of 600,000 ha, of which, according to studies carried out around 1997 by the Society for the Study of Biotic Resources of Oaxaca (SERBO A.C., cited in García-Aguirre, 2015), 78% (almost 463,000 ha) was in a very good state of conservation, with only 5% (30,000

ha) totally deforested after 3,000 years of indigenous presence. Notably, of almost half a million hectares of diverse and well-preserved vegetation, 220,000 ha contain tropical evergreen forest and more than 60,000 ha are covered by montane cloud forest; these two complex natural ecosystems are well known to contain the greatest levels of biodiversity on the planet (García-Aguirre, *op. cit.*), (Fig. 4).

COMPOSITION OF THE HERPETOFAUNA

We present a taxonomic list of the herpetofauna updated to 2022, which comprises a total of 155 species (53 amphibians and 102 reptiles). We also present a summary of the composition of the Los Chimalapas herpetofauna (Table 1).

As typically is the case in tropical herpetofaunal studies, the number of amphibian species is fewer in number than that of reptiles. In the Los Chimalapas region the amphibians (53 species) comprise 34.2% of the total number of species (155), and the reptiles (102 species) represent 65.8% of the total. The ratio of amphibian to reptilian species in the Chimalapas is 53/102 or 0.52.

Of the 53 amphibians, 44 are anurans (83.0%), eight are salamanders (15.1%), and one is a caecilian (1.9%). Of the 102 reptiles, one is a crocodylian (1.0%), 93 are squamates (91.2%), and eight are turtles (7.8%), see Table 1. The percentage representation of these groups in the Los Chimalapas compared to that of the state of Oaxaca ranges from 17.0% in the salamanders to 50.0% in the caecilians. The average percentage representation for amphibians is 33.5%, for reptiles 31.7%, and for both groups 32.3% (Table 1).

Compared to the numbers for all of Mexico, the amphibians comprise from 5.0–33.3% ($\bar{x} = 12.7\%$) and the reptiles from 10.3–33.3% ($\bar{x} = 10.6\%$), with a total average of 11.3% (Table 1). In general, the Los Chimalapas region contain about one third of the herpetofauna of the state of Oaxaca, which is the most speciose state in Mexico (Mata-Silva *et al.*, 2021). This region also supports a bit more than one-tenth of the total herpetofauna of Mexico (mesoamericanherpetology.com; accessed 26 April 2022).

DISTRIBUTIONAL STATUS OF THE HERPETOFAUNA

For the distributional status of the Los Chimalapas herpetofauna, we used the same categories as in all the entries in the Mexican Conservation Series, beginning with Alvarado-Díaz *et al.*, (2013). These categories, as used in this paper, are: NE (non-endemic to Mexico); CE (endemic to Mexico); RE (endemic to the Los Chimalapas region); and NN (non-native to Mexico). Nonetheless, since the Alvarado-Díaz *et al.*, (2013) paper dealt with the herpetofauna of the state of Michoacán, instead of using the category SE for state endemics we used RE for regional endemics. In addition, for the non-endemic

species we used the distributional categories established by Wilson *et al.*, (2017). We list the data on distributional status in Appendix 1 and present a summary in Table 2.

The data in Table 2 indicate that the largest group of non-endemic species in the Los Chimalapas are categorized as MXCA, i.e., species that occur both in Mexico and Central America; this number is 76 or 70.4% of the total number of non-endemic species of 108 and 49.0% of the total number of species of 155 for the region. The next largest group of species in the region comprises the country endemics, of which there are 40 or 25.8% of the total. Together, these two groups make up 116 or 74.8% of the total. Most of the remaining non-endemic species are categorized as MXSA, i.e., species that range from Mexico to South America; there are 23 such species or 14.8% of the total. Only four of the 155 species (2.6%) are regional endemics, of which there are one amphibian (*Ixalotriton parvus*) and three reptiles (*Xenosaurus arboreus*, *Cenaspis aenigma*, and *Chersodromus australis*). The two species of snakes were recently described, in 2018 (Reptile Database; accessed 05 January 2022). Only a single non-native species is recorded from the Los Chimalapas region, the widespread gecko *Hemidactylus frenatus*.

CONSERVATION STATUS OF THE HERPETOFAUNA

The anthropogenic drivers of the sixth major mass extinction episode have been well documented (Kolbert, 2015). These are the drivers that all conservation biologists are attempting to defeat.

We examined the conservation status of the herpetofauna of the Los Chimalapas region of Oaxaca by using three systems of assessment, including the EVS system (Wilson *et al.*, 2013a, b), the IUCN system (www.iucnredlist.org), and the SEMARNAT system (SEMARNAT, 2012). We placed the data arising from the application of these three systems in Appendix 1, and summarize them in Appendix 2. As usual, we found the SEMARNAT system to be the least useful, insofar as only 63 of 154 native species (40.9%) have been evaluated; 91 species (59/1%) remain unevaluated. Of these 63 species, five have been allocated to the P or Endangered category (3.2% of total of 154), 12 to the A or Threatened category (7.8%), and 46 to the Pr or Special Protection category (29.9%).

The IUCN system shares the same deficiency as the SEMARNAT system, i.e, in having a large portion of species that have not been evaluated. Of a total of 154 native species in the Los Chimalapas region, 57 or 37.0% remain unevaluated. Another deficiency of this system is that a fairly high percentage of species have been placed in the Data Deficient (DD) categories (nine species or 5.8%). In addition, 55 species (35.7%) have been placed in the Least Concern (LC) category. Only 24 species (15.8%) have been placed in the three threat categories (CR, EN, VU), and only nine (5.8%) in the Near Threatened (NT) category.

One of the advantages of the EVS system is that all of the species occurring in the region, except for the single non-native species, can be evaluated. We summarize these evaluations in Appendix 2. The values range from 3 to 19, which is one less than the entire theoretical range of values. As in other papers using this measure, this range of values is partitioned into three categories of vulnerability, i.e., low, medium, and high. The low values range from 3 to 9 and are applied to a total of 59 or 38.3% of 154 native species; the medium values range from 10 to 13 and are attached to another total of 59 species or 38.3% of the total; and the high values range from 14 to 19 and are associated with 36 species or 23.4% of the total. As a result of this analysis, it is evident that the species of most significant conservation concern are five of the 44 anurans (* = endemic species of Mexico, ** = species endemic to Chimalapas region of Oaxaca), viz., *Craugastor berkenbuschii**, *C. lineatus*, *C. rhodopsis**, *C. silvicola**, and *Quilticohylla zoque**, five of the eight salamanders (*Bolitoglossa alberchi**, *B. platydactyla**, *B. veracruzis**, *Ixalotriton niger**, and *I. parvus***), 21 of the 90 squamates (*Abronia bogerti**, *A. ornelasi**, *Norops alvarezdeltoroi**, *N. compressicauda**, *N. cuprinus**, *N. purpuronectes**, *N. pygmaeus**, *Ctenosaura oaxacana**, *Phyllodactylus muralis**, *Xenosaurus arboreus***), *Ficimia ramirezi**, *Salvadora lemniscata**, *Tantilla briggsi**, *T. striata**, *Adelphicos latifasciatum**, *Cenaspis aenigma***), *Oxyrhopus petolarius**, *Micrurus ephippifer**, *Bothriechis rowleyi**, *Crotalus culminates**, and *Metlapilcoatlus olmec*), and five of the eight turtles (*Chelydra rossignonii*, *Dermatemys mawii*, *Kinosternon acutum*, *Claudius angustatus*, and *Staurotypus triporcatus*) (Figs. 5–50). Consequently, 26 of these 36 species (72.2%) are country endemics, and three are regional endemics (8.3%); the remaining seven species (19.4%) are non-endemics.

DISCUSSION

In this paper, we updated our knowledge on the herpetofauna of the Los Chimalapas region. As result, we demonstrated that this site qualifies as a significant hotspot of diversity for these two vulnerable groups of vertebrates at the state and country levels, as previously was indicated for birds (Peterson *et al.*, 2003) and mammals (Lira-Torres *et al.*, 2012).

Perusal of Table 1 indicates that the total number of species for this region (155) is 32.3% of the total of 480 species for the state of Oaxaca and 11.3% of the total of 1,377 species for Mexico (see above). The values for the anurans are proportionately better represented, as they comprise 44 species, 40.4% of the 109 Oaxacan species, and 17.4% of the 253 Mexican species (Mata-Silva *et al.*, 2021; mesoamericanherpetology.com; accessed 05 January 2022). Proportionally, the salamanders are less well represented, as with eight species they comprise only 17.0% of the 47 Oaxacan species and 5.0% of the 161 Mexican species. Since the total number of caecilians in the Mexican herpetofauna is so low, it is not surprising that the single species in the Los Chimalapas

region represents 50.0% of the number in Oaxaca (two) and 33.3% of the number for Mexico (three). As a whole, the 53 amphibian species in Los Chimalapas constitute 33.5% of the 158 Oaxacan amphibians and 12.7% of the 417 Mexican amphibian species (Mata-Silva *et al.*, 2021; mesoamericanherpetology.com; accessed 05 January 2022).

The single species of crocodylian is only 33.3% of both the three Oaxacan and Mexican species. The proportion of the 93 Chimalapan squamates is 31.0% of the 300 Oaxacan species and 10.3% of the 904 Mexican species, which is close to the values for the total reptilian fauna of 102 species, i.e., 31.7% of 322 Oaxacan species and 10.6% of 960 Mexican species. Given the relatively few turtle species found in the Chimalapan region, the proportion of the eight species is 42.1% of the total of 19 species for Oaxaca and 15.1% of the 53 of the total Mexican species (Mata-Silva *et al.* 2021; mesoamericanherpetology.com; accessed 05 January 2022).

The ratio of amphibian to reptilian species in the Los Chimalapas is similar to that reported for Oaxaca (0.49; 158/322) and Mexico as a whole (0.43; 417/960).

In a recent reexamination of the members of the herpetofauna of Oaxaca, Mexico (Mata-Silva *et al.*, 2021), these authors documented that among the 12 recognized physiographic regions in their study, the Sierra Madre de Chiapas (SMC) is one of the three most diverse herpetofaunal regions in the state of Oaxaca, which also is the Mexican state with the highest levels of biodiversity. Still, with regard to numbers of species, the SMC is less diverse than the Sierra Madre de Oaxaca (SMO) and the Sierra Madre del Sur (SMS). The data provided by Mata-Silva *et al.*, (2021) indicated a total of 227 species for the SMO, 165 species for the SMS, and 152 species for the SMC. In this study, we show a slight increase in species numbers in the Oaxacan portion of the SMC, from 152 to 155. We believe that the principal reasons why the number of herpetofaunal species in the SMC is less than those in the SMO and SMS, is because of the smaller size of the SMC relative to the size of the other two regions, in addition to a lesser degree of field effort expended in the smallest region.

To stress the biological relevance of the Los Chimalapas region, a recent study (Figel *et al.*, 2018) evaluated the umbrella value of jaguar (*Panthera onca*) for the endemic herpetofauna in Nuclear Central America (= NCA), a ~ 370,000 km² region. The NCA contains the greatest density of threatened reptiles in the Western Hemisphere and harbors an extraordinarily high diversity of amphibians, the most threatened class of vertebrate worldwide. Of the 304 regional endemics in the NCA, the distributions of 187 species of amphibians and reptiles (61.5%) overlapped the ground-truthed range of the jaguar. The results demonstrated that Los Chimalapas, with a total of 59 regional and country-level endemic species of amphibians and reptiles is the most significant locality in terms of the number of species that receive direct conservation benefits from the presence of the jaguar in the entirety of the NCA.

In the regions of Los Chimalapas and La Chinantla, the Zoque and Chinantecan indigenous people have been preserving these substantial hotspots of biodiversity under the social tenure of the land, and the voluntary conservation community initiatives have been effective for more than 3,000 years of known occupation and management. As a result of the lack of systematic monitoring of wildlife in the Los Chimalapas and Chinantla regions in Oaxaca, we suspect that many herpetofaunal species remain to be discovered, reported, and formally described, which is not the expected case in the Selva Lacandona and El Triunfo in Chiapas, where significantly more studies have been conducted during the decades of Mexican governmental presence (expropriation) and the respective intrusion of such environmental institutions as CONANP and several NGOs.

The indigenous communities are the guardians of 80% of the remnant biodiversity on our planet (United Nations, 2009). So, for us as biologists, we have to recognize that the people of these indigenous communities are the real social and environmental heroes. These people deserve considerable respect and recognition for their labor, which has been conducted over centuries and millennia of proven occupation of their ancestral territories. Similarly, this also is the case with the Los Chimalapas region, with the proven presence of ca. 3,000 years by the Zoques, Chima, or *Ang p̄on*, the direct descendants of the prehistoric Olmecs (the mother culture of Mesoamerica). After all this time, they still preserve ca. 400,000 ha of a mix of tropical forest types in excellent conservation status, which in fact, at the country level is the most biologically diverse region (see García-Padilla, 2020). The recognition and support of the local indigenous communities is highly important, as well as their efforts to preserve their ancestral territories and natural resources in common under the social tenure of the land and their community conservation initiatives. To do so might be the only real hope for the conservation of biodiversity for perpetuity.

“UNLESS WE PRACTICE CONSERVATION, THOSE WHO COME AFTER US WILL HAVE TO PAY THE PRICE OF MISERY, DEGRADATION, AND FAILURE FOR THE PROGRESS AND PROSPERITY OF OUR DAY.”

—GIFFORD PINCHOT (1910)

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- A. The region of the Los Chimalapas is a 594,000 ha ancestral property of two indigenous communities of Zoque Olmec origin, located in the Isthmus of Tehuantepec in the eastern part of the Mexican state of Oaxaca.
- B. The herpetofauna of the region of the Los Chimalapas in Oaxaca, Mexico, is comprised of 155 species, including 44 anurans, eight salamanders, one caecilian, one crocodylian, 93 squamates, and eight turtles.
- C. The largest distributional grouping of the herpetofauna consists of species that occur in both Mexico and Central America (76),

with the next largest group made up of the species endemic to Mexico (40).

- D. The EVS for the 154 native members of the herpetofauna are arranged into low (59 species), medium (59 species), and high (36 species). Only 63 of the 154 native species in Los Chimalapas have been evaluated by the SEMARNAT system and 57 of these species remain unevaluated by the IUCN system, whereas 55 are placed in the Least Concern category and nine in the Data Deficient category.
- E. Of most significant conservation concern are the 36 species of high EVS vulnerability, which include five anurans, five salamanders, 21 squamates, and five turtles.
- F. The Los Chimalapas region is part of the Sierra Madre de Chiapas in Oaxaca, and is one of the three most important herpetofaunal regions in the state. In turn, Oaxaca is the most herpetofaunally diverse state in the country of Mexico. In addition, Los Chimalapas, along with the La Chinantla region, contain greater terrestrial vertebrate diversity than the two nationally protected areas, the Selva Lacandona and El Triunfo, long thought to be the most diverse regions of the country.
- G. Indigenous communities are extremely important as guardians of eight-tenths of the remaining biodiversity on the planet. In Los Chimalapas, descendants of the ancestral Olmec indigenous peoples are providing protection as part of the continuing legacy of 3,000 years of their occupancy of the region, as perhaps the only real hope for lasting conservation of this significant component of the Mexican biological patrimony.

RECOMMENDATIONS

- A. Based on its enormous diversity, we strongly recommend that the Mexican government and its respective environmental institutions, such as SEMARNAT, recognize the Los Chimalapas region as the priority number one region for conservation in the entire country.
- B. We also encourage the aforementioned institutions to recognize that local communities are doing a tremendous job conserving the biodiversity under the social tenure of the land, as well as the community conservation initiatives.
- C. The region of the Los Chimalapas needs to be supported by the Mexican government and its institutions to initiate other types of eco-friendly productive activities, such as low impact ecotourism, social forest management, agroecology, and payment for environmental services.
- D. We strongly believe that social justice goes hand in hand with a healthy environment and the preservation of its ecosystems, in addition to the environmental services they provide for humanity.

Groups	Chimalapas	Oaxaca	Mexico	Percentage
Anura	44	109	253	40.4/17.4
Caudata	8	47	161	17.0/5.0
Gymnophiona	1	2	3	50.0/33.3
Subtotals	53	158	417	33.5/12.7
Crocodylia	1	3	3	33.3/33.3
Squamata	93	300	904	31.0/10.3
Testudines	8	19	53	42.1/15.1
Subtotals	102	322	960	31.7/10.6
Totals	155	480	1,377	32.3/11.3

Table 1. Summary of ordinal numbers of native and non-native species in the herpetofauna of the Los Chimalapas region of Oaxaca, the state of Oaxaca, and the country of Mexico. Percentages include ratios of those in the Los Chimalapas compared to those in the state of Oaxaca and the country of Mexico. Data for the state of Oaxaca from Mata-Silva *et al.*, (2021) and for Mexico from mesoamericanherpetology.com; accessed 06 January 2022.

Groups	Non-endemic Species					Country Endemics	Regional Endemics	Non-native Species	Totals
	3	4	6	7	8				
Anura	—	24	4	4	1	11	—	—	44
Caudata	—	3	—	—	—	4	1	—	8
Gymnophiona	—	1	—	—	—	—	—	—	1
Subtotals	—	28	4	4	1	15	1	—	53
Crocodylia	—	1	—	—	—	—	—	—	1
Squamata	2	42	16	3	1	25	3	1	93
Testudines	—	5	3	—	—	—	—	—	8
Subtotals	2	48	19	3	1	25	3	1	102
Totals	2	76	23	7	2	40	4	1	155

Table 2. Summary of distributional categorization for the species of the herpetofauna of the Chimalapas region of Oaxaca, Mexico. The numbers indicated below the non-endemic box refer to the following distributional categories (as explained in Wilson *et al.*, [2017]): 3 (MXUS—species distributed only in Mexico and the United States); 4 (MXCA—species found both in Mexico and Central America); 6 (MXSA—species ranging from Mexico to South America); 7 (USCA—species ranging from the United States to Central America); and 8 (USSA—species ranging from the United States to South America).



Taxa	Distributional Status	Environmental Vulnerability Category (Score)	IUCN Categorization	SEMARNAT Status
Class Amphibia (53 species) Order Anura (44 species) Family Bufonidae (7 species)				
<i>Incilius canaliferus</i>	NE4	L (8)	LC	NS
<i>Incilius coocifer</i>	NE4	L (9)	LC	Pr
<i>Incilius macrocristatus</i>	NE4	M (11)	VU	NS
<i>Incilius marmoratus*</i>	CE	M (11)	LC	NS
<i>Incilius tutelarius</i>	NE4	M (10)	EN	NS
<i>Incilius valliceps</i>	NE4	L (6)	LC	NS
<i>Rhinella horribilis</i>	NE7	L (3)	LC	NS
Family Centrolenidae (1 species)				
<i>Hyalinobatrachium viridissimum</i>	NE4	M (10)	NE	NS
Family Craugastoridae (8 species)				
<i>Craugastor berkenbuschii*</i>	CE	H (14)	NT	Pr
<i>Craugastor laticeps</i>	NE4	M (12)	NT	Pr
<i>Craugastor lineatus</i>	NE4	H (15)	CR	Pr
<i>Craugastor loki</i>	NE4	M (10)	LC	NS
<i>Craugastor pygmaeus</i>	NE4	L (9)	VU	NS
<i>Craugastor rhodopsis*</i>	CE	H (14)	VU	NS
<i>Craugastor rugulosus*</i>	CE	M (13)	LC	NS
<i>Craugastor silvicola*</i>	CE	H (18)	EN	NS
Family Eleutherodactylidae (1 species)				
<i>Eleutherodactylus leprus</i>	NE4	M (12)	VU	NS
Family Hylidae (17 species)				
<i>Charadrahyla chaneque*</i>	CE	M (13)	EN	Pr
<i>Dendropsophus microcephalus</i>	NE6	L (7)	LC	NS
<i>Duellmanohyla chamulae*</i>	CE	M (13)	EN	Pr
<i>Duellmanohyla schmidtorum</i>	NE4	L (8)	VU	Pr
<i>Exerodonta chimalapa*</i>	CE	H (12)	EN	NS
<i>Exerodonta sumichrasti*</i>	CE	L (9)	LC	NS
<i>Plectrohyla hartwegi</i>	NE4	M (10)	CR	Pr
<i>Plectrohyla matudai</i>	NE4	M (11)	VU	NS
<i>Ptychohyla euthysanota</i>	NE4	L (8)	NT	A
<i>Quilticohyla zoque*</i>	CE	H (14)	NE	NS
<i>Scinax staufferi</i>	NE4	L (4)	LC	NS
<i>Smilisca baudinii</i>	NE7	L (3)	LC	NS
<i>Smilisca cyanosticta</i>	NE4	M (12)	NT	NS
<i>Tlalocohyla loquax</i>	NE4	L (7)	LC	NS
<i>Tlalocohyla picta</i>	NE4	L (8)	LC	NS
<i>Trachycephalus vermiculatus</i>	NE6	L (4)	LC	NS
<i>Tripurion spatulatus*</i>	CE	M (13)	LC	NS
Family Leptodactylidae (2 species)				
<i>Leptodactylus fragilis</i>	NE8	L (5)	LC	NS
<i>Leptodactylus melanonotus</i>	NE6	L (6)	LC	NS
Family Microhylidae (2 species)				
<i>Hypopachus ustus</i>	NE4	L (7)	LC	Pr
<i>Hypopachus variolosus</i>	NE7	L (4)	LC	NS

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Taxa	Distributional Status	Environmental Vulnerability Category (Score)	IUCN Categorization	SEMARNAT Status
Family Phyllomedusidae (1 species)				
<i>Agalychnis taylori</i>	NE4	M (11)	NE	NS
Family Ranidae (4 species)				
<i>Lithobates brownorum</i>	NE4	L (8)	NE	Pr
<i>Lithobates forreri</i>	NE4	L (3)	LC	Pr
<i>Lithobates maculatus</i>	NE4	L (5)	LC	NS
<i>Lithobates vaillanti</i>	NE6	L (9)	LC	NS
Family Rhinophrynidae (1 species)				
<i>Rhinophrynus dorsalis</i>	NE7	L (8)	LC	NS
Order Caudata (8 species)				
Family Plethodontidae (8 species)				
<i>Bolitoglossa alberchi</i> *	CE	H (15)	LC	NS
<i>Bolitoglossa mexicana</i>	NE4	M (11)	LC	Pr
<i>Bolitoglossa occidentalis</i>	NE4	M (11)	LC	Pr
<i>Bolitoglossa platydactyla</i> *	CE	H (15)	NT	Pr
<i>Bolitoglossa rufescens</i>	NE4	L (9)	LC	Pr
<i>Bolitoglossa veracrucis</i> *	CE	H (17)	EN	Pr
<i>Ixalotriton niger</i> *	CE	H (18)	CR	P
<i>Ixalotriton parvus</i> **	RE	H (18)	CR	A
Order Gymnophiona (1 species)				
Family Dermophiidae (1 species)				
<i>Dermophis mexicanus</i>	NE4	M (11)	VU	Pr
Class Reptilia				
Order Crocodylia (1 species)				
Family Crocodylidae (1 species)				
<i>Crocodylus moreletii</i>	NE4	M (13)	LC	Pr
Order Squamata (91 species)				
Family Anguidae (3 species)				
<i>Abronia bogerti</i> *	CE	H (18)	DD	P
<i>Abronia ornelasi</i> *	CE	H (18)	DD	P
<i>Gerrhonotus liocephalus</i>	NE3	L (6)	LC	Pr
Family Corytophanidae (3 species)				
<i>Basiliscus vittatus</i>	NE4	L (7)	NE	NS
<i>Corytophanes hernandesii</i>	NE4	M (13)	NE	Pr
<i>Laemanctus serratus</i>	NE4	L (8)	LC	Pr
Family Dactyloidae (11 species)				
<i>Norops alvarezdeltoroi</i> *	CE	H (17)	DD	NS
<i>Norops biporcatus</i>	NE6	M (10)	NE	Pr
<i>Norops compressicauda</i> *	CE	H (15)	LC	NS
<i>Norops cuprinus</i> *	CE	H (16)	LC	Pr
<i>Norops laevis</i>	NE4	L (9)	NE	NS
<i>Norops petersii</i>	NE4	L (9)	NE	NS
<i>Norops purpuronectes</i> *	CE	H (16)	NE	NS
<i>Norops pygmaeus</i> *	CE	H (16)	EN	Pr
<i>Norops sericeus</i>	NE4	L (8)	NE	NS
<i>Norops tropidonotus</i>	NE4	L (9)	NE	NS
<i>Norops unilobatus</i>	NE4	L (7)	NE	NS

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Taxa	Distributional Status	Environmental Vulnerability Category (Score)	IUCN Categorization	SEMARNAT Status
Family Diploglossidae (1 species)				
<i>Celestus rozellae</i>	NE4	M (13)	NT	Pr
Family Eublepharidae (1 species)				
<i>Coleonyx elegans</i>	NE4	L (9)	NE	A
Familia Gekkonidae (1 species)				
<i>Hemidactylus frenatus***</i>	NN	—	—	—
Family Iguanidae (3 species)				
<i>Ctenosaura oaxacana*</i>	CE	H (19)	CR	A
<i>Ctenosaura similis</i>	NE4	L (8)	LC	A
<i>Iguana rhinolopha</i>	NE4	M (10)	NE	NS
Family Mabuyidae (1 species)				
<i>Marisora brachypoda</i>	NE?	L (6)	NE	NS
Family Phrynosomatidae (3 species)				
<i>Sceloporus internasalis</i>	NE4	M (11)	LC	NS
<i>Sceloporus teapensis</i>	NE4	M (13)	LC	NS
<i>Sceloporus variabilis</i>	NE4	L (5)	NE	NS
Family Phyllodactylidae (1 species)				
<i>Phyllodactylus muralis*</i>	CE	H (14)	LC	Pr
Family Scincidae (1 species)				
<i>Plestiodon sumichrasti</i>	NE4	M (12)	NE	NS
Family Sphaerodactylidae (2 species)				
<i>Sphaerodactylus continentalis</i>	NE4	M (10)	NE	NS
<i>Sphaerodactylus glaucus</i>	NE4	M (12)	NE	Pr
Family Sphenomorphidae (1 species)				
<i>Scincella cherriei</i>	NE4	L (8)	NE	NS
Family Teiidae (2 species)				
<i>Aspidoscelis deppii</i>	NE4	L (8)	LC	NS
<i>Holcosus amphigramus*</i>	CE	M (11)	NE	NS
Family Xantusiidae (3 species)				
<i>Lepidophyma flavimaculatum</i>	NE4	L (8)	NE	Pr
<i>Lepidophyma pajapanense*</i>	CE	M (13)	LC	Pr
<i>Lepidophyma tuxtlae*</i>	CE	M (11)	DD	A
Family Xenosauridae (2 species)				
<i>Xenosaurus arboreus**</i>	RE	H (17)	NE	NS
<i>Xenosaurus rackhami</i>	NE4	M (11)	NE	NS
Family Boidae (1 species)				
<i>Boa imperator</i>	NE6	M (10)	NE	NS
Family Colubridae (18 species)				
<i>Dendrophidion vinitor</i>	NE4	M (13)	LC	NS
<i>Drymarchon melanurus</i>	NE6	L (6)	LC	NS
<i>Drymobius chloroticus</i>	NE4	L (8)	LC	NS
<i>Drymobius margaritiferus</i>	NE8	L (6)	NE	NS
<i>Ficimia publia</i>	NE4	L (9)	NE	NS
<i>Ficimia ramirezi*</i>	CE	H (16)	DD	Pr
<i>Leptophis ahaetulla</i>	NE6	M (10)	NE	A
<i>Leptophis mexicanus</i>	NE4	L (6)	LC	A

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Taxa	Distributional Status	Environmental Vulnerability Category (Score)	IUCN Categorization	SEMARNAT Status
<i>Mastigodryas melanolomus</i>	NE4	L (6)	LC	NS
<i>Oxybelis microphthalmus</i>	NE3	M (11)	NE	NS
<i>Phrynonax poecilonotus</i>	NE6	M (10)	LC	NS
<i>Salvadora lemniscata*</i>	CE	H (15)	LC	Pr
<i>Senticolis triaspis</i>	NE7	L (6)	NE	NS
<i>Spilotes pullatus</i>	NE6	L (6)	NE	NS
<i>Stenorrhina degenhardtii</i>	NE6	L (9)	NE	NS
<i>Tantilla briggsi*</i>	CE	H (16)	DD	A
<i>Tantilla striata*</i>	CE	H (14)	DD	NS
<i>Tantilla vulcani</i>	NE4	M (12)	NE	NS
<i>Tantillita lintoni</i>	NE4	M (12)	LC	Pr
Family Dipsadidae (18 species)				
<i>Adelphicos latifasciatum*</i>	CE	H (15)	DD	Pr
<i>Cenaspis aenigma**</i>	RE	H (16)	NE	NS
<i>Chersodromus australis**</i>	RE	M (12)	NE	NS
<i>Chersodromus liebmanni*</i>	CE	M (12)	LC	Pr
<i>Coniophanes fissidens</i>	NE6	L (7)	NE	NS
<i>Coniophanes imperialis</i>	NE7	L (8)	LC	NS
<i>Enulius flavitorques</i>	NE6	L (5)	NE	NS
<i>Imantodes cenchoa</i>	NE6	L (6)	NE	Pr
<i>Imantodes gemmistratus</i>	NE6	L (6)	NE	NS
<i>Manolepis putnami*</i>	CE	M (13)	LC	NS
<i>Ninia diademata</i>	NE4	L (9)	LC	NS
<i>Ninia sebae</i>	NE4	L (5)	NE	NS
<i>Oxyrhopus petolarius</i>	NE6	H (14)	NE	NS
<i>Rhadinaea decorata</i>	NE6	L (9)	NE	NS
<i>Rhadinaea macdougalli*</i>	CE	M (12)	DD	Pr
<i>Rhadinella godmani</i>	NE4	M (10)	NE	NS
<i>Sibon dimidiatus</i>	NE4	M (10)	LC	NS
<i>Tropidodipsas fischeri</i>	NE4	M (11)	NE	NS
<i>Tropidodipsas sartorii</i>	NE4	L (9)	NE	Pr
Family Elapidae (4 species)				
<i>Micrurus diastema*</i>	CE	L (8)	LC	Pr
<i>Micrurus elegans</i>	NE4	M (13)	LC	Pr
<i>Micrurus ephippifer*</i>	CE	M (15)	VU	Pr
<i>Micrurus nigrocinctus</i>	NE6	M (11)	NE	Pr
Family Leptotyphlopidae (1 species)				
<i>Epictia phenops</i>	NE4	L (4)	NE	NS
Family Loxocemidae (1 species)				
<i>Loxocemus bicolor</i>	NE4	M (10)	NE	Pr
Family Natricidae (1 species)				
<i>Thamnophis marcianus</i>	NE7	M (10)	NE	A
Family Sibynophiidae (1 species)				
<i>Scaphiodontophis annulatus</i>	NE4	M (11)	NE	NS
Family Typhlopidae (1 species)				
<i>Amerotyphlops tenuis</i>	NE4	M (11)	LC	NS

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Taxa	Distributional Status	Environmental Vulnerability Category (Score)	IUCN Categorization	SEMARNAT Status
Family Viperidae (6 species)				
<i>Bothriechis rowleyi</i> *	CE	H (16)	VU	Pr
<i>Bothriechis schlegelii</i>	NE6	M (12)	NE	NS
<i>Bothrops asper</i>	NE6	M (12)	NE	NS
<i>Cerrophidion godmani</i>	NE4	M (11)	NE	NS
<i>Crotalus culminatus</i> *	CE	H (15)	NE	NS
<i>Metlapilcoatlus olmec</i>	NE4	H (15)	LC	A
Order Testudines (8 species)				
Family Chelydridae (1 species)				
<i>Chelydra rossignonii</i>	NE4	H (17)	VU	NS
Family Dermatemydidae (1 species)				
<i>Dermatemys mawii</i>	NE4	H (17)	CR	P
Family Emydidae (1 species)				
<i>Trachemys venusta</i>	NE6	M (13)	VU	NS
Family Kinosternidae (3 species)				
<i>Kinosternon acutum</i>	NE4	H (14)	NT	Pr
<i>Kinosternon leucostomum</i>	NE6	M (10)	NE	Pr
<i>Kinosternon scorpioides</i>	NE6	M (10)	NE	Pr
Family Staurotypidae (2 species)				
<i>Claudius angustatus</i>	NE4	H (14)	NT	P
<i>Staurotypus triporcatus</i>	NE4	H (14)	NT	A

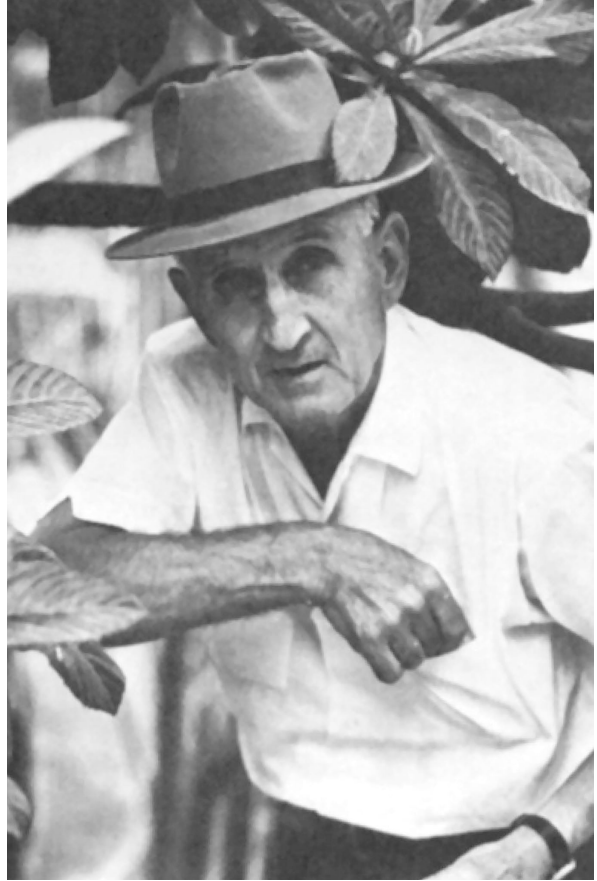
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Groups	Environmental Vulnerability Score																	IUCN Categorizations							SEMARNAT			Totals	
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	CR	EN	VU	NT	LC	DD	NE	P	A	Pr	NS	
Anura	3	3	2	2	3	6	4	4	4	4	4	3	1	1	1	2	2	2	5	6	4	23	4		1	11	32	44	
Caudata	—	—	—	—	—	1	1	2	2	—	—	2	2	—	1	2	—	2	1	1	4	—	—	1	1	5	1	8	
Gymnophiona	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	
Subtotals	3	3	2	2	3	6	5	4	7	4	4	3	3	—	1	3	—	4	6	7	5	27	—	4	1	2	17	33	53
Crocodylia	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1
Squamata	—	1	3	10	3	9	9	10	10	9	7	3	6	7	2	2	1	1	1	2	1	27	9	51	2	9	25	56	92
Testudines	—	—	—	—	—	—	—	2	—	1	1	3	—	—	2	—	—	1	2	2	3	—	2	2	1	3	2	8	
Subtotals	—	1	3	10	3	9	9	12	10	9	9	6	6	7	4	2	1	2	1	4	4	28	9	53	4	10	29	58	100
Totals	3	4	5	12	6	15	14	16	17	13	13	9	9	7	5	5	1	6	7	11	9	55	9	57	5	12	46	91	155

Appendix 2. Summary of conservation status for the herpetofaunal species occurring in the Los Chimalapas region of Oaxaca, Mexico. The numbers below the Environmental Vulnerability Score box are the range of scores evident for the herpetofauna. The abbreviations below the IUCN Categorization box signify the following: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; and NE = Not Evaluated. The abbreviations below the SEMARNAT box signify the following: P = Endangered; A = Threatened; Pr = Special Protection; and NS = No Status. The totals are the same for each of the three systems of conservation assessment. Non-native species not included.

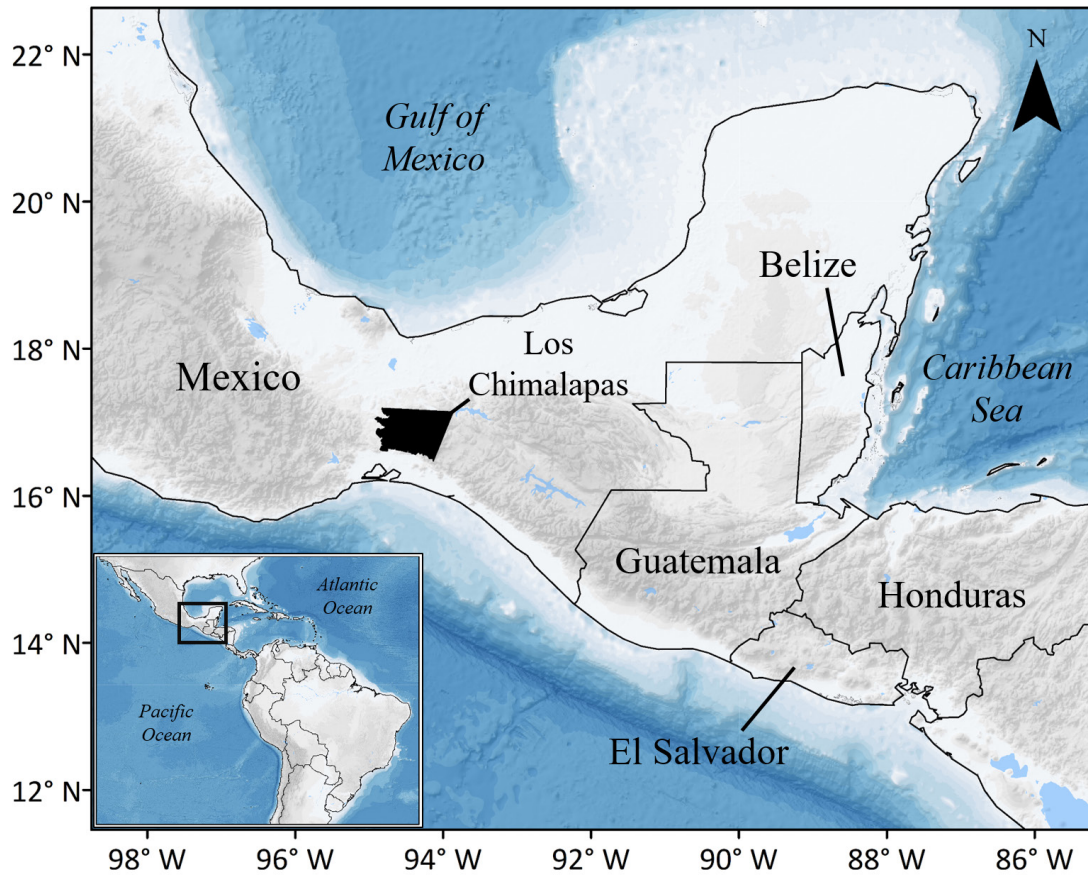




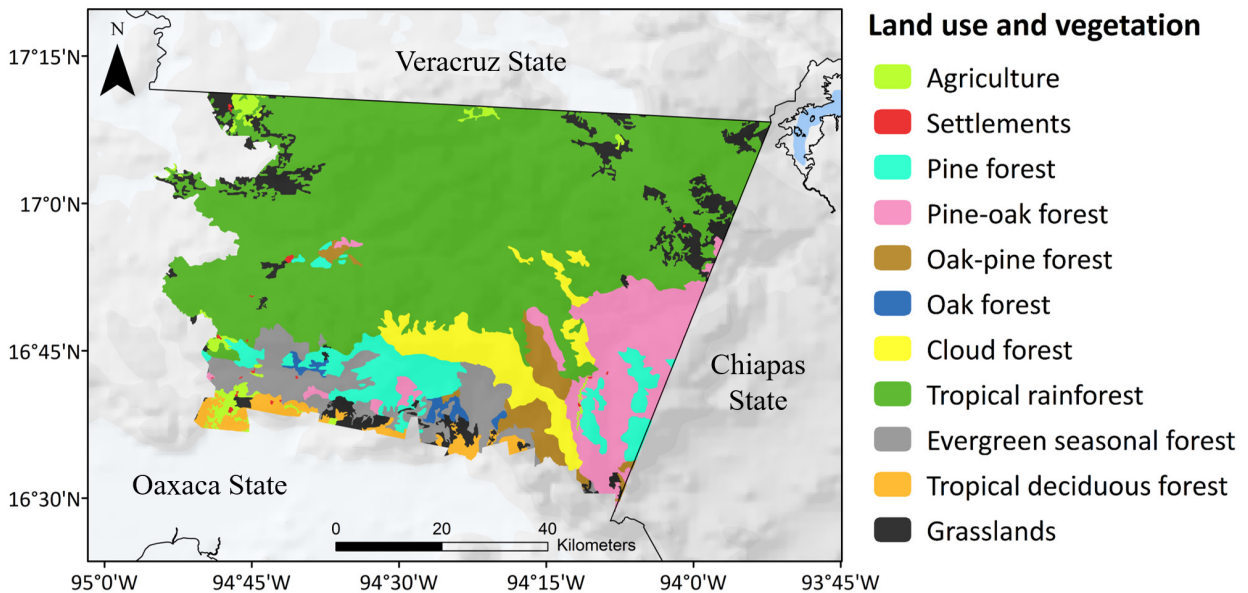
1).- Portrait of Thomas Baillie MacDougall, known as “Don Tomás,” while living in the Isthmus of Tehuantepec. The top formal explorer of the Los Chimalapas region. Photo by Martin Schweigs



2).- The local field guide for “Don Tomás, Juan Ramírez Vigueño, an indigenous person of Chontal origin from the Isthmus of Tehuantepec. Juan collected the type specimen of *Bothrops nigroviridis macdougalli*, currently *Bothriechis rowleyi*. Photo by Myron Kimnach.



3).- Map depicting the geographic location of the Los Chimalapas geographic region in the Isthmus of Tehuantepec, known as “the waist” of Mexico (Modified from UNIMAR, 2013).



4).- Map depicting the types of vegetation in the Los Chimalapas geographic region. Modified from Rzedowski (1978).



5).- Vegetation composed of tropical evergreen forest in the vicinity of La Gloria, in the municipality of Santa María Chimalapa. Photo by Elí García-Padilla.



6).- Remnant vegetation composed of cloud forest in Cerro Baúl, a historical locality inside the communal property of San Miguel Chimalapa. Photo by Vojtech Vita.



7).- Forest fire in the Sierra Atravesada in the municipality of Santa María Chimalapa. This site suffered an immense forest fire in 1998, the hottest year of that decade. Estimates indicate that over 100,000 ha of cloud forest and pine-oak forest were lost. Photo by Vojtech Vita.



8).- A road-killed *Dermophis mexicanus* found in the vicinity of Escolapa, in the municipality of Santa María Chimalapa. Photo by Elí García-Padilla.

9).- A road-killed *Crotalus culminatus* found on the road between Lázaro Cárdenas and Arroyo Chichihua, in the municipality of Santa María Chimalapa. Importantly, local transporters intentionally kill these animals due to cultural beliefs. Photo by Elí García-Padilla.



10).- Deforestation for agricultural purposes in the vicinity of Santa María Chimalapa. The presence of governmental socially-productive programs, such as “Sembrando Vida,” have been forcefully allowing the deforestation of native vegetation for the purpose of introducing crops and fruit trees with foreign genes, which might represent a potential risk for the native species, as well as the possibility of introducing plagues and diseases. Photo by Elí García-Padilla.



11).- Deforestation caused by cattle in the vicinity of La Esmeralda, in the municipality of Santa María Chimalapa. Importantly, the Mexican Government has subsidized this activity. In the past, people in the Los Chimalapas region used to survive from the production of eco-friendly coffee. Photo by Arthur Rocha.



12).- Deforestation and land conversion for mining purposes at Cerro La Cristalina, in the municipality of San Miguel Chimalapa. The local people in this municipality recently faced a struggle in defending their communal territory against a Canadian mining company (Minaorum Gold). Photo by Raúl Contreras.



13).- *Incilius macrocristatus* (Firschein and Smith, 1957). The Huge Crested Toad is a non-endemic species ranging in elevation from 1,000 to 1,600 masl in the Sierra Chimalapa and Atlantic versants of the northern and eastern highlands of Chiapas, Mexico, and associated areas in Guatemala such as the Sierra Cuchumatanes, as well as the northern slopes of the Sierra Madre de Chiapas (Frost, 2021). This individual was photographed in "Río Negro," a remnant of cloud forest in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013a) calculated its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been evaluated as Vulnerable by IUCN, but this species has not been assessed by SEMARNAT. Photo by Elí García-Padilla.



14).- *Craugastor alfredi* (Boulenger, 1898). Alfred's Rainfrog is a non-endemic species distributed from central Veracruz, Mexico, to western El Petén, Guatemala (Köhler 2011). This individual was encountered at Ejido La Esmeralda, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013a) calculated its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been evaluated as Vulnerable by IUCN, but this species has not been assessed by SEMARNAT. Photo by Arthur Rocha.



15).- *Craugastor laticeps* (Duméril, 1853). The Broad-headed Rainfrog is a non-endemic species found on the Atlantic premontane slopes and some adjacent lowland sites from the Sierra de Los Tuxtlas in southern Veracruz, Mexico, the base of the Yucatan Peninsula through northern Guatemala, and from the Maya Mountains in Belize to western and northern Honduras, at elevations from near sea level to 1,600 masl (Frost, 2021). This individual was found in the vicinity of Santa María Chimalapa in the municipality of the same name. Wilson *et al.*, (2013a) calculated its EVS as 12, placing it in the upper portion of the medium vulnerability category. Its conservation status has been evaluated as Near Threatened by IUCN, and as Special Protection by SEMARNAT. Photo by Elí García-Padilla.



16).- *Eleutherodactylus leprus* (Cope, 1879). The Leprus Chirping Frog is a non-endemic species ranging from low elevations on the Atlantic slopes from eastern San Luis Potosí, central Veracruz, and northern Oaxaca (Mexico), and on the Pacific slopes from the Isthmus of Tehuantepec eastward to northern Guatemala and southwestern Belize (Frost, 2021). This individual was found in in the vicinity of Santa María Chimalapa in the municipality of the same name. Wilson *et al.*, (2013a) calculated its EVS as 12, placing it in the upper portion of the medium vulnerability category. Its conservation status has been evaluated as Vulnerable by IUCN, but this species has not been assessed by SEMARNAT. Photo by Vicente Mata-Silva.



17).- *Charadrahyla chaneque* (Duellman, 1961). The Fairy Treefrog is a country endemic species restricted to two high-elevation cloud-forest areas east of the Isthmus of Tehuantepec in extreme southwestern Tabasco, eastern Oaxaca, and Chiapas, Mexico: the Chimalapas Range and the Selva Negra area on the Atlantic versant of the Chiapas Highlands, at elevations from 800 to 2,200 masl (Frost, 2021). Wilson *et al.*, (2013a) calculated its EVS as 13, placing it at the upper portion of the medium vulnerability category. Its conservation status has been evaluated as Endangered by IUCN, but this species has not been listed by SEMARNAT. The individual in photo was found in the vicinity of Santa María Chimalapa, in the municipality of the same name. Photo by Bartolo López- Jiménez.



18).- *Duellmanohyla chamulae* (Duellman, 1961). The Chamulan Mountain Brook Frog is a country endemic species known only from a few localities at elevations above 1,600 masl on the northern slopes of the Central Highlands of Chiapas, Mexico, from Jitotol to Soluschiapa, and into adjacent extreme southwestern Tabasco, Mexico (Frost, 2021). The first report for Veracruz in the Uxpanapa región was authored by Aguilar-López *et al.*, 2010, and the first record for Oaxaca in the Chimalapas region (Chalchijapa) and in the municipality of Guienegati was reported by Canseco-Márquez and Ramírez-Gonzalez, (2015). This individual was found at night along the edge of a creek in La Gloria, in the municipality of Santa María Chimalapa. The vegetation in the area is tropical evergreen forest. Several other individuals were observed in 2017 and 2018. Wilson *et al.*, (2013a) calculated its EVS as 13, placing it at the upper portion of the medium vulnerability category. Its conservation status has been evaluated as Endangered by IUCN, and as Special Protection by SEMARNAT. Photo by Elí García-Padilla.



19).- *Plectrohyla matudai* (Hartweg, 1941). Matuda's Spikethumb Frog is a non-endemic species that is widely distributed in cloud forests at elevations from 700–2,300 masl. This species is found along the Pacific versant from extreme southeastern Oaxaca, Mexico, through south-central Guatemala, to the Las Nubes range; it also occurs in pine-oak forest in the Grijalva Depression of western Guatemala, and in cloud forest at an elevation of 1,370 masl on Cerro Azul in northwestern Honduras (Frost, 2021). This individual was encountered on a trail that goes from Río Negro to La Gloria in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013a) ascertained its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been assessed as Vulnerable by IUCN, but this species has not been listed by SEMARNAT. Photo by Elí García-Padilla.



20).- *Quiltiocoehyla zoque* (Canseco-Márquez, Aguilar-López, Luría-Manzano, Pineda-Arredondo, and Caviedes-Solís, 2017). The Zoque Treefrog is a country endemic species known from evergreen tropical forest at three localities in southern Mexico in the Selva Zoque, two in southern Veracruz (Paso del Moral and Arroyo Zarco), one in extreme southwestern Tabasco near the Veracruz and Chiapas borders, and one in northeastern Oaxaca (Chalchijapa), at elevations from 76 to 600 masl (Frost, 2021). Johnson *et al.*, (2017) calculated its EVS as 14, placing it at the lower portion of the high vulnerability category. Its conservation status has not been evaluated by the IUCN, and this species has not been assessed by SEMARNAT. This individual was photographed at La Gloria, in the municipality of Santa María Chimalapa. Photo by Vicente Mata-Silva.



21).- *Lithobates vaillanti* (Brochi, 1877). Vaillant's Frog is a non-endemic species occurring at low and moderate elevations from north-central Veracruz and northern Oaxaca to the central Rio Magdalena region in Colombia, on the Atlantic versant, and on the Pacific versant from southeastern Oaxaca and northwestern Chiapas, Mexico, and from northwestern Nicaragua to southwestern Ecuador, at elevations from near sea level to 1,700 masl (Frost, 2021). This individual is from the vicinity of La Esmeralda, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013a) ascertained its EVS as 9 placing it at the higher portion of the low vulnerability category. Its conservation status has been assessed as Least Concern by IUCN, and this species is not listed by SEMARNAT. Photo by Arthur Rocha.



22).- *Bolitoglossa mexicana* (Duméril, Bibron and Duméril, 1854). The Mexican Mushroomtongue Salamander is a non-endemic species ranging along the Atlantic slope from southern Veracruz (Mexico) across the base of the Yucatan Peninsula, with an isolated population in the northern part of the Yucatan Peninsula, to Honduras (extending to the Pacific versant in the department of Ocotepeque) and El Salvador (Departamento de Chalatenango, municipio de La Palma, Cerro La Palma), at elevations from sea level to 2,054 masl; this species is expected to occur in northeastern Nicaragua (Frost, 2021). In Oaxaca, García-Padilla *et al.*, (2019) reported the first record from the Los Chimalapas region. According to David Wake, *B. mexicana* "is in fact a complex of cryptic species awaiting to be clarified by the use of DNA samples." The individual in this photo was found and photographed in the vicinity of Santa María Chimalapa, in the municipality of the same name. Wilson *et al.*, (2013a) calculated its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been assessed as Least Concern by IUCN, and this species is not listed by SEMARNAT. Photo by Elí García-Padilla.



23).- *Bolitoglossa veracruzis* (Taylor, 1951). The Veracruz Mushroomtongue Salamander is known from a few localities in southern Mexico, in the western part of the Isthmus of Tehuantepec, extreme southern Veracruz, and extreme northeastern Oaxaca (IUCN, 2019). This individual was found at Ejido La Esmeralda, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013a) determined its EVS as 17, placing it in the middle of the high vulnerability category. Its conservation status has been assessed as Endangered by IUCN, and this species is listed as Special Protection by SEMARNAT. Photo by Arthur Rocha.



24).- *Abronia bogerti*. (Tihen, 1954). Bogert's Arboreal Alligator Lizard is a country endemic species known only from the type locality in the Sierra Atravesada, north of Niltepec, between Cerro Atravesada and Sierra Madre, Oaxaca, Mexico, at elevations from about 830 to 5,500 masl. This individual came from Cerro Baúl, in the municipality of San Miguel Chimalapa. Wilson *et al.*, (2013a) determined its EVS as 18, placing it in the upper portion of the high vulnerability category. Its conservation status has been assessed as Data Deficient by IUCN, and this species is listed as in Danger of Extinction (P) by SEMARNAT. Photo by Adam G. Clause.



25).- *Abronia ornelasi*. (Campbell, 1984). The Cerro Baúl Alligator Lizard is country endemic species known only from the type locality. This individual (the type specimen) was found in 1983 on Cerro Baúl, in the municipality of San Miguel Chimalapa. Wilson *et al.*, (2013a) ascertained its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been assessed as Least Concern by IUCN, and this species is not listed by SEMARNAT. Photo by David Hillis.



26).- *Corytophanes hernandezii* (Wiegmann, 1831). Hernandez's Helmeted Basilisk is a non-endemic species with a distribution ranging from southeastern San Luis Potosí southward to northwestern Honduras (Köhler, 2008). This individual was found in the vicinity of Santa María Chimalapa, in the municipality of the same name. Wilson *et al.*, (2013b) assessed its EVS at 13, placing it at the upper portion of the medium vulnerability category. Its conservation status has been determined as Least Concern by IUCN, and as Special Protection (Pr) by SEMARNAT. Photo by Elí García-Padilla.



27).- *Norops purpuronectes*. (Gray, Meza-Lazaro, Poe and Nieto Montes de Oca, 2016). This anole is a country endemic species known only from Chimalapas (Chalchijapa) and the adjacent state of Veracruz (Gray *et al.*, 2016). This individual was found on a trail from Río Negro to La Gloria, in the municipality of Santa María Chimalapa. Johnson *et al.*, (2017) determined its EVS as 16, placing it in the middle portion of the high vulnerability category. Its conservation status has not been assessed by IUCN, or by SEMARNAT. Photo by Elí García-Padilla.



28).- *Coleonyx elegans*. (Gray, 1845). The Yucatan Banded Gecko is a non-endemic species ranging on the Pacific slope from southern Nayarit (Mexico) to western El Salvador, and on the Atlantic slope from Veracruz (Mexico) southward through the Yucatan Peninsula, including northern Guatemala and Belize. Its elevational range extends from near sea level to about 1,055 masl (Wilson and Johnson, 2010). This individual was photographed in the Ejido La Esmeralda, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) calculated its EVS as 9, placing it at the upper portion of the low vulnerability category. Its conservation status has not been assessed by IUCN, and this species is listed as Endangered (A) by SEMARNAT. Photo by Arthur Rocha.

29).- *Ctenosaura similis* (Gray, 1831). The Common Spiny-tailed Iguana is a non-endemic species that can be found from the Isthmus of Tehuantepec southward through Central America. It occurs on both the Caribbean and Pacific versants and on several offshore islands, including: Cozumel, Mujeres, and del Carmen, Mexico; Utila and Guanaja, Honduras; Maiz Grande and Maiz Pequeño, Nicaragua (S. Pasachnik pers. obs. 2008); El Rey, Panama; and Providencia and San Andres, Columbia this lizard has also been introduced to Florida, USA, and has now established a reproducing population. A recent report also indicates that this species has been introduced into Venezuela, near Lecharias, along the road from Barcelona to La Cruz. This species has been found from sea level to 1,300 masl above sea level (Pasachnik, 2015). This individual was photographed in the vicinity of Santa María Chimalapa. Wilson *et al.*, (2013b) ascertained its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status is assessed as Least Concern by the IUCN and it is not listed by SEMARNAT. Photo by Elí García-Padilla.



30).- *Sceloporus internasalis* (Smith and Bumzahem, 1955). The Mail-snouted Spiny Lizard is a non-endemic species ranging from southern Veracruz to Guatemala (Uetz, 2021). This individual was photographed in the vicinity of Santa María Chimalapa, in the municipality of the same name. Wilson *et al.*, (2013a) ascertained its EVS as 11, placing it in the lower portion of the medium vulnerability category. Its conservation status has been assessed as Least Concern by IUCN, and this species is not listed by SEMARNAT. Photo by Elí García-Padilla.





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31).- *Drymarchon melanurus*. (Duméril, Bibron and Duméril, 1854). The Central American Indigo Snake is a non-endemic species ranging from southern Texas, on the Atlantic versant, and southern Sonora, on the Pacific versant, southward to Venezuela and Ecuador (Heimes, 2016). This individual was found in the vicinity of Santa María Chimalapa, in the municipality of the same name. Wilson *et al.*, (2013a) determined its EVS as 6, placing it in the middle portion of the low vulnerability category. Its conservation status has been assessed as Least Concern by the IUCN, and this species is not listed by SEMARNAT. Photo by Elí García-Padilla.



32).- *Leptophis ahaetulla*. (Linnaeus, 1758). The Green Parrot Snake is a non-endemic species ranging through lowlands and premontane areas (at elevations up to 1,200 masl) on the Atlantic versant, from central Veracruz and northeastern Oaxaca southward through Central and South America to Argentina; it also occurs on the Pacific versant from Costa Rica to Ecuador (Heimes, 2016). This individual came from “Zona Pak” (Arroyo Sardina) in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013a) calculated its EVS as 10, placing it at the lower portion of the medium vulnerability category. Its conservation status has not been determined by IUCN, but this species is listed as Endangered (A) by SEMARNAT. Photo by Elí García-Padilla.



33).- *Oxybelis microphthalmus*. (Barbour and Amaral, 1926). The Thornscurb Vine Snake is a non-endemic species ranging from southern Arizona southward to Oaxaca, Mexico (Jadin *et al.*, 2020). This individual was encountered in the vicinity of Santa María Chimalapa, in the municipality of the same name. We calculated its EVS as 11 (this paper), which places it in the lower portion of the medium vulnerability category. Its conservation status has not been determined by IUCN or SEMARNAT. Photo by Vicente Mata-Silva.



34).- *Senticolis triaspis*. (Cope, 1866). The Green Rat Snake is non-endemic species with an extensive distribution from southeastern Arizona and central Nuevo León, southward through much of Mexico and Central America to Costa Rica (Heimes, 2016). In Mexico, this species is widely distributed along the Pacific slopes from Sonora southward to Chiapas (Heimes, 2016). This individual was found in the cabins of the community ecotourism project "Paraíso Jaguar" at Ejido La Esmeralda, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) determined its EVS as 6, placing it in the middle of the low vulnerability category. Its conservation status has not been determined by IUCN or SEMARNAT. Photo by Elí García-Padilla.



35).- *Spilotes pullatus* (Linnaeus, 1758). The Tropical Treesnake is a non-endemic species found from Tamaulipas southward through Central America and South America to Argentina, on the Atlantic versant, and from the Isthmus of Tehuantepec to Ecuador on the Pacific versant (Lemos-Espinal and Dixon, 2013). This individual was found at a site called Sona Pak in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) determined its EVS as 6, placing it in the middle of the low vulnerability category. Its conservation status has not been determined by IUCN or SEMARNAT. Photo by Elí García Padilla.



36).- *Sceloporus variabilis* (Wiegmann, 1834) The Rosebelly Lizard is a non-endemic species that occurs from southern Texas, in the United States, through eastern and southern Mexico to northwestern and central Costa Rica on the Pacific slope. This species occurs at elevations from near sea level to 2,500 m (Wilson and Johnson, 2010). Its conservation status was evaluated as Low (5) by the Environmental Vulnerability Score (EVS) by Wilson *et al.*, 2013b. The IUCN considered it as Least concern and SEMARNAT (2019) provided no status since it is not yet enlisted. The individual in photo was found in the vicinity of Santa María Chimalapa in the municipality of the same name. Photo by Elí García-Padilla.



37).- *Adelphicos quadrivirgatum* (Jan, 1862). The Mesoamerican Earth Snake is a non-endemic species distributed from Tamaulipas to Honduras, on the Atlantic versant, and from Oaxaca to Guatemala on the Pacific versant (Lemos-Espinal and Dixon, 2013). This individual was found in Cerro Azul, a community conservation area in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) ascertained its EVS as 10, placing it at the lower portion of the medium vulnerability category. Its conservation status has been determined as Least Concern by IUCN, and as Special Protection (Pr) by SEMARNAT. Photo by Elí García-Padilla.



38).- *Imantodes cenchoa* (Linnaeus, 1758). The Blunt-headed Treesnake is a non-endemic species occurring at low and intermediate elevations (up to 1,600 masl) on the Atlantic versant, from southern Tamaulipas southward through Central and South America to Argentina. This snake also occurs along the Pacific lowlands and premontane slopes from Chiapas to Guatemala. In the Yucatán Peninsula, it is known from southern Campeche and Quintana Roo, but this species apparently is absent from the arid northwestern region of the peninsula (Heimes, 2016). This individual was found at La Esmeralda, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) determined its EVS as 6 placing it in the low vulnerability category. Its conservation status is not listed by IUCN or the SEMARNAT. Photo by Arthur Rocha.



39).- *Imantodes gemmistratus*. (Cope, 1861). The Central American Blunt-headed Treesnake ranges from low to intermediate elevations (up to 2,000 masl) on the Atlantic versant from Tamaulipas, and on the Pacific versant from Sonora, southward through Central America to Colombia. (Heimes, 2016). This individual was encountered at Arroyo Chichihua, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) determined its EVS as 6, placing it in the middle portion of the low vulnerability category. Its conservation status has not been determined by IUCN or SEMARNAT. Photo by Elí García-Padilla.



40).- *Ninia diademata* (Baird and Girard, 1853). The Ringneck Coffee Snake is a non-endemic species occurring on the Atlantic versant from San Luis Potosí and central Veracruz, southward through the base of the Yucatán Peninsula to central Honduras, and on the Pacific versant from southeastern Oaxaca to Guatemala (Heimes, 2016). This individual was photographed in the vicinity of Santa María Chimalapa, in the municipality of the same name. Wilson *et al.*, (2013a) ascertained its EVS as 9, placing it at the upper portion of the low vulnerability category. Its conservation status has been assessed as Least Concern by IUCN, but this species is not listed by SEMARNAT. Photo by Elí García-Padilla.



41).- *Ninia sebae* (Duméril, Bibron and Duméril, 1854). The Red Coffee Snake ranges through the lowlands and pre-montane slopes (up to 2,200 masl) from central Veracruz on the Atlantic versant, and from southern Oaxaca on the Pacific versant southward to Costa Rica (Heimes, 2016). This individual was found in the vicinity of La Gloria, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013a) ascertained its EVS as 5, placing it in the lower portion of the low vulnerability category. Its conservation status has not been assessed by IUCN or SEMARNAT. Photo by Elí García-Padilla.



42).- *Rhadinaea decorata*. (Günther, 1858). The Central American Graceful Brownsnake is a non-endemic species ranging from the lowland and premontane areas (up to 1,200 masl), from eastern Mexico southward to northern Ecuador. In Mexico, this species is known from extreme southeastern San Luis Potosí, northeastern Hidalgo, northern and southeastern Puebla, eastern Oaxaca, Veracruz, and northern and eastern Chiapas (Heimes, 2016). This individual was found along the Río Negro, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) ascertained its EVS as 9, placing it at the upper portion of the low vulnerability category. Its conservation status has not been determined by IUCN or SEMARNAT. Photo by Elí García-Padilla.



43).- *Sibon dimidiatus*. (Günther, 1872). The Orange-backed Snail-sucker occurs in lowlands and premontane slopes (up to 1,600 masl) on the Atlantic versant from northern Veracruz southward to Costa Rica, but excluding the Yucatán Peninsula. This snake also occurs on the Pacific versant, from southeastern Chiapas to Honduras (Heimes, 2016). This individual was found at La Gloria, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) evaluated its EVS as 10, placing it at the lower portion of the medium vulnerability category. Its conservation status has been judged as Least Concern by IUCN, and this species is not listed by SEMARNAT. Photo by Vicente Mata-Silva.



44).- *Micrurus diastema*. (Duméril, Bibron and Duméril, 1854). The Variable Coralsnake is a country endemic species ranging at low and moderate elevations (up to 1,500 masl) on the Atlantic versant, from central Veracruz to northern Oaxaca (Reyes-Velasco *et al.*, 2020). This individual was found in the vicinity of Santa María Chimalapa, in the municipality of the same name. Wilson *et al.*, (2013b) ascertained its EVS as 8, placing it in the upper portion of the low vulnerability category. Its conservation status has been assessed as Least Concern by IUCN, and is listed as Special Protection by SEMARNAT. Photo by Vicente Mata-Silva.



45).- *Crotalus culminatus* (Klauber, 1952) the Northwestern Neotropical Rattlesnake ranges along the Pacific coastal plains and foothills from southwestern Michoacán southward to the Isthmus of Tehuantepec, and into the Río Balsas drainage system, eastward to southwestern Puebla (Heimes, 2016). The species has undergone recent taxonomic changes, as it passed from being partially described as *Crotalus ehecatli* (Carbajal-Márquez *et al.*, 2020) only to be synonymized by Reyes-Velasco *et al.*, (2022). This individual was photographed on a road in the vicinity of the communal territory of the Los Chimalapas region. According to the local Zoque people, originally this species was not part of the herpetofauna within the Los Chimalapas region, but presumably due to climate change and deforestation, recently it has been recorded inside the “bienes comunales” of San Miguel and Santa María Chimalapa. During our fieldwork, we documented two individuals on the road (a young one alive and an adult dead) in the vicinity of La Cofradía and Arroyo Chichihua. Wilson *et al.*, (2013) ascertained its EVS as 15, placing in the lower portion of the high vulnerability category. Its conservation status has not been not evaluated by IUCN or SEMARNAT. Photo by Elí García-Padilla.



46).- *Bothriechis rowleyi*. (Bogert, 1968). Rowley's Palm-pitviper is a country endemic species that occurs at moderate elevations (1,060 to 1,830 masl) in the Sierra Atravesada (the northern extension of the Sierra Madre de Chiapas) in extreme southeastern Oaxaca and in the northern highlands of Chiapas (Mesa de Ocozocoautla and Selva Negra) (Heimes, 2016). This individual is from Cerro Baúl, in the municipality of San Miguel Chimalapa. Wilson *et al.*, (2013b) calculated its EVS as 16, placing it in the middle portion of the high vulnerability category. Its conservation status has been assessed as Vulnerable by IUCN, and as Special Protection (Pr) by SEMARNAT. Photo by Brandon Thomas La Forest.



47).- *Bothrops asper* (Garman, 1883). The Terциopelo is a non-endemic species ranging from southwestern Tamaulipas to coastal Venezuela on the Atlantic versant, and from Costa Rica to southern Ecuador on the Pacific versant, with a disjunct population in southern Chiapas and adjacent Guatemala (Lemos-Espinal and Dixon, 2013). This individual was found at Sierra de Los Tuxtlas, in the municipality of San Andrés Tuxtla. Wilson *et al.*, (2013b) determined its EVS at 12, placing it in the upper portion of the medium vulnerability category. Its conservation status has not been assessed by IUCN or SEMARNAT. Photo by Elí García-Padilla.



48).- *Metlapilcoatlus olmec* (Pérez-Higareda, Smith, and Julia Zertuche, 1985). The Olmecan Jumping Pitviper is a non-endemic species with a highly disjunct distribution, with populations occurring in the Sierra de Los Tuxtlas of southern Veracruz, the Sierra Atravesada (Cerro Baúl region) of southeastern Oaxaca, the Mesa de Ocozocoautla of northwestern Chiapas, and in some isolated localities in central Guatemala (Purullhá in Baja Verapaz and Sierra de las Minas), at elevations from about 530 to at least 1,200 masl (Heimes, 2016). This individual was encountered on the road between San Miguel and Santa María Chimalapa. Wilson *et al.*, (2013b) determined its EVS as 15, placing it at the lower portion of the high vulnerability category. Its conservation status has been evaluated as Least Concern by IUCN, and this species is not listed by SEMARNAT. Photo by Luis Alberto Bernal-Ramírez.



49).- *Chelydra rossignonii*. (Bocourt, 1868). The Mesoamerican Snapping Turtle is a non-endemic species distributed from Veracruz, Mexico, through southern Belize and central Guatemala to northwestern Honduras; it is not known from Yucatán (Iverson, 1992). This individual is from Escolapa, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) ascertained its EVS as 17, placing it in the middle portion of the high vulnerability category. Its conservation status has been assessed as Vulnerable by IUCN, and this species is not listed by SEMARNAT. Photo by Elí García-Padilla.



50).- *Kinosternon leucostomum* (Duméril, Bibron, and Duméril, 1854). The White-lipped Mud Turtle is a non-endemic species distributed at low and moderate elevations (near sea level to 1,120 masl) from central Veracruz, Mexico, to north-central Colombia on the Atlantic versant, and from west-central Costa Rica to southwestern Ecuador on the Pacific versant; it also has been found on several islands: Islas del Maíz, Nicaragua, and Isla Guanaja and the Cayos Cochinos, Honduras. This individual is from Escolapa, in the municipality of Santa María Chimalapa. Wilson *et al.*, (2013b) calculated its EVS as 10 placing it in the medium vulnerability category. Its conservation status has not been not determined by IUCN, but this species is listed as Special Protection (Pr) by SEMARNAT. Photo by Elí García-Padilla.



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