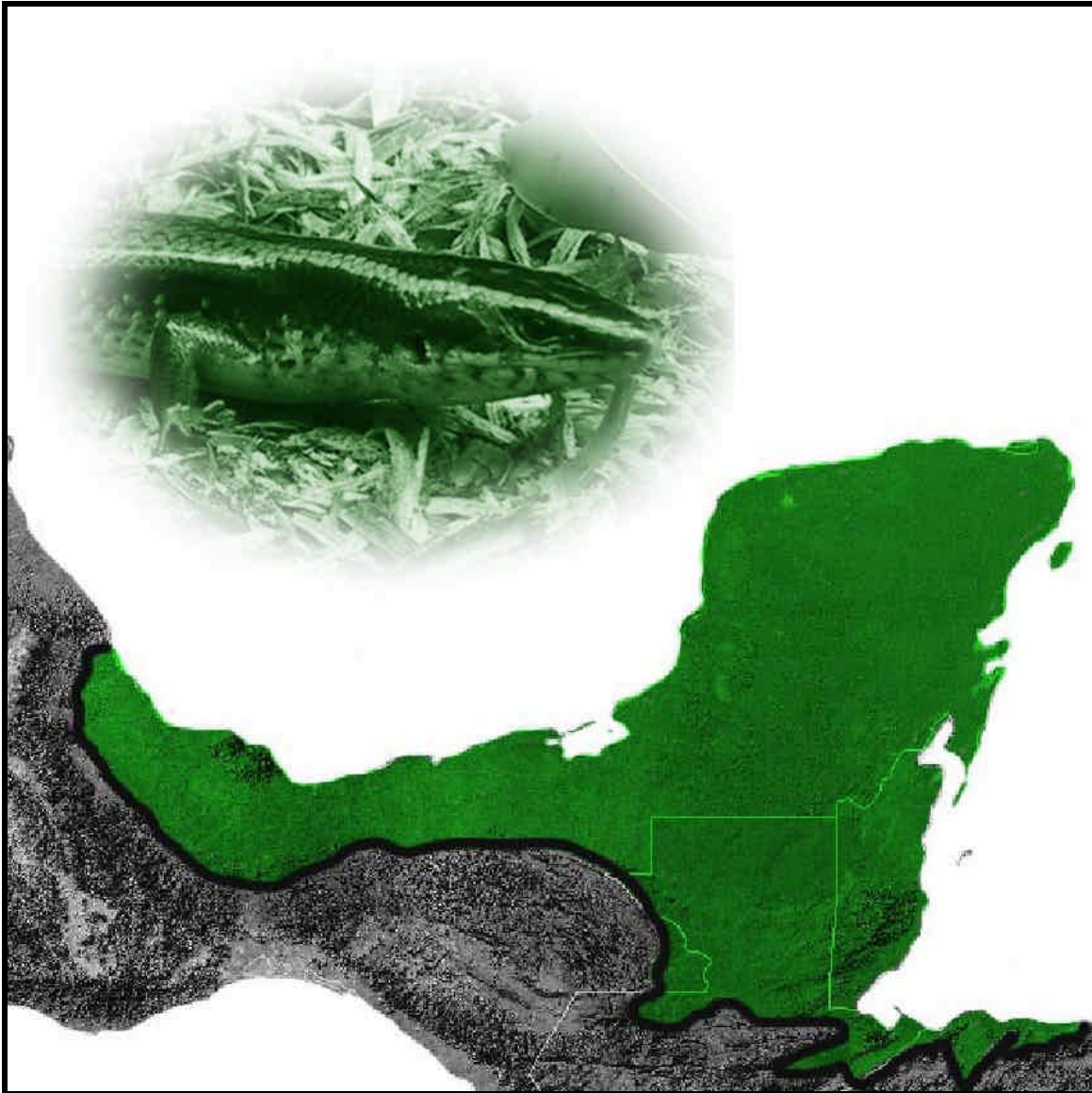


Endemism in the Maya Forest

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F I P A



Introduction

A species is endemic if it is found in a particular area and nowhere else. Endemic species may be confined to a certain area for historical, ecological, or physiological reasons. They may also be confined to a fraction of their historical range due to human disturbances.

Because endemics have restricted natural ranges, they are often more susceptible to extinction through habitat loss than other wide-ranging species. For this reason, they have commonly been given high conservation status. For example, if a species is endemic to the Maya Biosphere Reserve, it can only be conserved if the Maya Biosphere Reserve is protected. If its only refuge is destroyed, extinction is imminent.

In order to define the level of endemism in an area, or to determine which species are endemics, the area of interest must first be defined. At the largest scale of known life, the earth, all species, or 100 percent, are endemics. At successively smaller scales, the level of endemism decreases. However, there is great heterogeneity of levels of endemism in different areas. In the tropics, for example, endemism is generally far higher than in temperate zones.

This report aims to describe endemism in the Maya Biosphere Reserve and in the ecosystems it represents.

Distributions of Species with Restricted Ranges

In order to define biogeographic areas representative of habitat types in the Maya Biosphere Reserve, I analyzed the region's biogeography literature and revised range maps of vertebrates. Following are the range maps of several restricted species from each group of terrestrial vertebrates (Figures 1-3). Please note that these species are not necessarily endemics, but simply a tool for defining areas of endemism.

Mammals

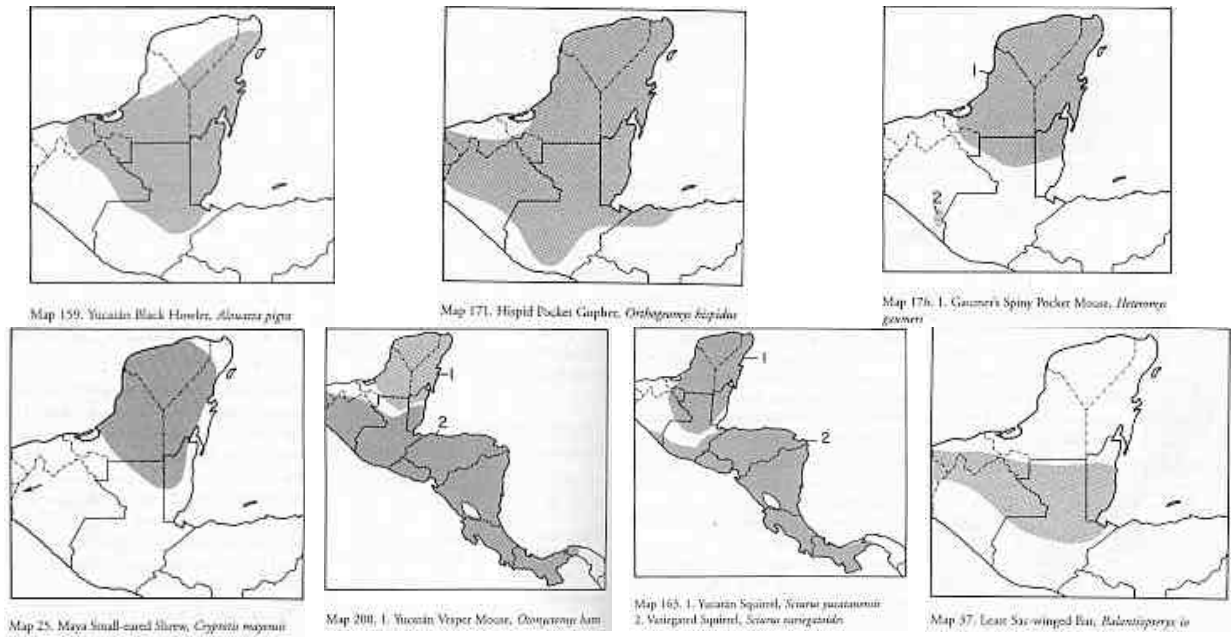


Figure 1. Mammals with restricted ranges in the Maya Forest region (from Reid 1997).

Birds

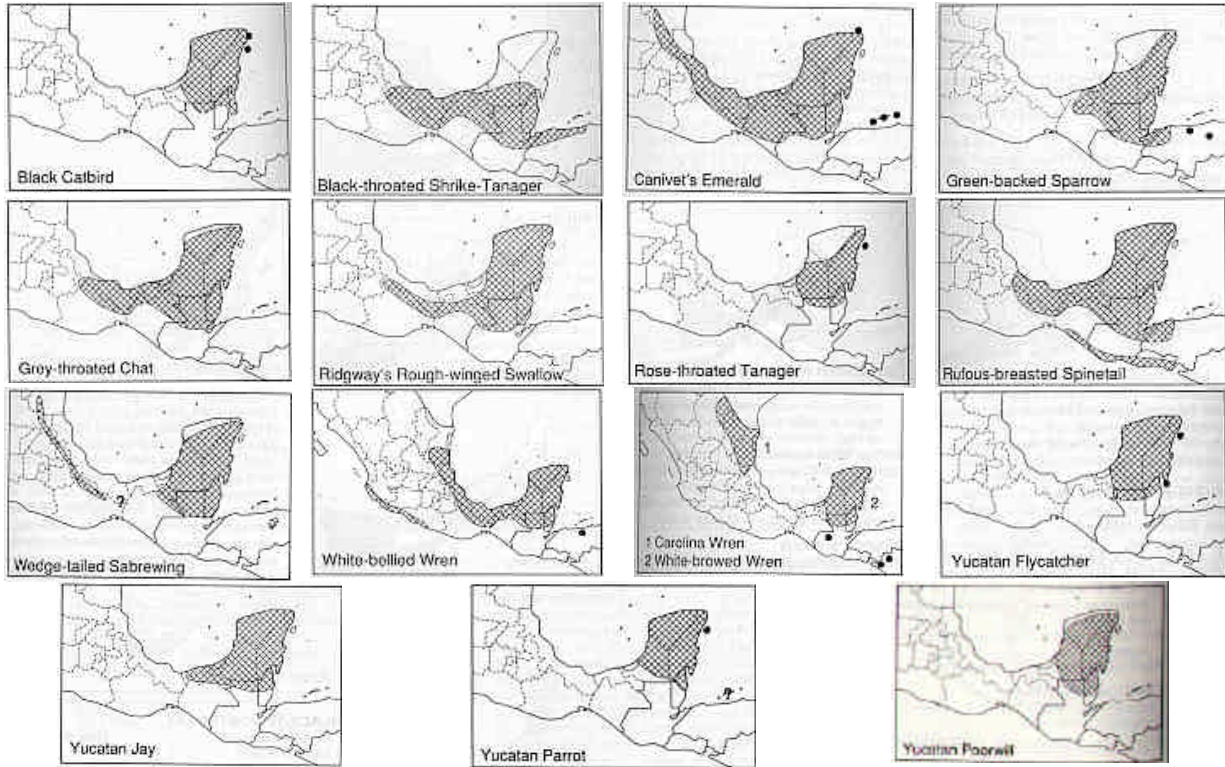


Figure 2. Birds with restricted ranges in the Maya Forest region (from Howell and Webb 1995).

Herpetofauna

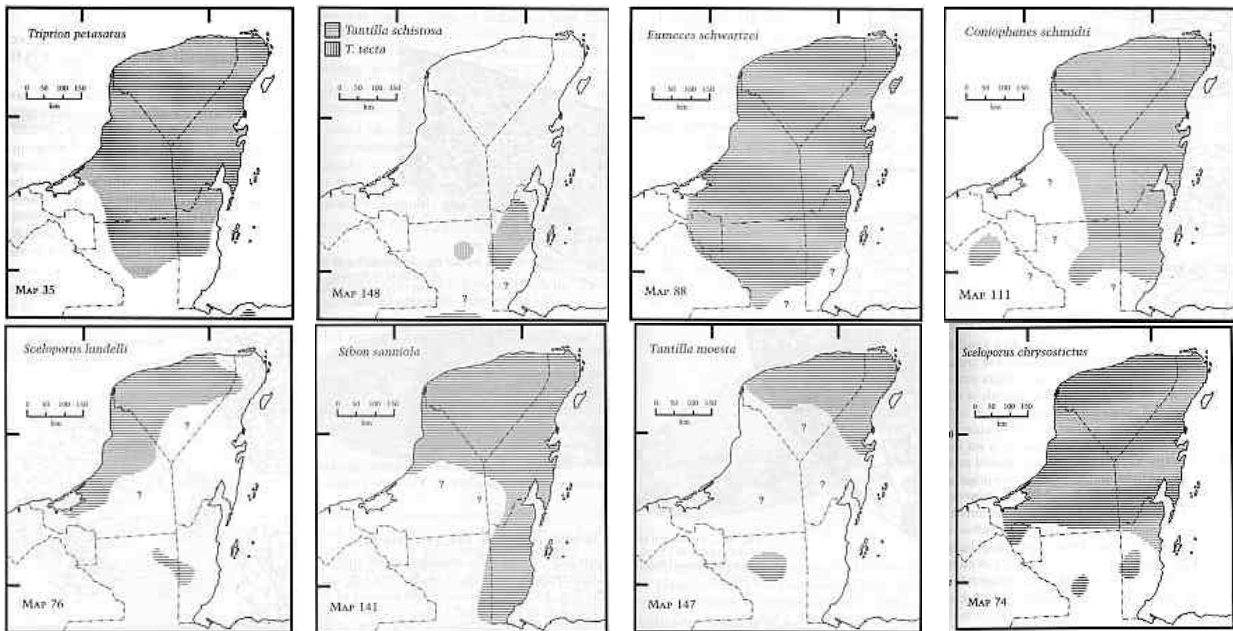


Figure 3. Herpetofauna (amphibians and reptiles) with restricted ranges in the Maya Forest region (from Lee 1996).

Three Levels of Regional Endemism

From range maps of species with relatively restricted ranges, a few common distribution patterns are evident. Below I define three areas for which such patterns exist.

Yucatán Peninsula

A large number of species are restricted to the Yucatán Peninsula. The biogeographic limits of the Yucatán Peninsula are described by Barrera (1963) as a nearly East-West line at 17° N latitude, beginning in central Belize and looping northwestward to the Gulf of Mexico at 19° N latitude and 92° 30' W longitude (Figure 4). Endemics to this region are mainly xerophilic, or arid-adapted, species. The Maya Biosphere Reserve plays an important role for these species because it is at the southern edge of many of these species' distributions.

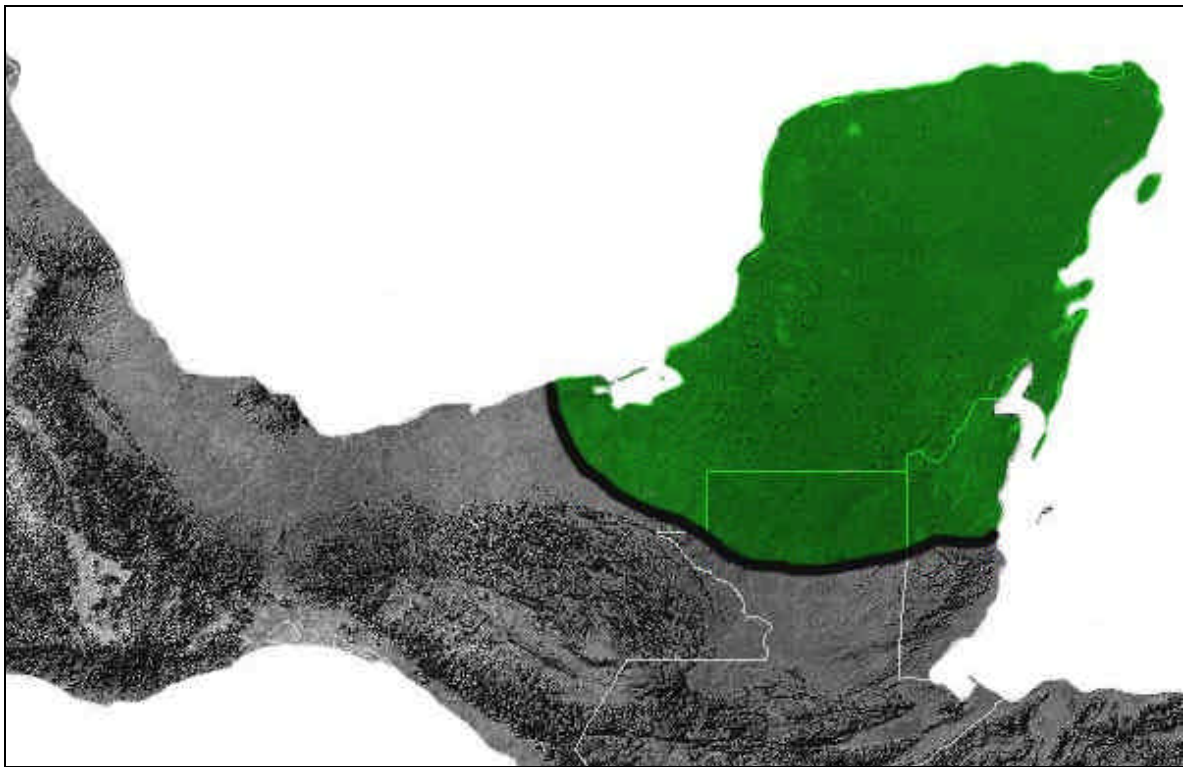


Figure 4. Yucatán Peninsula as defined by vertebrate zoogeography (Barrera 1963).

Tehuantepec Moist Forests

Many species reveal a different distributional pattern, encompassing the lowland moist forests from Northern Guatemala, Belize, the Southern Yucatán, and westward to Veracruz, Mexico. This area has been termed the Tehuantepec Moist Forest by an ecoregion analysis of World Wildlife Fund (Dinerstein *et al.* 1995). In contrast to the endemic species of the Yucatán Peninsula, endemics to the Tehuantepec Forest require areas of substantial moisture and do not survive in the more arid zones of the Yucatán. They are normally restricted on the western and southern edge of their distributions by mountains and the resultant climatic and ecological changes caused by higher elevations.

The Maya Biosphere Reserve is extremely important for these species because the majority of its forests are moist, lowland habitats. Furthermore, the vast majority of this ecoregion's natural forests have been converted for agriculture. The Maya Biosphere Reserve is the last large remnant for these endemic species.

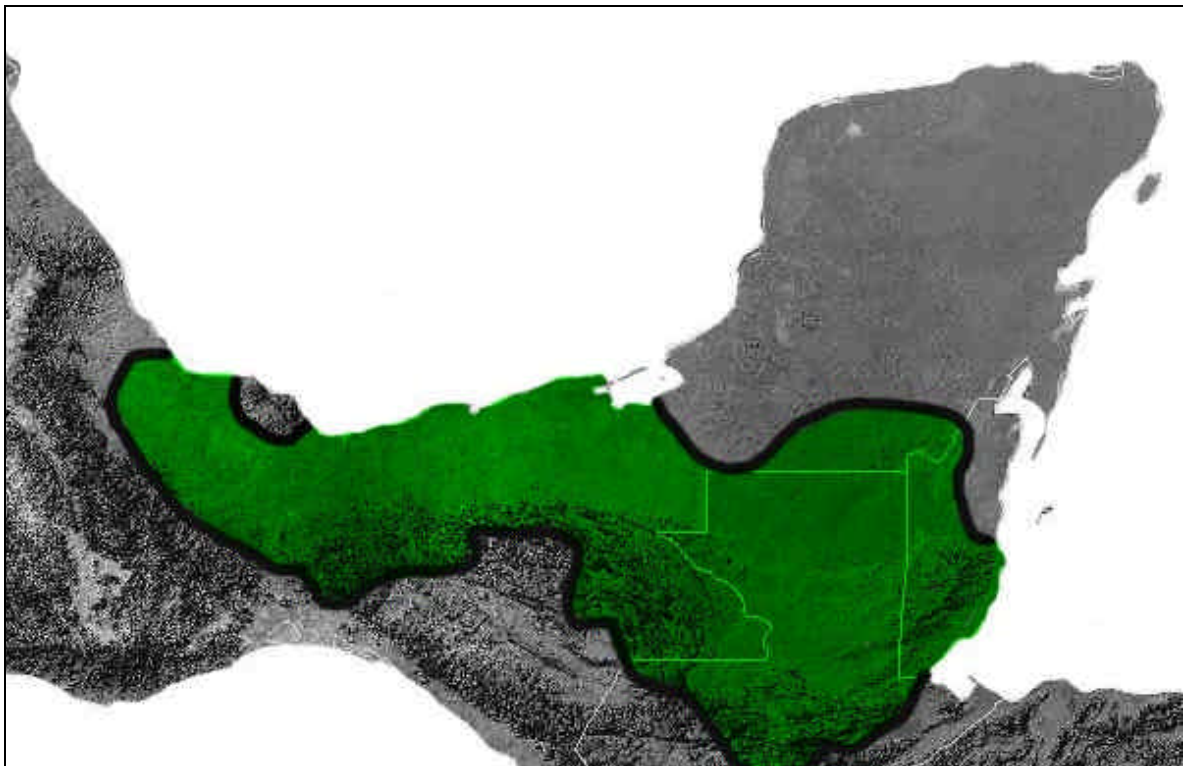


Figure 5. Tehuantepec moist forests as defined by WWF (Dinerstein *et al.* 1995).

Lowland Maya Forest

Several endemic species to the region have slightly more general habitat requirements and therefore extend over a larger area. This group of endemics, ranging from Northern Honduras, Northern Guatemala, all of Belize, the Yucatán Peninsula, and westward through Mexico to Veracruz, consists of species that require lowland forests, at elevations less than 1000 meters. For this reason, I have termed this distributional area the “Lowland Maya Forest”. This area also includes the ranges of both Yucatán and Tehuantepec endemics.

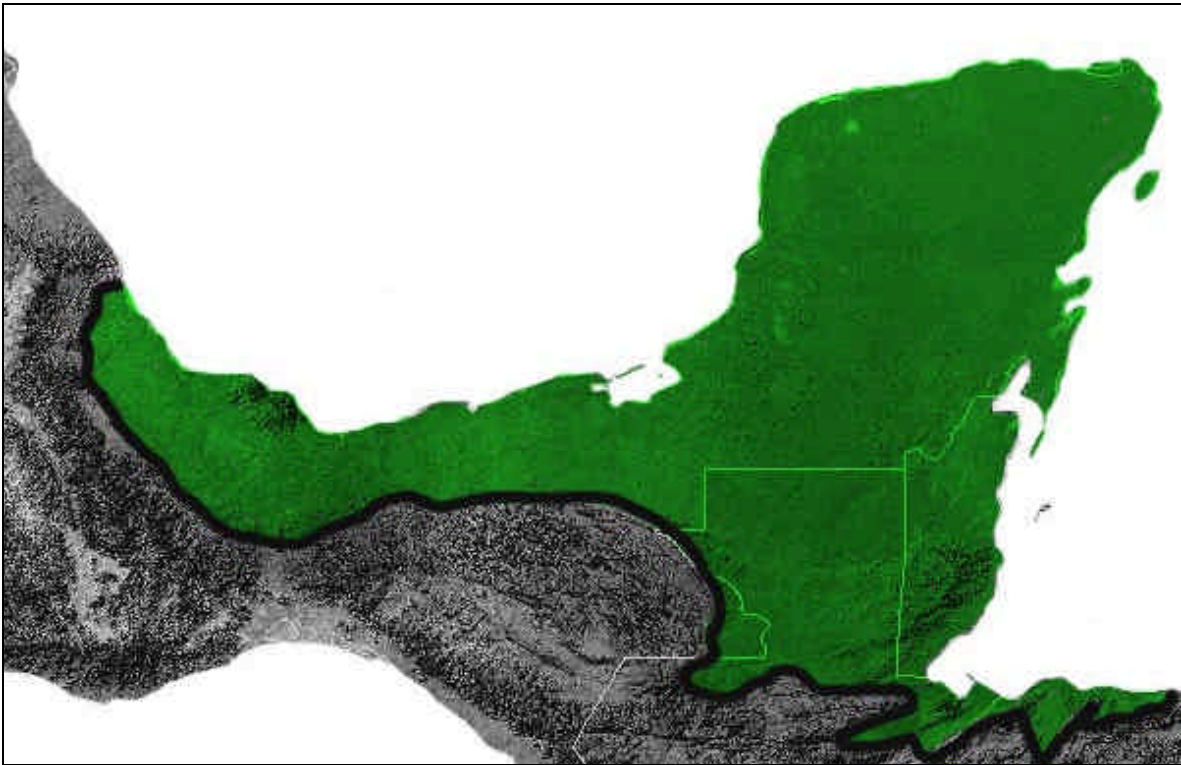


Figure 6. Lowland Maya Forest. This region includes all of the Yucatan Peninsula, the lowlands of the Tehuantepec Moist Forest, and lowlands of Northern Guatemala and Honduras.

Maya Biosphere Reserve

One snake species, the white-striped centipede eater (*Tantilla tecta*), is endemic to the Maya Biosphere Reserve. The entire species is represented by a single individual collected near Laguna Yaxha. Though only one terrestrial vertebrate is known to be endemic to the Maya Biosphere Reserve, there are likely more. Much of the reserve is unknown biologically, and several large areas have never been visited by collectors. Furthermore, numerous fish, plant, and insect species are undoubtedly endemic to the reserve.

Endemic Species in the Maya Forest

In Appendices I-VIII, I list all terrestrial vertebrate species endemic to each of the abovementioned areas of endemism. As a general rule, I considered a species endemic to an area if 90 percent of its mapped range fell inside of the delimited area. It is important to remember that range maps are based on historical records and that through habitat conversion, many species ranges have been constricted. Range maps used are those of Howell and Webb (1995), Reid (1997), and Lee (1996).

In Appendices I-IV, I also list whether or not the species is present in the Maya Biosphere Reserve. This does not indicate endemism to the MBR. For example, if a species has a check in the columns “Lowland Maya Forest Endemic”, “Yucatan Endemic”, and “Present in MBR”, the species range includes the Maya Biosphere Reserve, but also other areas in the Yucatán peninsula.

The last three columns indicate the conservation status of each species as listed by CITES, IUCN, and CONAP. For CITES, the appendix under which a species is listed is given. For IUCN, the category “EN” is endangered, “VU” is vulnerable, and “LR” is low risk. Interestingly, these lists often do not coincide.

Maps of Observations of Endemics in the MBR

Using a database of vertebrate observations recently constructed by Wildlife Conservation Society, CEMEC was able to map all observations of endemic species in the Maya Biosphere Reserve (Appendices IX-XII). These maps show high concentrations of observations around villages, roads, and areas of intensive surveys.

In order to better understand the distribution of endemic species within the reserve, WCS plans to continue collecting observations linked with exact geographic coordinates through rapid surveys and alongside other studies. With better data, WCS and CEMEC will be able to extrapolate species ranges by creating models to correlate species distributions with other mapped variables. We suggest that all observational data taken within the reserve hereafter be accompanied by latitudinal and longitudinal coordinates to permit such analyses.

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Appendix I. Mammals endemic to the Maya Forest region.

Common Name	Latin Name	Lowland Maya Forest Endemic	Yucatán Endemic	Tehuantepec Moist Forest Endemic	Present in Maya Biosphere Reserve	Cites Status	IUCN Status	CONAP Status
Maya small-eared shrew	<i>Cryptotis mayensis</i>	X	X		X			2
Yucatan vesper mouse	<i>Otonyctomys hatti</i>	X	X		X			2
Gaumer's spiny pocket mouse	<i>Heteromys gaumeri</i>	X	X		X			2
Yucatan Brown Brocket Deer	<i>Mazama pandora</i>	X	X		X			2
Least sac-winged bat	<i>Balantiopteryx io</i>	X		X	X		LR	2
Yucatan black howler monkey	<i>Alouatta pigra</i>	X			X	I		2
Yucatan squirrel	<i>Sciurus yucatanensis</i>	X			X			
Yucatan deer mouse	<i>Peromyscus yucatanicus</i>	X	X					
Cozumel harvest mouse	<i>Reithrodontomys spectabilis</i>	X	X				EN	
Cozumel raccoon	<i>Procyon pygmaeus</i>	X	X				EN	
Mexican black agouti	<i>Dasyprocta mexicana</i>	X		X			LR	
	Total	11	7	2	6			

Appendix II. Birds endemic to the Maya Forest region.

Common Name	Latin Name	Lowland Maya Forest Endemic	Yucatán Endemic	Tehuantepec Moist Forest Endemic	Present in MBR	Cites Status	IUCN Status	CONAP Status
Yucatan (yellow-lored) parrot	<i>Amazona xantholora</i>	X	X		X	II		
Yucatan jay	<i>Cyanocorax yucatanicus</i>	X	X		X			
Black catbird	<i>Dumetella glabrirostris</i>	X	X		X			
Ocellated turkey	<i>Meleagris ocellata</i>	X	X		X	III	LR	3
Yucatan flycatcher	<i>Myiarchus yucatanensis</i>	X	X		X			3
Yucatan Poorwill	<i>Nyctiphrynus yucatanicus</i>	X	X		X			
Rose-Throated tanager	<i>Piranga roseogularis</i>	X	X		X			
Carolina wren	<i>Thryothorus ludivicianus</i>	X	X		X			
Black-throated shrike-tanager	<i>Lanio aurantius</i>	X		X	X			
Green-backed sparrow	<i>Arremonops chloronotus</i>	X			X			
Wedge-Tailed sabrewing	<i>Campylopterus curvipennis</i>	X			X	II		2
Grey-throated chat	<i>Granatellus sallaei</i>	X			X			
Ridway's rough-winged swallow	<i>Stelgidopteryx ridgwayi</i>	X			X			
Rufous-breasted spinetail	<i>Synallaxis erythrothorax</i>	X			X			
Yucatan wren	<i>Campylorhynchus yucatanicus</i>	X	X					
Yucatan (tawny-collared) Nightjar	<i>Caprimulgus badius</i>	X	X					
Yucatan (Red-vented) woodpecker	<i>Centurus pygmaeus</i>	X	X					
Orange oriole	<i>Icterus auratus</i>	X	X					
Caribbean dove	<i>Leptotila jamaicensis</i>	X	X					
Yucatan vireo	<i>Vireo magister</i>	X						
	Total	20	13	1	14			

Appendix III. Reptiles endemic to the Maya Forest region.

* Endemic to islands of Belize

Common Name	Latin Name	Lowland Maya Forest Endemic	Yucatán Endemic	Tehuantepec Moist Forest Endemic	Present in Maya Biosphere Reserve	CITES Status	IUCN Status	CONAP Status
Lundell's Spiny Lizard	<i>Sceloporus lundelli</i>	X	X		X			3
Rosebellied Spiny Lizard	<i>Sceloporus teapensis</i>	X	X		X			
Yucatán Blind Snake	<i>Typhlops microstomus</i>	X	X		X			3
Schmidt's Striped Snake	<i>Coniophanes schmidtii</i>	X	X		X			
Mayan Black-headed Centipede-eater	<i>Tantilla cuniculator</i>	X	X		X			
Black-bellied Centipede-eater	<i>Tantilla moesta</i>	X	X		X			2
Yucatán Dwarf Centipede-eater	<i>Tantillita canula</i>	X	X		X			2
White-striped centipede-eater	<i>Tantilla tecta</i>	X		X	X			
Central American River Turtle	<i>Dermatemys mawii</i>	X		X	X	II	EN	3
Narrow-bridged Musk Turtle	<i>Claudius angustatus</i>	X		X	X		LR	3
Northern Giant Musk Turtle	<i>Staurotypus triporcatus</i>	X		X	X		LR	3
Tabasco Mud Turtle	<i>Kinosternon acutum</i>	X		X	X		LR	3
Hernandez's Helmeted Basilisk	<i>Corytophanes hernandezii</i>	X		X	X			3
Rozella's canopy lizard	<i>Celestus rozellae</i>	X		X	X			
Linton's Dwarf Centipede-eater	<i>Tantillita lintoni</i>	X		X	X			2
Furrowed Wood Turtle	<i>Rhinoclemmys areolata</i>	X			X			3

Common Name	Latin Name	Lowland Maya Forest Endemic	Yucatán Endemic	Tehuantepec Moist Forest Endemic	Present in Maya Biosphere Reserve	CITES Status	IUCN Status	CONAP Status
Rodriguez's anole	<i>Norops rodriguezi</i>	X			X			3
Lesser forest anole	<i>Norops uniformis</i>	X			X			3
Schwartz's Skink	<i>Eumeces schwarzei</i>	X			X			3
Maslin's Whiptail	<i>Cnemidophorus cozumela</i>	X			X			
Striped Spotted Snake	<i>Coniophanes quinquevittatus</i>	X			X			
Blotched Hooknosed Snake	<i>Ficimia publia</i>	X			X			3
Yucatán Cat-eyed Snake	<i>Leptodeira frenata</i>	X			X			3
Weatherman gecko	<i>Aristelliger georgeensis</i>	X	*					
Island leaf-toed gecko	<i>Phyllodactylus insularis</i>	X	*					
Yucatán spiny-tailed iguana	<i>Ctenosaura defensor</i>	X	X					
Yucatán spiny lizard	<i>Sceloporus chrysostictus</i>	X	X					3
Cozumel spiny lizard	<i>Sceloporus cozumelae</i>	X	X					
Yucatán whiptail lizard	<i>Cnemidophorus angusticeps</i>	X	X					3
Rodeck's whiptail lizard	<i>Cnemidophorus rodecki</i>	X	X					
Smooth peninsular snake	<i>Coniophanes meridanus</i>	X	X					
Short-faced Snail-eater	<i>Dipsas brevifacies</i>	X	X					
Yucatán blunt-headed tree snake	<i>Imantodes tenuissimus</i>	X	X					

Common Name	Latin Name	Lowland Maya Forest Endemic	Yucatán Endemic	Tehuantepec Moist Forest Endemic	Present in Maya Biosphere Reserve	CITES Status	IUCN Status	CONAP Status
Pygmy snail sucker	<i>Sibon sanniola</i>	X	X					3
Mayan Golden-backed Snake	<i>Symphimus mayae</i>	X	X					
Yucatán hognose pitviper	<i>Porthidium yucatanicum</i>	X	X					
Chaitzam's Ameiva	<i>Ameiva chaitzami</i>	X		X				
Mayan coral snake	<i>Micrurus hippocrepis</i>	X		X				3
Creaser's mud turtle	<i>Kinosternon creaseri</i>	X					LR	
Total		39	18	10	23			

Appendix IV. Amphibians endemic to the Maya Forest region.

Common Name	Latin Name	Lowland Maya Forest Endemic	Yucatán Endemic	Tehuantepec Moist Forest Endemic	Present in Maya Biosphere Reserve	CITES Status	IUCN Status	CONAP Status
Yucatán casqueheaded treefrog	<i>Tripion petasatus</i>	X	X		X			3
Alfred's climbing frog	<i>Eleutherodactylus alfredi</i>	X		X	X			2
Leprus chirping frog	<i>Eleutherodactylus leprus</i>	X		X	X			
Elegant Narrowmouthed Toad	<i>Gastrophryne elegans</i>	X		X	X			
Yucatán salamander	<i>Bolitoglossa yucatanana</i>	X	X					
Yucatán rainfrog	<i>Eleutherodactylus yucatanensis</i>	X	X					
White-crowned Worm Salamander	<i>Oedipina elongata</i>	X		X				3
Chac's Leaf-litter Frog	<i>Eleutherodactylus chac</i>	X		X				3
Broad-headed Leaf-litter Frog	<i>Eleutherodactylus laticeps</i>	X		X				3
Campbell's Forest Toad	<i>Bufo campbelli</i>	X		X				3
Julian's Frog	<i>Rana juliani</i>	X		X				
	Total	11	3	8	4			

Appendix V. Endemics to the lowland Maya Forest

Mammals	Birds	Reptiles	Amphibians
<i>Alouatta pigra</i>	<i>Amazona xantholora</i>	<i>Ameiva chaitzami</i>	<i>Bolitoglossa yucatanana</i>
<i>Balantiopteryx io</i>	<i>Arremonops chloronotus</i>	<i>Aristelliger georgeensis</i>	<i>Bufo campbelli</i>
<i>Cryptotis mayensis</i>	<i>Campylopterus curvipennis</i>	<i>Celestus rozellae</i>	<i>Eleutherodactylus alfredi</i>
<i>Dasyprocta mexicana</i>	<i>Campylorhynchus yucatanicus</i>	<i>Claudius angustatus</i>	<i>Eleutherodactylus chac</i>
<i>Heteromys gaumeri</i>	<i>Caprimulgus badius</i>	<i>Cnemidophorus angusticeps</i>	<i>Eleutherodactylus laticeps</i>
<i>Mazama pandora</i>	<i>Centurus pygmaeus</i>	<i>Cnemidophorus cozumela</i>	<i>Eleutherodactylus leprus</i>
<i>Otonyctomys hatti</i>	<i>Cyanocorax yucatanicus</i>	<i>Cnemidophorus rodecki</i>	<i>Eleutherodactylus yucatanensis</i>
<i>Peromyscus yucatanicus</i>	<i>Dumetella glabrirostris</i>	<i>Coniophanes meridanus</i>	<i>Gastrophryne elegans</i>
<i>Procyon pygmaeus</i>	<i>Granatellus sallaei</i>	<i>Coniophanes quinquevittatus</i>	<i>Oedipina elongata</i>
<i>Reithrodontomys spectabilis</i>	<i>Icterus auratus</i>	<i>Coniophanes schmidti</i>	<i>Rana juliani</i>
<i>Sciurus yucatanensis</i>	<i>Lanio aurantius</i>	<i>Corytophanes hernandezii</i>	<i>Triprion petasatus</i>
	<i>Leptotila jamaicensis</i>	<i>Ctenosaura defensor</i>	
	<i>Meleagris ocellata</i>	<i>Dermatemys mawii</i>	
	<i>Myiarchus yucatanensis</i>	<i>Dipsas brevifacies</i>	
	<i>Nyctiphrynus yucatanicus</i>	<i>Eumeces schwartzei</i>	
	<i>Piranga roseogularis</i>	<i>Ficimia publia</i>	
	<i>Stelgidopteryx ridgwayi</i>	<i>Imantodes tenuissimus</i>	
	<i>Synallaxis erythrothorax</i>	<i>Kinosternon acutum</i>	
	<i>Thryothorus ludivicianus</i>	<i>Kinosternon creaseri</i>	
	<i>Vireo magister</i>	<i>Leptodeira frenata</i>	
		<i>Micrurus hippocrepis</i>	
		<i>Norops rodriguezi</i>	
		<i>Norops uniformis</i>	
		<i>Phyllodactylus insularis</i>	
		<i>Porthidium yucatanicum</i>	
		<i>Rhinoclemmys areolata</i>	
		<i>Sceloporus chrysostictus</i>	
		<i>Sceloporus cozumelae</i>	
		<i>Sceloporus lundelli</i>	
		<i>Sceloporus teapensis</i>	
		<i>Sibon sanniola</i>	
		<i>Staurotypus triporcatus</i>	
		<i>Symphimus mayae</i>	
		<i>Tantilla cuniculator</i>	
		<i>Tantilla moesta</i>	
		<i>Tantillita canula</i>	
		<i>Tantillita lintoni</i>	
		<i>Typhlops microstomus</i>	
		<i>Tantilla tecta</i>	

Appendix VI. Endemics to the Yucatán Peninsula

Mammals	Birds	Reptiles	Amphibians
<i>Cryptotis mayensis</i>	<i>Meleagris ocellata</i>	<i>Aristelliger georgeensis</i>	<i>Tripion petasatus</i>
<i>Otonyctomys hatti</i>	<i>Amazona xantholora</i>	<i>Phyllodactylus insularis</i>	<i>Bolitoglossa yucatanana</i>
<i>Heteromys gaumeri</i>	<i>Nyctiphrynus yucatanicus</i>	<i>Sceloporus lundelli</i>	<i>Eleutherodactylus yucatanensis</i>
<i>Mazama pandora</i>	<i>Myiarchus yucatanensis</i>	<i>Sceloporus teapensis</i>	
<i>Peromyscus yucatanicus</i>	<i>Cyanocorax yucatanicus</i>	<i>Typhlops microstomus</i>	
<i>Reithrodontomys spectabilis</i>	<i>Dumetella glabrirostris</i>	<i>Coniophanes schmidtii</i>	
<i>Procyon pygmaeus</i>	<i>Piranga roseogularis</i>	<i>Tantilla cuniculator</i>	
	<i>Thryothorus ludivicianus</i>	<i>Tantilla moesta</i>	
	<i>Leptotila jamaicensis</i>	<i>Tantillita canula</i>	
	<i>Caprimulgus badius</i>	<i>Ctenosaura defensor</i>	
	<i>Centurus pygmaeus</i>	<i>Sceloporus chrysostictus</i>	
	<i>Campylorhynchus yucatanicus</i>	<i>Sceloporus cozumelae</i>	
	<i>Icterus auratus</i>	<i>Cnemidophorus angusticeps</i>	
		<i>Cnemidophorus rodecki</i>	
		<i>Coniophanes meridanus</i>	
		<i>Dipsas brevifacies</i>	
		<i>Imantodes tenuissimus</i>	
		<i>Sibon sanniola</i>	
		<i>Symphimus mayae</i>	
		<i>Porthidium yucatanicum</i>	

Appendix VII. Endemics to the Tehuantepec Moist Forest

Mammals	Birds	Reptiles	Amphibians
<i>Balantiopteryx io</i>	<i>Lanio aurantius</i>	<i>Dermatemys mawii</i>	<i>Eleutherodactylus alfredi</i>
<i>Dasyprocta mexicana</i>		<i>Claudius angustatus</i>	<i>Eleutherodactylus leprus</i>
		<i>Staurotypus triporcatus</i>	<i>Gastrophryne elegans</i>
		<i>Kinosternon acutum</i>	<i>Oedipina elongata</i>
		<i>Corytophanes hernandezii</i>	<i>Eleutherodactylus chac</i>
		<i>Celestus rozellae</i>	<i>Eleutherodactylus laticeps</i>
		<i>Tantillita lintoni</i>	<i>Bufo campbelli</i>
		<i>Ameiva chaitzami</i>	<i>Rana juliani</i>
		<i>Micrurus hippocrepis</i>	
		<i>Tantilla tecta</i>	

Appendix VIII. Endemics to the Maya Forest, present in the Maya Biosphere Reserve.

Mammals	Birds	Reptiles	Amphibians
<i>Cryptotis mayensis</i>	<i>Amazona xantholora</i>	<i>Sceloporus lundelli</i>	<i>Triprrion petasatus</i>
<i>Otonyctomys hatti</i>	<i>Cyanocorax yucatanicus</i>	<i>Sceloporus teapensis</i>	<i>Eleutherodactylus alfredi</i>
<i>Heteromys gaumeri</i>	<i>Dumetella glabrirostris</i>	<i>Typhlops microstomus</i>	<i>Eleutherodactylus leprus</i>
<i>Mazama pandora</i>	<i>Meleagris ocellata</i>	<i>Coniophanes schmidti</i>	<i>Gastrophryne elegans</i>
<i>Balantiopteryx io</i>	<i>Myiarchus yucatanensis</i>	<i>Tantilla cuniculator</i>	
<i>Alouatta pigra</i>	<i>Nyctiphrynus yucatanicus</i>	<i>Tantilla moesta</i>	
<i>Sciurus yucatanensis</i>	<i>Piranga roseogularis</i>	<i>Tantillita canula</i>	
	<i>Thryothorus ludivicianus</i>	<i>Tantilla tecta</i>	
	<i>Lanio aurantius</i>	<i>Dermatemys mawii</i>	
	<i>Arremonops chloronotus</i>	<i>Claudius angustatus</i>	
	<i>Campylopterus curvipennis</i>	<i>Staurotypus triporcatus</i>	
	<i>Granatellus sallaei</i>	<i>Kinosternon acutum</i>	
	<i>Stelgidopteryx ridgwayi</i>	<i>Corytophanes hernandezii</i>	
	<i>Synallaxis erythrothorax</i>	<i>Celestus rozellae</i>	
		<i>Tantillita lintoni</i>	
		<i>Rhinoclemmys areolata</i>	
		<i>Norops rodriguezi</i>	
		<i>Norops uniformis</i>	
		<i>Eumeces schwartzeii</i>	
		<i>Cnemidophorus cozumela</i>	
		<i>Coniophanes quinquevittatus</i>	
		<i>Ficimia publia</i>	
		<i>Leptodeira frenata</i>	