

## **SPECIES RICHNESS OF MAMMALS FROM THE VICINITY OF SALINA CRUZ, COASTAL OAXACA, MEXICO**

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### **RESUMEN**

Se estudió la riqueza de especies de mamíferos de los alrededores de Salina Cruz, Oaxaca, México. Se encontraron 65 especies de mamíferos terrestres nativos pertenecientes a 54 géneros, 24 familias y 8 órdenes. Se registraron solamente una especie endémica de Oaxaca y otra de México. Tres roedores murinos, un felido y un cánido no nativos complementaron la lista de especies. La afinidad biogeográfica de esta mastofauna resultó principalmente tropical. La comunidad de mamíferos de la región resultó ser rica y diversa. Los registros de presencia de los mamíferos del área se incrementaron notablemente. Falta confirmar la presencia de otras especies no registradas en este estudio y evaluar los factores humanos que amenazan la riqueza de especies de los mamíferos de los alrededores de Salina Cruz.

Palabras clave: riqueza de especies, mamíferos, Salina Cruz, Oaxaca, México.

### **ABSTRACT**

The species richness of mammals from the vicinity of Salinas Cruz, Oaxaca, Mexico, was surveyed. Sixty-five species of native terrestrial mammals in the region, belonging to 54 genera, 24 families, and 8 orders were found. Two species are endemic, one to Oaxaca, and the other to Mexico. Five exotic species (three murine rodents, one felid, and one canid) complemented the list. Most taxa are of tropical affinity. The species richness of mammals of the study area turned out to be large and diverse. This survey increased the mammal records for this region of coastal Oaxaca. However, more research is needed to: 1, record other species expected to be present, and 2, evaluate the human factors

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that may be threatening the mammal species richness of the vicinity of Salina Cruz.

Key words: species richness, mammals, Salina Cruz, Oaxaca, Mexico.

## INTRODUCTION

The Mexican wildlife contains the highest number of terrestrial mammalian species in the New World, and ranks second on a worldwide basis (Mittermeier & Goettsch de Mittermeier, 1992). The Neartic and Neotropical biogeographic regions come together in Mexico, promoting such an enormous diversity. The state of Oaxaca, in southern Mexico, is recognized as the region holding the richest community of mammalian species in the country in a diverse arrangement of temperate and tropical habitats (Goodwin, 1969; Mittermeier & Goettsch de Mittermeier, 1992).

Unfortunately, human impact has significantly influenced the elimination or modification of natural ecosystems in this state, where the loss of vegetation and animal populations is an actively expanding process. Therefore, research on the study and conservation of Oaxacan mammals is needed to promote the protection and adequate sustainable use of this important resource. Yet, the fauna of Oaxaca is still poorly known. The only comprehensive study on Oaxacan mammals was carried out more than 20 years ago, and was based primarily on the examination of museum specimens (Goodwin, 1969). If a program on conservation biology of Oaxacan mammals is to succeed, the updated basic knowledge of the mammalian diversity becomes a priority.

The pacific coast in Oaxaca is considered to host a rich component of tropical mammals (Ramírez-Pulido & Castro-Campillo, 1992; Ramírez-Pulido *et al.*, 1992). However, little is known about the subject since few workers have documented mammalian records. The information on the mammals from coastal Oaxaca turns out to be scarce and scattered. The aims of this paper are, therefore, to document the mammalian fauna of the surroundings of Salina Cruz, Oaxaca, and contribute further data to the knowledge of the mammalian species richness of coastal Oaxaca.

## MATERIALS AND METHODS

The study area is located from Santiago Astata, 58 km W of Salina Cruz, to Santa María del Mar, 33 km E of Salina Cruz (Fig. 1). The climate in this region is tropical with mean annual temperature of 25°C and mean annual rainfall of 800 mm (García, 1964). The climate is highly seasonal, with a rainy period from June to September. Vegetation types occurring in the area are mangroves, tropical deciduous forest, tropical thorn scrub, halophytic grassland, and dune vegetation.

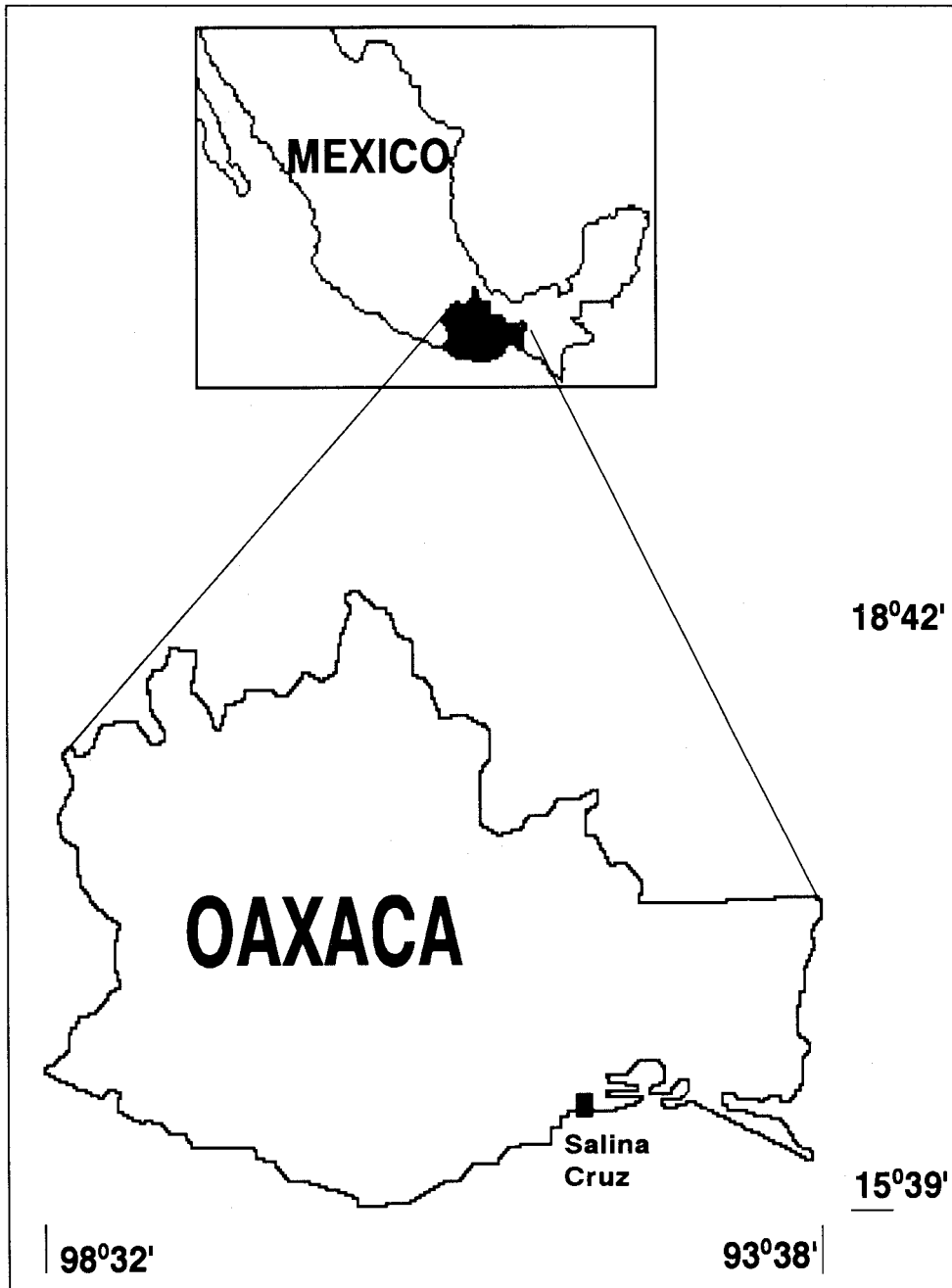


Fig. 1. Geographical location of the study area for the species richness of mammals from the vicinity of Salina Cruz, coastal Oaxaca, México.

Small non-volant mammals were caught using conventional snap traps and Sherman live traps baited with vanilla scent, oatmeals, and smashed corn, and set before dark. Medium-sized mammals were collected live using Tomahawk traps baited with sardines, and set before dark (Hall, 1981). Several specimens of medium-sized mammals and larger mammals were provided by local hunters. Bats were collected using mistnets set over creeks and along trails in the vegetation (Hall, 1981). Collection sites included all different vegetation types represented in the study area. Collecting effort included trips in two rainy seasons and two dry seasons.

Skins and skulls of specimens collected are deposited in the mammal collection of Instituto de Biología, Universidad Nacional Autónoma de México (IBU-NAM). The taxonomic arrangement followed Cervantes *et al.* (1994).

## RESULTS

Sixty-five species of native terrestrial mammals were recorded in the study area, corresponding to 54 genera, 24 families, and 8 orders (Table 1). No Insectivora nor native Perissodactyla were caught or seen, and local people claimed that these mammals do not occur in the region. In addition, five exotic and widespread species were recorded: house mice (*Mus musculus*), black rats, (*Rattus rattus*), brown rats (*R. norvegicus*), feral cats (*Felis catus*), and feral dogs (*Canis familiaris*).

**Table 1.** Mammals from the vicinity of Salina Cruz, coastal Oaxaca, Mexico

ORDER DIDELPHOIDIA	<i>Diphylla ecaudata</i>
FAMILY MARMOSIDAE	<i>Artibeus jamaicensis triomylus</i>
<i>Marmosa canescens canescens*</i>	<i>Artibeus lituratus palmarum</i>
FAMILY DIDELPHIDAE	<i>Artibeus intermedius intermedius</i>
<i>Didelphis virginiana californica</i>	<i>Carollia subrufa</i>
	<i>Glossophaga soricina handleyi</i>
ORDER CHIROPTERA	<i>Sturnira lilium parvidens</i>
FAMILY EMBALLONURIDAE	FAMILY NATALIDAE
<i>Balantiopteryx plicata plicata</i>	<i>Natalus stramineus saturatus</i>
<i>Saccopteryx bilineata centralis</i>	FAMILY VERPERTILIONIDAE
FAMILY NOCTILIONIDAE	<i>Lasiurus blossevillii teliotis</i>
<i>Noctilio leporinus mastivus</i>	<i>Lasiurus cinereus cinereus</i>
FAMILY MORMOOPIDAE	<i>Lasiurus intermedius intemedius</i>
<i>Mormoops megalophylla megalophylla</i>	<i>Rhogeessa parvula major</i>
<i>Pteronotus davyi fulvus</i>	FAMILY MOLOSSIDAE
<i>Pteronotus parnellii mexicanus</i>	<i>Eumops underwoodi underwoodi</i>
<i>Pteronotus personatus psilotis</i>	<i>Molossus aztecus</i>
FAMILY PHYLLOSTOMIDAE	<i>Molossus rufus nigricans</i>
<i>Micronycteris megalotis mexicana</i>	<i>Promops centralis centralis</i>
<i>Desmodus rotundus murinus</i>	<i>Tadarida brasiliensis mexicana</i>

Table 1. *Continues*

ORDER PRIMATES	FAMILY ERETHIZONTIDAE
FAMILY CEBIDAE	<i>Sphiggurus mexicanus mexicanus</i>
<i>Ateles geoffroyi vellerosus</i>	
ORDER XENARTHRA	ORDER CARNIVORA
FAMILY MYRMECOPHAGIDAE	FAMILY CANIDAE
<i>Cyclopes didactylus mexicanus</i>	<i>Canis familiaris</i> ***
<i>Tamandua mexicana mexicana</i>	<i>Canis latrans goldmani</i>
FAMILY DASYPODIDAE	<i>Urocyon cinereoargenteus orinomus</i>
<i>Dasybus novemcinctus mexicanus</i>	FAMILY PROCYONIDAE
ORDER LAGOMORPHA	<i>Bassariscus astatus macdougalli</i>
FAMILY LEPORIDAE	<i>Bassariscus sumichrasti sumichrasti</i>
<i>Lepus flavigularis</i> **	<i>Potos flavus prehensilis</i>
<i>Sylvilagus floridanus aztecus</i>	<i>Nasua narica narica</i>
ORDER RODENTIA	<i>Procyon lotor shufeldti</i>
FAMILY SCIURIDAE	FAMILY MUSTELIDAE
<i>Sciurus aureogaster nigrescens</i>	<i>Mustela frenata marcophonius</i>
<i>Sciurus depppei depppei</i>	<i>Conepatus mesoleucus mesoleucus</i>
FAMILY GEOMYIDAE	<i>Mephitis macroura macroura</i>
<i>Orthogeomys grandis scalops</i>	<i>Spilogale putorius putorius</i>
FAMILY HETEROMYIDAE	<i>Lutra longicaudis annectens</i>
<i>Liomys pictus pictus</i>	FAMILY FELIDAE
FAMILY MURIDAE	<i>Felis catus</i> ***
<i>Baiomys musculus pallidus</i>	<i>Herpailurus yagouaroundi fossata</i>
<i>Neotoma mexicana isthmica</i>	<i>Leopardus pardalis pardalis</i>
<i>Oryzomys couesi mexicanus</i>	<i>Leopardus wiedii oaxacensis</i>
<i>Peromyscus melanophrys melanophrys</i>	<i>Puma concolor mayensis</i>
<i>Peromyscus mexicanus angelensis</i>	<i>Panthera onca hernandezii</i>
<i>Sigmodon mascotensis mascotensis</i>	ORDER ARTIODACTYLA
<i>Mus musculus</i> **	FAMILY TAYASSUIDAE
<i>Rattus rattus</i> ***	<i>Tayassu tajacu humeralis</i>
<i>Rattus norvegicus</i> ***	FAMILY CERVIDAE
	<i>Odocoileus virginianus acapulcensis</i>
	<i>Mazama americana temama</i>

\*Endemic to Mexico, \*\* endemic to Oaxaca, \*\*\* exotic species

Only two species endemic to Mexico were recorded (Table 1): the mouse opossum (*Marmosa mexicana*), found chiefly in the west portion of the study area, and the Tehuantepec jackrabbit (*Lepus flavigularis*), in the east part. This leporid was recorded only in the halophytic grasslands and dunes between the towns of San Mateo del Mar and Santa María del Mar, which comprises a small portion of its original distribution within the study area. Information provided by local authorities stated that overhunting and habitat disturbance area responsible for the absence of this species between Salina Cruz and San Mateo del Mar.

Bats, carnivores, and rodents were the taxa best represented in terms of families, genera, and species (Table 2). The total number of species of bats largely outnumbered those for other mammal orders.

However, the number of carnivore species was high. One primate species (*Ateles geoffroyi*) was present. Interestingly, the occurrence of multiple species in genera was relatively rare.

**Table 2.** Taxa distribution among the eight orders of terrestrial native mammals recorded in the vicinity of Salina Cruz, Oaxaca, Mexico, and their family classification according to their present geographic range (after Ceballos and Navarro, 1991)

	Families	Genera	Species	Neartic	Neotropical	Shared
DIDELPHOIDIA	2	2	2			
Marmosidae		1	1		X	
Didelphidae		1	1			X
CHIROPTERA	7	19	26			
Emballonuridae		2	2		X	
Noctilionidae		1	1		X	
Mormoopidae		2	4		X	
Phyllostomidae		7	9		X	
Natalidae		1	1		X	
Vespertilionidae		2	4			X
Molossidae		4	5			X
PRIMATES	1	1	1			
Cebidae		1	1		X	
XENARTHRA	2	3	3			
Myrmecophagidae		1	1		X	
Dasypodidae		2	2			X
LAGOMORPHA	1	2	2			
Leporidae		2	2			X
RODENTIA	5	9	11			
Sciuridae		1	2			X
Geomyidae		1	1			X
Heteromyidae		1	1			X
Muridae		5	6			X
Erethizontidae		1	1			X

**Table 2.** *Continues*

	Families	Genera	Species	Nearctic	Neotropical	Shared
CARNIVORA	4	15	17			
Canidae		2	2			X
Procyonidae		4	5			X
Mustelidae		5	5			X
Felidae		4	5			X
ARTIODACTYLA	2	3	3			
Tayassuidae		1	1			X
Cervidae		2	2			X
TOTALS	24	54	65	0	8	16

The faunal affinities of the mammal community examined were predominantly Neotropical (Table 2). Most families shared temperate and tropical affinities, however, a third of the total number of families are exclusively of Neotropical affinity.

Observations also indicated the occurrence of severe habitat disturbance in the study area. The construction of roads due to the opening of oil facilities has allowed for increased hunting, and factors such as logging and grazing. Moreover, some areas showed the effects of periodic fires. According to local residents there has been a reduction of conspicuous mammal species in the region. Particular examples are the spider monkey (*Ateles geoffroyi*), the river otter (*Lutra longicaudis*), and the cats (*Herpailurus*, *Leopardus*, *Puma* and *Panthera*).

## DISCUSSION

The native mammals collected in the vicinity of Salina Cruz (65) represent 14.4% of the terrestrial mammalian diversity of Mexico (450 species; Cervantes *et al.*, 1994). Similarly, they stand for the 34.0% and 35.3% of the total number of mammals of Oaxaca and Chiapas, respectively (191 species: Arita, 1993; and 184 species: Aranda and March, 1987, respectively). These states rank first and second, respectively, in the list of the Mexican states with the highest number of mammalian species (Arita, 1993). Therefore, the number of mammal species of the study area is comparatively high. Interestingly, our study area lies in the southernmost portion of the region (a 2 by 2-degree quadrat) with the highest number of recorded mammal species in Mexico (n=165; Ceballos & Navarro, 1991).

Compared with previous mammalian records from coastal Oaxaca (Goodwin, 1969; Leopold, 1959; Schaldach, 1966; Webb & Baker, 1969), the results of this

survey noticeably increased the knowledge of the number of species occurring in the vicinity of Salina Cruz (Table 3). On the other hand, our data for the study area are about the same as those provided by Goodwin (1969) for the whole Oaxacan coastal range. Interestingly, the mammal genera contained in our sample are represented only by a few number of species. The taxonomic composition of the mammal species community of the study area is indeed rich. Selective further collecting in several localities explored here may reveal the occurrence of more species of bats (chiefly phyllostomids) and shrews of the common tropical genus *Cryptotis*. According to local residents, tayras (*Eira barbara*) and grisons (*Galictis vittata*) could also be recorded.

**Table 3.** Taxa distribution of mammals by author and geographic range relative to the survey of native terrestrial mammals of the vicinity of Salina Cruz, Oaxaca, Mexico.

	Coastal Oaxaca		Study area		
	Leopold (1959)	Goodwin (1969)	Leopold (1959)	Goodwin (1969)	Present study
Orders	7	8	6	6	8
Families	13	24	11	14	24
Genera	24	51	20	23	54
Species	30	63	25	24	65

To understand better the species richness of the mammals of the study area, additional research should evaluate their body masses and trophic guilds relationships. However, most mammals reported here are species of small body masses, and they represent all the trophic guilds known for Mexican mammals (herbivores, insectivores, frugivores, carnivores, nectarivores, sanguivores, and omnivores) according to Ceballos & Navarro (1991).

On the other hand, the majority of the mammals recorded for the vicinity of Salina Cruz are taxa with strong tropical affinities. Marsupials, chiropterans, primates and xenarthrans are typical examples of this condition. No family of mammals with exclusively Nearctic affinity was recorded. These results match the species composition and biogeographic affinities of previous mammal surveys (Goodwin, 1969) for coastal Oaxaca.

The study area lies in the southeasternmost portion of the range with the highest number (81) of endemic mammals in Mexico (Ramírez-Pulido *et al.*, 1992). However, this study only recorded two endemics and only one turned out to be endemic to Oaxaca, *Lepus flavigularis*. The populations of this jackrabbit were reported to be declining due to overhunting and habitat disturbance (Flux & Angermann, 1990; Cervantes, 1993). Our field observations, unfortunately, confirmed the same trend and suggest its populations in the region may be in critical condition.



In summary, the species richness of mammals of the vicinity of Salina Cruz Oaxaca, is large and diverse. This mammalian community is largely of tropical affinity and holds a small fraction of endemics. More collecting efforts are needed to search for some species not recorded in this study. *L. flavigularis* is a species that locally requires urgent attention to plan its protection. Furthermore additional research must be carried out to determine to what extent the species richness of the region may be threatened.

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