

HERPETOFAUNA IN TWO COASTAL SITES IN THE MUNICIPALITY OF SOTO LA MARINA, TAMAULIPAS, MEXICO

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ABSTRACT. We conducted a herpetofaunal study from November 2009 to July 2010 on the ranches El Herradero and San Jose de los Leones, both in the municipality of Soto la Marina, in the central-eastern part of the state of Tamaulipas, northeastern Mexico. Their location corresponds to a peninsula surrounded by the Laguna Madre. The objectives were to conduct a herpetological inventory and to determine the distribution of the species in the plant communities and the status of each species following the criteria of the NOM-059-SEMARNAT-2010. The information will be useful in delineating an area to set aside for conservation easement for the species. We followed the transect method described by Campbell & Christman (1982). We recorded 17 species: one anuran, one crocodile, six turtles, three lizards and six snakes. Of these, eight are new records for the municipality of Soto la Marina, 10 species are at risk, six are of special concern, three are threatened, and one is endangered. The ranches contain 34.69% of the herpetofauna species present in the municipality.

Key words: Herpetofauna, Vertebrates, Soto la Marina, Tamaulipas

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RESUMEN. Se realizó un estudio herpetofaunístico en los ranchos El Herradero y San José de los Leones ambos ubicados en el municipio de Soto la Marina, en la porción central-oriental del estado de Tamaulipas al Noreste de México. Estos predios se ubican en una forma de península rodeada por agua perteneciente a la Laguna Madre. Los objetivos fueron: realizar un inventario herpetológico, determinar la asociación de la herpetofauna con las comunidades vegetales y determinar el estatus de cada una de

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las especies de acuerdo a la NOM-059-SEMARNAT-2010. Lo anterior con la finalidad de que el área ocupada por los ranchos sea para establecer sitios de conservación como servidumbre ecológica de especies. Se siguió el muestreo de transectos descrito por Campbell & Christman (1982). El estudio se realizó desde noviembre de 2009 hasta julio de 2010. Se registraron 17 especies: un anuro, seis tortugas, un cocodrilo, tres lagartijas y seis serpientes. De estos, ocho son nuevos reportes para el municipio de Soto la Marina, y de acuerdo con la NOM-059-SEMARNAT-2010 se reportaron 10 especies donde seis se encuentran Sujetas a Protección Especial, tres se encuentran Amenazadas y una en Peligro de Extinción. Los ranchos cuentan con 34.69% de las especies de herpetofauna presente en el municipio.

Palabras clave: Herpetofauna, Vertebrados, Soto la Marina, Tamaulipas.

INTRODUCTION

The state of Tamaulipas is located in northeastern México with an area of 78,380.03 km². Because of its physiographic position it is a state with a high diversity of species. A complete overview of the herpetofauna has never been published. The pioneer work of Martin (1958) is the most comprehensive study, although it was restricted to a limited area of the state. The herpetofauna of Tamaulipas is composed of 43 species of amphibians and 129 reptiles (Lazcano 1999). These vertebrate groups have never been studied recently in the municipality, only during sporadic field trips. In the two sites surveyed in this study (ranches El Herradero and San Jose de los Leones) Tamaulipean thorn scrub is the main plant community type, making this an important area for conservation and management. This is a unique plant community spreading throughout the northeastern México and a portion of Texas, USA (Ramirez-Albores 2007), but has been strongly impacted by habitat fragmentation related to human activities, agriculture, and livestock (Rojas 1965, Jurado & Reid 1989).

Authors reporting herpetological species in their distribution maps of the state of Tamaulipas are: Smith (1946), Wright and Wright (1949, 1957), King & Thompson (1968), Smith (1978), Behler & King (1992), Lavin (1998) working in El Cielo, Gomez-Farías, Conant & Collins (1998), Werler & Dixon (2000), Canseco-Marquez *et al.* (2004), and Flores-Villela & Perez-Mendoza (2006). On the other hand, Lee (1996) and Lemos & Smith (2007) mentioned the species found in between Yucatan peninsula and Coahuila respectively, mapping species distribution, including Tamaulipas. Recently Farr *et al.* (2007, 2009) documented new distributional records for the species in this state.

Lazcano (2000) reported herpetofauna found dead on the roads in the municipality of Aldama, Tamaulipas, a very close municipality to Soto La Marina. Leija-Tristan *et al.* (2000) cited the species present in Laguna Madre, Farr *et al.* (2009) reported a list of the herpetofauna in the municipality of Aldama. Rossman (1970) and Rossman *et al.* (1996) mentioned that most of Tamaulipas is an area of intergrades between subspecies of *Thamnophis proximus*. Iverson & Berry (1979) reported *Kinosternon scorpioides* from the northern part of Soto la Marina. Baker & Webb (1966) documented the herpetofauna for La Pesca, Soto La Marina reporting one amphibian and 14 species of reptiles.

The objectives were to conduct a herpetological inventory of the species present in the ranches San Jose de los Leones and El Herradero; determining the status of the species according to NOM-059-SEMARNAT-2010 (SEMARNAT 2010) and the distribution of the species by plant communities. The study would contribute important information for the preservation of the areas as conservation easement for many vertebrate species in the area.

MATERIALS AND METHODS

Study site. The information on the study site is described in the Sintesis Geografica del Estado de Tamaulipas (SPP 1983). Ranches El Herradero and San Jose de los Leones are located in the municipally of Soto la Marina, Tamaulipas, México, between $24^{\circ}14'30.38''\text{N}$ and $24^{\circ}27'7.61''\text{N}$; and $97^{\circ}45'7.81''\text{W}$ and $97^{\circ}50'5.36''\text{W}$ (Fig. 1). The ranches are located on a small peninsula that is part of the Laguna Madre, with water surrounding these locations to the north, east and west (this is the particular

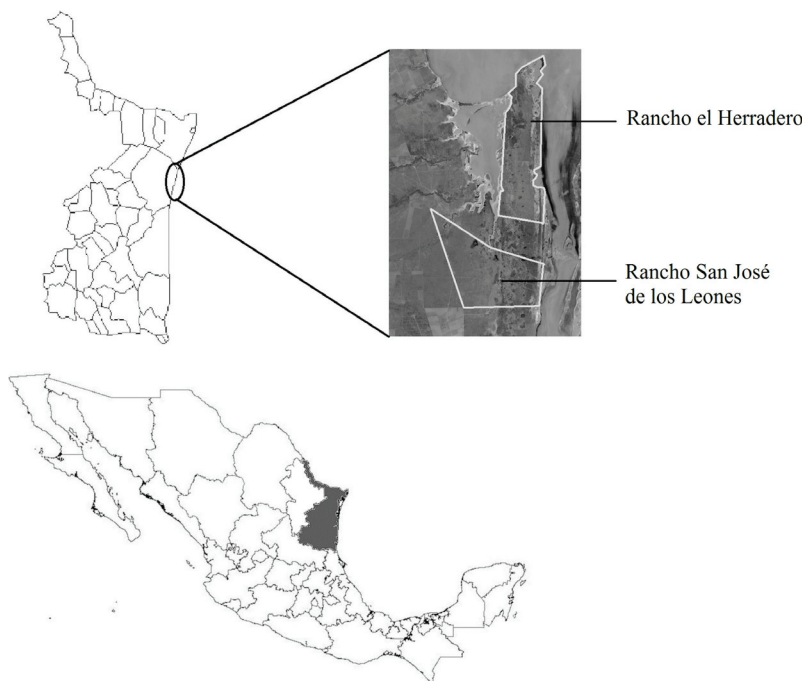


Figure 1. Location of study site, ranches El Herradero and San Jose de los Leones in the municipality of Soto la Marina, Tamaulipas.

case in El Herradero); at its southern end it is bordered by other private properties (San Jose de los Leones). Physiographically the area is part of Northern Gulf Coastal Plains Province and Tamaulipean Coastal Plains Subprovince.

The study site comprehends four plant communities which are: Tamaulipean thorn scrub, natural grasses, induced grasses and agriculture areas.

The following dominant plant communities are present in the study area: Tamaulipean Thorn Scrub (TTS); some areas of the TTS are secondary growth caused by fires that are common here. Plant species in the superior stratus include: *Prosopis glandulosa*, *Pithecellobium brevifolium*, and *Cordia boissieri*; in the medium stratus: *Celtis pallida*, *Pithecellobium brevifolium*, *Yucca* sp. and *Condalia hookeri*, and in the inferior stratus *Zanthoxylum fagara*, *Opuntia leptocauli* and *Karwinskia humboldtiana* (SPP 1983). Native grasses include *Aristida roemeriana*, *Bouteloua radicata* and *Aristida pansa*; introduced grasses include *Cynodon dactylon* and *Sporobolus* sp., as well as the induced halophytic grasses *Spartina spartinae* and *Sporobolus pyramidatus*.

Procedure. Four sampling areas were selected considering the different plant communities: Tamaulipean Thorn Scrub, natural grasses, induced grassland, and agriculture areas with house buildings at Rancho El Herradero and San Jose de los Leones. Transects were conducted on these areas following inventory and sampling methods described by Campbell & Christman (1982), locating and capturing each specimen.

Field trips were conducted monthly during November 2009-July 2010. Data taken where specimen was observed included: locality, coordinates with GPS (Garmin eTrex Legend H), substrate used and plant communities. Specimens were captured and identified *in situ* according to Smith & Taylor (1966), Conant & Collins (1998), and the catalogue of the Society for the Study of Amphibians and Reptiles (SSAR). Common and scientific names were updated based on Liner & Casas-Andreu (2008). The status of each species followed the criteria of the NOM-059-SEMARNAT-2010 (SEMARNAT 2010).

RESULTS

We found 17 species and 48 individuals were captured in the two ranches El Herradero and San Jose de los Leones, distributed taxonomically as follows: one anuran, six turtles one crocodilian, three lizards and six snakes (Table 1).

Higher species richness was recorded in Tamaulipean thorn scrub (14), followed by natural grasslands (7), agriculture areas (6) and induced grassland (4).

Ten of these species are listed by the Mexican environmental protection laws (NOM-059-SEMARNAT-2010) as threatened (3), special concern (5), and endangered (1) (Table 1).

Table 1. Species distribution by plant communities and status in the NOM-059-SEMARNAT-2010 on the El Herradero and San Jose de los Leones, Soto la Marina, Tamaulipas. Scientific names based on Limer and Casas-Andreu (2008), Status: Pr: special concern, A – Threatened, P – Endangered and SE – without status. Plant communities: Tamaulipean thorn scrub – TTS, Natural grassland – NG, Induced grassland - IG, and Agriculture areas – AS.

Species	Plant communities				Status
	TTS	NG	IG	AS	
Amphibia					
Anura					
<i>Lithobates berlandieri</i>				X	Pr
Reptilia					
Crocodylia					
<i>Crocodylus moreletti</i>	X			X	Pr
Sauria					
<i>Sceloporus olivaceus</i>	X	X		X	SE
<i>Plestiodon tetragrammus</i>	X	X	X		SE
<i>Aspidoscelis scalaris</i>	X	X	X	X	SE
Serpentes					
<i>Coluber schotti</i>	X				SE
<i>Drymarchon melanurus</i>	X	X			SE
<i>Pantherophis emoryi</i>			X	X	SE
<i>Tantilla atriceps</i>	X				A
<i>Thamnophis proximus</i>	X	X			A
<i>Crotalus atrox</i>	X				Pr
Testudines					
<i>Chelonia mydas</i>	X				P
<i>Lepidochelys kempii</i>	X				SE
<i>Trachemys venusta</i>	X	X			SE
<i>Terrapene carolina</i>		X		X	Pr
<i>Kinosternons corpioides</i>	X		X		Pr
<i>Gopherus berlandieri</i>	X				A

DISCUSSION

The herpetofauna present in the municipality of Soto la Marina reported in the data base collection of Tamaulipas (Instituto Tecnológico de Cd. Victoria = ITCV, now in the Universidad Autónoma de Nuevo Leon scientific collection) contains 49 species, represented by 11 species of amphibians, one turtle, 10 lizards and 27 snakes. This study increases to 57 the herpetofaunistic species for this municipality, with eight

new records: *Crocodylus moreletti*, *Tantilla atriceps*, *Chelonia mydas*, *Lepidochelys kempii*, *Kinosternon scorpioides*, *Trachemys venusta*, *Terrapene carolina* and *Gopherus berlandieri*.

Of the 17 species recorded in this study, the highest diversity (using Shannon-Wiener) of herpetofauna occurred in the Tamaulipean Thorn Scrub with $H' = 2.401$ species (82.35%), followed by $H' = 1.831$ species (41.17%) in natural grasslands, $H' = 1.609$ species (29.41%), in anthropogenic substrates and $H' = 1.386$ species (17.64%) in induced grassland. The diversity data gathered are important to consider when deciding to preserve the Tamaulipean Thorn Scrub, because it includes a significant amount of species (WWF 2001 cited by Ramirez-Albores *et al.* 2007), but has been strongly impacted by habitat fragmentation originated by human activities, agriculture and livestock (Rojas 1965, Jurado & Reid 1989).

In the anthropogenic substrates we observed *Lithobates berlandieri*, *Crocodylus moreletti* and *Terrapene carolina*. This may be related to the occurrence of some small water reservoirs where specimens were found (Behler & King 1992, Lee 1996, Lemos-Espinal & Smith 2007). *Sceloporus olivaceus*, *Aspidoscelis gularis* and *Pantherophis emoryi* were observed frequently near the agriculture areas because they are optimal ground feeders, and there were plenty of food items during the harvesting period (Pritchett 1903, Lemos-Espinal & Smith 2007).

Nine out of 17 species registered in the study area, are listed within the NOM-059-SEMARNAT-2010 (SEMARNAT 2010), this equals to 52.9% of the total herpetofauna in the municipality of Soto La Marina. Of these species five are in special concern, three are threatened and one is endangered. The presence of all species observed in the study area was consistent with the distribution maps and information in Behler & King (1992), Lee (1996), Conant & Collins (1998), Werler & Dixon (2000), Seidel (2002), and Lemos-Espinal & Smith (2007).

In the course of this study we observed a predation event in which a specimen of *Drymarchon melanurus* was consuming a *Thamnophis proximus*. The literature documents that this species consumes an array of prey items, including frogs, rodents and other snakes including venomous ones (Wright & Wright 1957, Moler 1992, Belson 2000), birds and young turtles (Lazcano *et al.* 2005). Here we document *Thamnophis proximus* in its diet.

The presence of dead individuals of *Chelonia mydas* in the coastal lands is of importance. In Mexico *Chelonia mydas* is listed as endangered (SEMARNAT 2010). The Laguna Madre shores are used as a nesting ground (Lee 1996) for *C. mydas* (Marquez 1996) and *Lepidochelys kempii* (Ross *et al.* 1989). However, no nesting areas were found in the study area. Thus a survey for this species is needed to establish better conservation strategies.

In this municipality there are three main roads (Mexico 180 Federal Road, 70 State Road and Soto La Marina-Tepeguajes) which perhaps together with habitat

destruction represent the two main factors that contribute to the high levels of herpetofauna mortality. The rest of the roads in this municipality are dirt roads, although vertebrate mortality in these has not been documented as it has been in the municipality of Aldama, Tamaulipas (Lazcano 2009).

During our survey we observed the presence of neonates of *Crocodylus moreletti* in a reservoir found in rancho San Jose de Los Leones and a dead individual near (approximately 20 m) of the Laguna Madre.

The two ranches are near to the shores of the Laguna Madre, making them difficult to survey during the raining season because of road inaccessibility. It is important to determine species that are active during this season, even through walking surveys the number of species found could increase, providing additional support to this area for status of conservation easement.

Tamaulipas has eight natural protected areas located in the different municipalities: Laguna La Vega Escondida in Tampico, Bernal de Horcasitas in González, Colonia Parras de la Fuente in Abasolo, El Cielo in Gómez Farías, Llera, Ocampo y Jaumave, Laguna de la Escondida in Reynosa, Altas Cumbres in Victoria and Jaumave, Rancho Nuevo in Aldama, Laguna Madre y Delta del Rio Bravo in Matamoros, and San Fernando y Soto La Marina (APM 2011). These natural protected areas represent 10% of the surface of Tamaulipas which is important to preserve and increase by establishing additional natural areas.

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