

## LISTS OF SPECIES

### Herpetofauna, provinces of Chaco and Formosa, Chaco Oriental region, north-eastern Argentina

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#### Abstract

Oriental Chaco, part of the Great American Chaco, embraces a plain area with soft slopes towards the west-east region. In this region, different kinds of landscapes and vegetation converge, both conditioned by topographical and pluviometric gradients. This region undergoes processes of fragmentation and habitat loss due to intense human activities such as deforestation, agricultural exploitation, construction of a dam, and pollution. In order to contribute to the knowledge of the Oriental Chaco biodiversity, we studied the herpetofauna during one year. We sampled four sites between the coordinates 25° 00' S, 58° 00' W and 27° 00' S, 61° 00' W in the provinces of Chaco and Formosa. Eighty-eight species were registered in the studied places. The higher biodiversity was in grid 46.

#### Introduction

The Great American Chaco is an ecoregional forest in which the most important value is the existence of the only subtropical dry forest in the planet. It spreads over Brazil, Bolivia, Paraguay, and Argentina and covers 1,066,000 km<sup>2</sup> approximately, 655,000 km<sup>2</sup> of which are located in Argentina (Morello and Matteucci 1999).

In Argentina, the Chaco region spreads over numerous Northern provinces, forming a huge alluvial plain with a soft slope towards the southeast. It presents a wide variety of climates and environments with a high diversity of plants and animals species. According to Morello and Mateucci (1999), there are two fundamental macrounits, considering the weather conditions: wet Oriental Chaco with an annual rainfall varying from 750 to 1200 mm and dry Western Chaco where the annual rainfall ranges from 500 to 750 mm.

Cabrera (1976) recognized four districts to the two already mentioned the Chaco Serrano district

to the west and the district of the Savannas to the south. Ledesma (1977) identified four ecoregions from East to West: Wet Chaco, Subhumid Parque Chaqueño, Semi-arid Subhumid Chaco and Dry Semi-arid Chaco.

In Argentina, the Wet or Oriental Chaco embraces approximately 200,000 km<sup>2</sup> extending through the oriental half of the provinces of Chaco and Formosa, northern province of Santa Fe and northwestern province of Corrientes. The abundant annual rainfall (1000–1200 mm) determines a richness of different types of water environments that alternate with drier ones. This allows differentiation among natural environment as forests, grasslands, savannas, palm trees, riparian forests, and low open forest (Guinzburg and Adámoli 2005).

The main tropical trees are *quebracho chaqueño* (*Schinopsis balansae*), white *quebracho* (*Aspidosperma quebracho-blanco*), and white *algarrobo* and black *algarrobo* (*Prosopis alba*,

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*Prosopis nigra*, and *Prosopis flexuosa*). In the savannas, *Elionorus muticus* is the dominant species. Unfortunately, for more than one century, this region has been facing serious problems such as the sustained loss of its natural resources because of habitat fragmentation, deforestation, and advance of the agricultural frontier. These activities have strikingly intensified during the last two decades. Decrease in biodiversity because of these impact factors is a matter of concern. These factors affect different types of environments, especially the forest and the savannas of the Oriental Chaco.

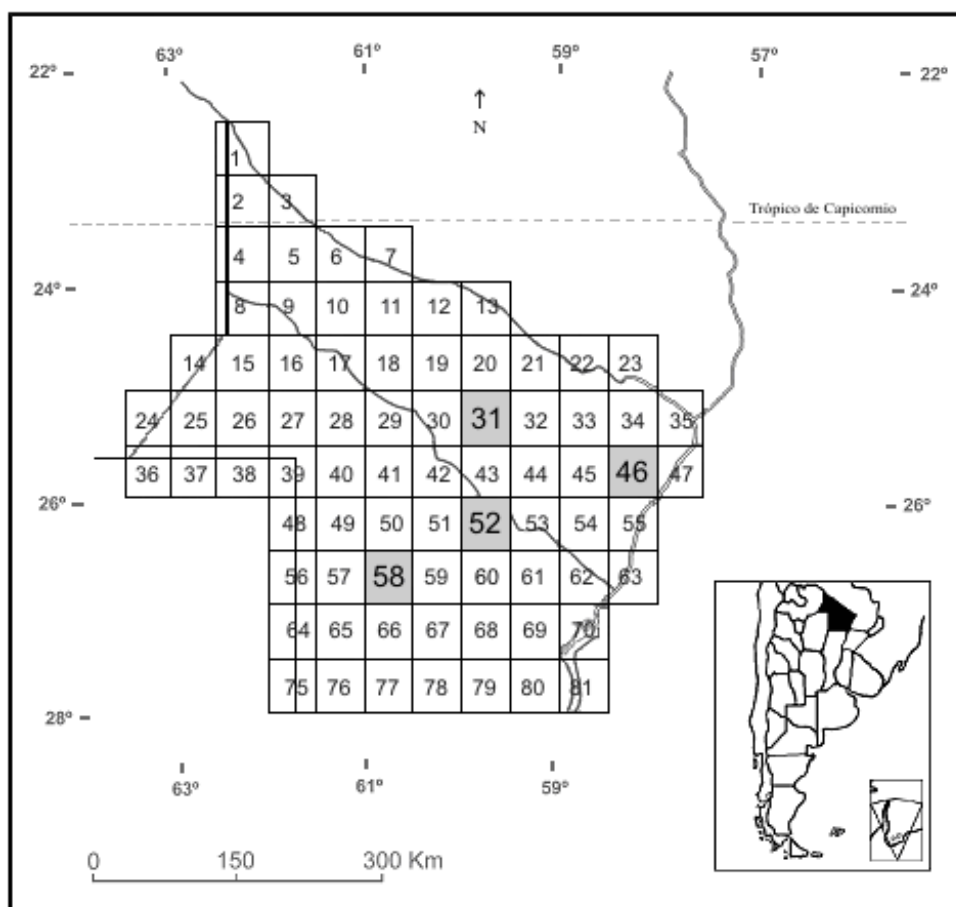
The aim of this study is to increase the knowledge of the herpetofaunal diversity of the Oriental Chaco in the provinces of Chaco and Formosa, Argentina. Species richness and comments on rare species and conservation data are presented herein.

## Materials and Methods

### Study site

Based on the grids of the Herpetological Atlas of Corrientes, Chaco and Formosa in Argentina (Álvarez et al. 2002) we selected four grids in the Oriental Chaco region according to accessibility and environments mosaic. Each grid covers an area of about 50 km by 50 km (Figure 1). The chosen grids are the following 52, 58, 31 and 46 limited by the following geographic coordinates:

- Grid 52 (26°00' S, 60°00' W, 26°30' S, 60°00' W, 26°00' S, 59°30' W, 26°30' S, 59°30' W).
- Grid 58 (26°30' S, 61°00' W, 27°00' S, 61°00' W, 26°30' S, 60°30'00' W, 27°00' S, 60°30'00' W).
- Grid 31 (25°00' S, 60°00' W, 25°30' S, 60°00' W, 25°00' S, 59°30' W, 25°30' S, 59°30' W).
- Grid 46 (25°30'00' S, 58°30' W, 26°00' S, 58°30' W, 25°30'00' S, 58°00' W, 26°00' S, 58°00' W).



**Figure 1.** Map showing the localization of grids surveyed in the Oriental Chaco located in the provinces of Chaco (52 and 58) and Formosa (31 and 46).

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### Data collection

Field methods included a combination of techniques based on Heyer et al. (1994): species inventory through time limited sampling and survey through visual and auditory encounter transects traced inside each grid. Specimens were identified using available keys (Ceí 1980; 1993; Giraudó 2001) and deposited at the *Colección Herpetológica, Universidad Nacional del Nordeste*, Corrientes, Argentina (UNNEC).

### **Result and Discussion**

A total of 33 amphibian species and 55 reptile species were recorded. Grid 46 had the highest species richness of amphibians and reptiles (75 species), these represents the 88 % and 79 % of recorded taxa, respectively. These data are significant considering the grade of anthropic modification in this grid due to livestock breeding and agricultural as well as forest exploitation. In the remaining grids, field records were as follow: grid 58 with 57 species, grid 52 with 50 species and grid 31 with 47 species.

The amphibian species belong to one order, seven families and sixteen genera. The family with the largest number of species was Hylidae (11 species), followed by Leptodactylidae (8 species), Bufonidae (5 species), Leiuperidae (4 species), Ceratophryidae and Microhylidae (2 species each) and Cycloramphidae (1 species) (Table 1, Figure 2 A-F).

The reptile species belong in three orders, seventeen families, and forty genera (Appendix 1). Colubridae was the richest taxon, comprising 24 species followed by Amphisbaenidae and Teiidae (5 species each), Chelidae, Alligatoridae, Tropiduridae, Scincidae, Boidae, Elapidae and Viperidae (2 species each), Testudinidae,

Anguidae, Gymnophthalmidae, Polychrotidae, Typhlopidae and Leptotyphlopidae (1 species each) (Appendix 1, Figure 3 A-F). We also registered the introduced species *Hemidactylus mabouia* (Gekkonidae).

The amphibians and reptiles recorded represent 60 % of the previously cited species by Álvarez et al. (2002) for the Oriental Chaco in north-eastern Argentina.

Considering the conservation status and according to Lavilla et al. (2000), we found one species in “danger of extinction”: the Chaco Side-necked Turtle *Acanthochelys pallidipectoris* (Figure 4 A) and one “threatened” species: the Argentine Constrictor Boa *Boa constrictor occidentalis* (Figure 4 B). It is important to remark that the latter species was recorded in areas with forest exploitation activities and high agricultural development of the province of Chaco. The yellow anaconda or *curiyú*, *Eunectes notaeus* (Figure 4 C), *Polychrus acutirostris* (Figure 4 D), and the caimans *Caiman latirostris* and *Caiman yacare* are “vulnerable” species while *Leptodactylus diptyx*, *Elachistocleis bicolor*, *Leposternon microcephalum* and *Kentropyx viridistriga* are “insufficiently known” species (Lavilla et al. 2000). All amphibian species recorded are currently categorized as Least Concern (LC) according to IUCN Red List.

Because of the over-exploitation of forest resources, advance of the agricultural boundary, and construction of engineering works in the Oriental Chaco, environmental policies for the conservation of the last pristine environment in South America need to be implemented soon. This region is threatened due to the absence of policies that consider the dynamics of the ecosystems (Adámoli et al. 2004).

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**Appendix 1.** List of amphibians and reptiles from Chaco Oriental. References: SC: Status Conservation, T: Threatened, IK: Insufficiently Known, I: Introduced, NT: Not Threatened, DE: Danger of extinction, V: Vulnerable.

CLASS	SPECIES	Grid				SC
		Chaco		Formosa		
ORDER / FAMILY		52	58	31	46	
<b>AMPHIBIA</b>						
<b>ANURA</b>						
Bufonidae	<i>Rhinella bergi</i> (Céspedes, 2000)	X	X	X	X	NT
	<i>Rhinella fernandezae</i> (Gallardo, 1957)	X	X	X	X	NT
	<i>Rhinella granulosa</i> (Müller & Hellmich, 1937)	X	X	X	X	NT
	<i>Rhinella schneideri</i> (Werner, 1894)	X	X	X	X	NT
	<i>Melanophryniscus klappenbachi</i> Prigioni & Langone, 2000	X			X	NT
Ceratophryidae	<i>Ceratophrys cranwelli</i> Barrio, 1980	X	X		X	NT
	<i>Lepidobatrachus llanensis</i> Reig & Cei, 1963				X	NT
Cycloramphidae	<i>Odontophrynus americanus</i> (Duméril & Bibrón, 1841)	X	X	X	X	NT
Hylidae	<i>Dendropsophus nanus</i> (Boulenger, 1889)	X	X	X	X	NT
	<i>Hypsiboas raniceps</i> (Cope, 1862)	X	X	X	X	NT
	<i>Phyllomedusa azurea</i> (Cope, 1862)	X	X	X	X	NT
	<i>Phyllomedusa sauvagii</i> Boulenger, 1882	X	X			NT
	<i>Pseudis limellus</i> (Cope, 1862)			X	X	NT
	<i>Pseudis paradoxus</i> Gallardo, 1961			X	X	NT
	<i>Scinax acuminatus</i> (Cope, 1862)	X	X	X	X	NT

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ORDER / FAMILY	SPECIES	52	58	31	46	
Hylidae	<i>Scinax nasicus</i> (Cope, 1862)	X	X	X		NT
	<i>Scinax squalirostris</i> (Lutz, 1925)				X	NT
	<i>Scinax fuscomarginatus</i> (Lutz, 1925)		X		X	NT
	<i>Trachycephalus venulosus</i> (Laurenti, 1768)	X	X	X	X	NT
Leptodactylidae	<i>Leptodactylus bufonius</i> Boulenger, 1894		X	X	X	NT
	<i>Leptodactylus chaquensis</i> Cei, 1950	X	X	X	X	NT
	<i>Leptodactylus diptyx</i> (Boettger, 1885)		X	X	X	IK
	<i>Leptodactylus elenae</i> Heyer, 1978	X	X	X	X	NT
	<i>Leptodactylus fuscus</i> (Schneider, 1799)	X	X	X	X	NT
	<i>Leptodactylus latinasus</i> Jiménez de la Espada, 1875	X	X	X	X	NT
	<i>Leptodactylus mystacinus</i> (Burmeister, 1861)	X	X		X	NT
	<i>Leptodactylus podicipinus</i> (Cope, 1862)	X	X	X	X	NT
Leiuperidae	<i>Physalaemus albonotatus</i> (Steindachner, 1862)	X	X	X	X	NT
	<i>Physalaemus biligonigerus</i> (Cope, 1860)	X	X	X	X	NT
	<i>Pseudopaludicola falcipes</i> (Hensel, 1867)	X	X			NT
	<i>Pseudopaludicola boliviana</i> Parker, 1927			X	X	NT
Microhylidae	<i>Dermatonotus muelleri</i> (Boettger, 1885)	X	X	X	X	NT
	<i>Elachistocleis bicolor</i> (Valenciennes, 1838)	X			X	IK
<b>REPTILIA</b>						
<b>TESTUDINES</b>						
Chelidae	<i>Acanthochelys pallidipectoris</i> (Freiberg, 1945)	X				DE
	<i>Phrynops hilarii</i> (Duméril & Bibrón, 1835)	X			X	NT
Testudinidae	<i>Chelonoidis chilensis</i> (Gray, 1870)	X				T
<b>CROCODYLIA</b>						
Alligatoridae	<i>Caiman latirostris</i> (Daudin, 1802)				X	V
	<i>Caiman yacare</i> (Daudin, 1802)				X	V
<b>SQUAMATA</b>						
Amphisbaenidae	<i>Amphisbaena heterozonata</i> Burmeister, 1861		X			NT
	<i>Amphisbaena bolivica</i> Mertens, 1929		X	X	X	NT
	<i>Amphisbaena mertensi</i> Strauch, 1881				X	NT
	<i>Anops kingi</i> Bell, 1833		X			NT
	<i>Leposternon microcephalum</i> Wagler, 1824	X	X	X	X	IK
Anguidae	<i>Ophiodes intermedius</i> Boulenger, 1894	X	X	X	X	NT
Gekkonidae	<i>Hemidactylus mabouia</i> Moreau de Jonnés, 1818				X	I
Gymnophthalmidae	<i>Cercosaura schreibersii</i> Wiegmann, 1834		X		X	NT
Polychrotidae	<i>Polychrus acutirostris</i> Spix, 1825				X	V
Scincidae	<i>Mabuya frenata</i> (Cope, 1862)	X	X	X	X	NT
	<i>Mabuya dorsivittata</i> Cope, 1862	X		X	X	NT
Teiidae	<i>Ameiva ameiva</i> (Linnaeus, 1758)	X	X	X	X	NT

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ORDER / FAMILY	SPECIES	52	58	31	46	
Teiidae	<i>Teius teyou</i> (Daudin, 1802)	X	X	X	X	NT
	<i>Teius oculatus</i> (D'Orbigny & Bibrón, 1837)	X	X		X	NT
	<i>Tupinambis merianae</i> (Duméril & Bibrón, 1839)				X	NT
	<i>Kentropyx viridistriga</i> (Boulenger, 1894)				X	IK
Tropiduridae	<i>Tropidurus spinulosus</i> (Cope, 1862)	X			X	NT
	<i>Tropidurus torquatus</i> (Wied, 1820)				X	NT
Typhlopidae	<i>Typhlops brongersmianus</i> Vanzolini, 1972	X	X	X	X	NT
Leptotyphlopidae	<i>Leptotyphlops albipunctus</i> (Burmeister, 1861)		X			NT
Boidae	<i>Boa constrictor occidentalis</i> Philippi, 1873	X	X	X	X	T
	<i>Eunectes notaeus</i> Cope, 1862	X			X	V
Colubridae	<i>Boiruna maculata</i> (Boulenger, 1896)		X		X	NT
	<i>Chrinonius quadricarinatus</i> Dixon, Wiest & Cei, 1993			X	X	NT
	<i>Clelia bicolor</i> (Peracca, 1904)	X	X	X	X	NT
	<i>Echinanthera occipitalis</i> (Jan, 1863)				X	NT
	<i>Helicops leopardinus</i> (Schlegel, 1837)	X		X	X	NT
	<i>Hydrodynastes gigas</i> (Duméril, Bibrón & Duméril, 1854)	X		X	X	NT
	<i>Leptodeira annulata pulchriceps</i> Duellman, 1958	X		X	X	NT
	<i>Leptophis ahaetulla marginatus</i> (Cope, 1862)	X	X		X	NT
	<i>Liophis almadensis</i> (Wagler, 1824)		X	X		NT
	<i>Liophis dilepis</i> (Cope, 1862)	X		X	X	NT
	<i>Liophis guentheri</i> Peracca, 1897	X	X	X	X	NT
	<i>Liophis poecilogyrus caesius</i> (Cope, 1862)		X	X	X	NT
	<i>Lystrophis dorbignyi</i> (Duméril, Bibrón & Duméril, 1854)				X	NT
	<i>Lystrophis pulcher</i> (Jan, 1863)		X			NT
	<i>Mastigodryas bifossatus</i> (Raddi, 1820)				X	NT
	<i>Oxyrhopus rhombifer rhombifer</i> (Duméril, Bibrón & Duméril, 1854)				X	NT
	<i>Philodryas aestivus</i> Boulenger, 1902				X	NT
	<i>Philodryas mattogrossensis</i> Koslowsky, 1898		X	X		NT
	<i>Philodryas patagoniensis</i> (Girard, 1857)	X	X	X	X	NT
	<i>Phimophis vittatus</i> (Boulenger, 1896)	X	X	X	X	NT
	<i>Sibynomorphus turgidus</i> (Cope, 1862)		X			NT
	<i>Thamnodynastes chaquensis</i> Bergna & Álvarez, 1993		X		X	NT
	<i>Thamnodynastes hypoconia</i> Cope, 1863		X	X	X	NT
	<i>Waglerophis merremii</i> (Wagler, 1824)	X	X	X	X	NT
Elapidae	<i>Micrurus baliocoryphus</i> (Cope, 1862)	X				NT
	<i>Micrurus pyrrhocryptus</i> (Cope, 1862)		X		X	NT
Viperidae	<i>Bothrops alternatus</i> Duméril, Bibrón & Duméril, 1854				X	NT
	<i>Bothrops diporus</i> Cope, 1862		X	X	X	NT

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**Figure 2.** Representatives of some of the amphibians recorded at the Oriental Chaco: A) *Odontophrynus americanus*; B) *Hypsiboas raniceps*; C) *Melanophryniscus klappenbachi*; D) *Elachistocleis bicolor*; E) *Trachycephalus venulosus*; F) *Phyllomedusa azurea*. Photos by V. H. Zaracho.

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**Figure 3.** Representatives of some of the reptiles recorded at the Oriental Chaco: A) *Liophis guentheri* (photo by C. C. Calamante); B) *Clelia bicolor* (photo by C. C. Calamante); C) *Phimophis vittatus* (photo by V. H. Zaracho); D) *Echinanthera occipitalis* (photo by C. C. Calamante); E) *Teius teyou* (photo by V. H. Zaracho); F) *Ameiva ameiva* (photo by C. C. Calamante).



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**Figure 4.** Species of reptiles which should be protected: A) *Acanthochelys pallidipectoris* (photo by L. M. Paszko); B) *Eunectes notaeus*; (photo by C. C. Calamante); C) *Boa constrictor occidentalis* (photo by J. A. Ruiz García); D) *Polychrus acutirostris* (photo by V. H. Zaracho).