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Herpetofauna from two municipalities of southwestern Colombia

Herpetofauna de dos municipios del suroeste de Colombia

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Abstract

We present a preliminary list of the herpetofauna of Tumaco and Francisco Pizarro municipalities, department of Nariño, Colombia, located in the south of the Chocó biogeographic region, based on field data and on museum collection databases and literature. We recorded 25 species of amphibians and 55 reptiles. The most species-rich families were Hylidae and Craugastoridae for amphibians, and Colubridae and Dactyloidae for reptiles, a pattern similar to that observed on a global scale. Two new species records for Colombia are presented -*Pristimantis walkeri* and *Scinax tsachila*, as well as range extensions for *Allobates talamancae*, *Anolis auratus*, *Dendropsophus ebraccatus*, *Gonatodes albogularis* and *Scinax sugillatus*. Species accumulation curves and sampling coverage reveal that more field studies are needed for complementing this list, especially studies using methodologies focused on aquatic and fossorial species, and that there could be an effect of deforestation on the diversity of the herpetofauna, which concurs with the lack of canopy amphibians and the exclusive presence of species associated with leaf litter or forest interior in the locations with best plant coverage.

Keywords. Amphibians. Checklist. Chocó biogeographic region. Reptiles. Species richness.

Resumen

Se presenta un listado preliminar de la herpetofauna de los municipios de Tumaco y Francisco Pizarro, departamento de Nariño, Colombia, ubicados al sur del Chocó biogeográfico, basado en datos de campo y búsquedas en base de datos y literatura. Registramos 25 especies de anfibios y 55 de reptiles, siendo las familias Hylidae y Craugastoridae (anfibios) y las familias Colubridae y Dactyloidae (reptiles) las de mayor riqueza, patrón similar al observado a escala global. Se reportan dos nuevos registros de especies para Colombia (*Pristimantis walkeri* y *Scinax tsachila*), así como extensiones de distribución geográfica (*Allobates talamancae*, *Anolis auratus*, *Dendropsophus ebraccatus*, *Gonatodes albogularis* y *Scinax sugillatus*). Las curvas de acumulación de especies y la cobertura de muestreo revelan que se necesitan más estudios de campo para complementar esta lista, especialmente los estudios que utilizan metodologías enfocadas en especies acuáticas y fosoriales, y que podría haber un efecto de la deforestación en la diversidad de la herpetofauna, lo cual concuerda con la falta de anfibios de dosel y la presencia exclusiva de especies asociadas a la hojarasca o al interior del bosque en las localidades con mejor cobertura vegetal.

Palabras clave. Anfibios. Chocó biogeográfico. Listado de especies. Reptiles. Riqueza y representatividad.

Introduction

Nearly 8007 species of amphibians and about 10 793 species of reptiles are recognized worldwide, and of these, 828 amphibians and 618 reptiles are distributed in Colombia (Acosta-Galvis, 2019; AmphibiaWeb, 2019; Frost, 2019; Uetz *et al.*, 2019). In 2004, 139 species of amphibians and 188 species of reptiles were known to occur in the Choco biogeographic region of Colombia (Castaño-Mora *et al.*, 2004; Lynch & Suárez-Mayorga, 2004). However, since 2005, the number of amphibians and reptiles recorded has increased substantially for this region to 157 amphibians and 215 reptiles (Ayerbe-González & López-López, 2005; Heyer, 2005; Passos *et al.*, 2009; Poe *et al.*, 2009; Rengifo & Rentería-Moreno, 2011; Cadle, 2012; Grant & Myers, 2013; Palacios-Rodríguez *et al.*, 2013a, 2013b; Jaramillo-Martínez *et al.*, 2015; Ospina-Sarria *et al.*, 2015; Sánchez-Pacheco *et al.*, 2016; Márquez *et al.*, 2017; Angarita-Sierra & Lynch, 2017; Grant *et al.*, 2017; Rada *et al.*, 2017; Medina-Rangel *et al.*, 2018a, 2018b; Pinto-Erazo & Medina-Rangel, 2018, Grisales-Martínez & Rendón-Valencia, 2019) representing ca. 19 % and 35 % of the richness of Colombian amphibians and reptiles, respectively.

According to Lynch & Suárez-Mayorga (2004), the northern Chocó of Colombia harbors the greatest richness of amphibians in this biogeographic region, and the reduced richness in southern Chocó (in Cauca and Nariño departments) is perhaps a consequence of the few available records in museum collections, and inventory publications. Particularly for Nariño, there are two published species list of amphibians and reptiles from the lowlands (Salaman, 1994; Mueses-Cisneros & Moreno-Quintero, 2012). Likewise, the species descriptions and range extensions are fewer for this department (ca. 15 publications) in comparison with the northern portion of the Colombian Choco biogeographic region (>30 publications) (Acosta-Galvis, 2019; Amphibiaweb, 2019; Frost, 2019; Uetz *et al.*, 2019).

Here we present a preliminary list and a diversity study of the amphibian and reptile fauna of the municipalities of Tumaco and Francisco Pizarro, department of Nariño, Colombia, based on field work, museum records and biodiversity databases, for characterizing and documenting the amphibians and reptiles from southwestern Colombia.

Materials and methods

Study area.

Fieldwork was carried out in the municipalities of Tumaco and Francisco Pizarro, Nariño, Colombia (Figure 1). Four localities were sampled in Tumaco (numbers 1-4 in Table 1) and five localities in Francisco Pizarro (numbers 5-9 in Table 1).

Sampling methods. We visited the municipality of Tumaco four times: 5-14 March, and 6-14 September, 2015; 29 February-9 March, and 5-12 September, 2016; and the municipality of Francisco Pizarro during 15-16 September, 2015; 1-9 March, and 3-4 September, 2016. We captured amphibians and reptiles through active searching in both Francisco Pizarro and Tumaco, and only in Tumaco did we use pitfall traps with drift fences, which were installed in a “Y” array with four buckets at the end of fences and were checked every other day (Crosswhite, 1999). Active searching was carried out during the day (09:00-12:00 h) and during the night (18:00-21:00 h) using the VES (Visual Encounter Survey) methodology, for a total sampling effort of 1604 hours.person⁻¹.

Collected specimens were euthanized with 2 % xylocaine, fixed in 10 % formaldehyde and preserved in 70 % ethanol (Pisani, 1973). Photographs and description of the coloration patterns were recorded for every individual. Additionally, the specimens were identified using Ayala & Castro (unpublished document), Peters & Orejas-Miranda (1970), Lynch (1976), Pérez-Santos & Moreno (1988), Campbell & Lamar (2004), Passos *et al.* (2009), MECN (2010), Harvey *et al.* (2012) and Arteaga *et al.* (2016).

We followed Frost (2019) and Uetz *et al.* (2019) as classification systems for amphibian and reptiles, respectively. All specimens were deposited in the amphibian and reptile collections of the Instituto de Ciencias Naturales (ICN), Universidad Nacional de Colombia (Appendix 1).

Database searching. To complement the species list we consulted the databases of GBIF (Global Biodiversity Information Facility), SIB (Biodiversity Information

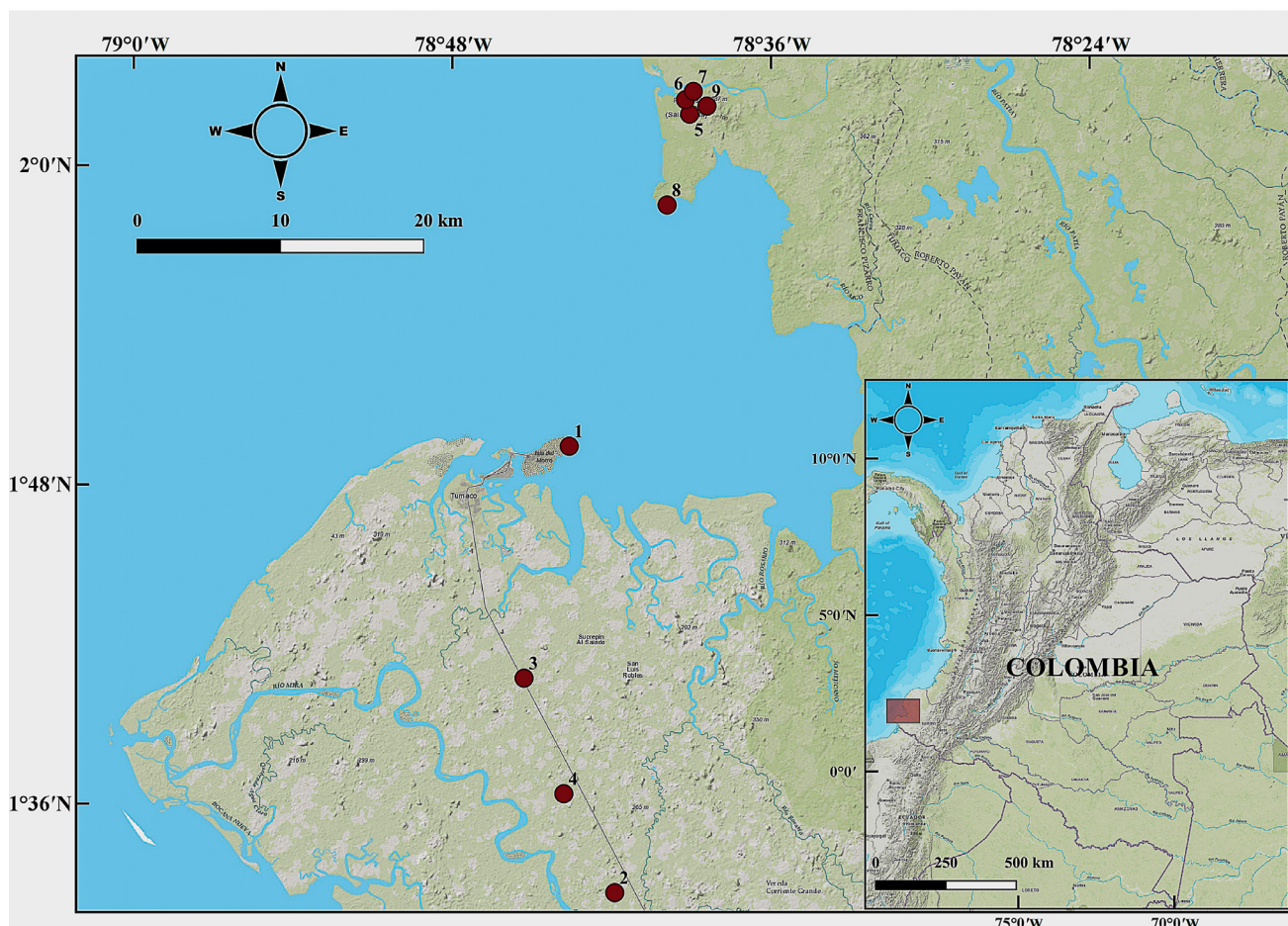


Figure 1. Sampling sites for herpetofauna in Tumaco (1-4) and Francisco Pizarro (5-9), Nariño, Colombia.

Table 1. Localities sampled for herpetofauna in Tumaco (1-4) and Francisco Pizarro (5-9), Nariño, Colombia.

# Site	Sites of sampling	Latitude	Longitude
1	Dirección General Marítima station (DIMAR)	1°49'25.82''N	78°43'35.90''W
2	Corporación Colombiana de Investigación Agropecuaria (CORPOICA)	1°32'39''N	78°41'53''W
3	Mar Agrícola station	1°40'42.89''N	78°45'17.96''W
4	Universidad Nacional de Colombia, Sede Tumaco	1°36'22.10''N	78°43'48.16''W
5	Empresa embotelladora de Agua and El Palmichal	2°01'54.94''N	78°39'03.83''W
6	La Primavera farm	2°02'27.48''N	78°39'13.04''W
7	Neighborhood of the sanitary landfill	2°02'46.16''N	78°38'55.27''W
8	Isla del Gallo	1°58'30.09''N	78°39'54.66''W
9	Bosque del Acueducto	2°02'13.21''N	78°38'24.59''W

System of Colombia) and the biological collections of the Instituto de Ciencias Naturales. Additional information was obtained from [Castaño-Mora *et al.* \(2004\)](#) and [Lynch & Suárez-Mayorga \(2004\)](#).

Data analysis. By means of a rarefaction and an extrapolation curve ([Chao *et al.*, 2014](#)), we estimated the species richness of amphibians and reptiles in the study area. The percentage of completeness (CM %) achieved by our inventory was estimated through sampling coverage curves, and the additional coverage that would be needed to reach the maximum number of species was also estimated. This analysis estimates the proportion of the total number of individuals in a community belonging to a species sampled ([Chao & Jost, 2012](#)). We used the iNEXT R package ([Hsieh *et al.*, 2016](#)) with 1000 bootstraps to create 95 % confidence interval (CI).

Results

During fieldwork we recorded 1392 specimens of 68 species: 23 species of amphibians (991 individuals) and 46 species of reptiles (401 individuals). Amphibian species with the highest abundance were *Epipedobates boulengeri* (380), *Scinax tsachila* (131) and *Rhinella horribilis* (103). For reptiles, *Basiliscus galeritus* (74), *Holcosus bridgesii* (45), *Anolis auratus* (37), *Dipsas gracilis* (28) and *Sibon nebulatus* (24) were the most abundant species ([Appendix 1](#)). With the addition of the information obtained in databases and literature, species richness increases to 25 amphibians and 55 reptiles for both localities ([Appendix 1, Figure 2 and 3](#)). Amphibians are represented by 11 families and 18 genera in the orders Anura, Caudata, and Gymnophiona, and reptiles by 21 families and 24 genera in the orders Squamata (suborders Sauria and Serpentes), Testudines and Crocodylia.

The figures of amphibians and reptiles in Tumaco and Francisco Pizarro represent 16 % of the amphibians and 26 % of the reptiles recorded for the Chocó biogeographic region, and 3 % of the amphibians and 9 % of the reptiles recorded for Colombia ([Castaño-Mora *et al.*, 2004](#); [Lynch & Suárez-Mayorga, 2004](#)).

The amphibian families Hylidae (7 spp., 29 %) and Craugastoridae (4 spp., 17 %) had the highest diversity. In contrast, the families Aromobatidae, Centrolenidae, Eleutherodactylidae, Ranidae (order: Anura) and the family Caeciliidae (order: Gymnophiona) registered the

lowest diversity, each representing 4 % of diversity, with one species. For reptiles, the families with the highest diversity were Colubridae (17 spp., 34 %) and Dactyloidae (10 spp., 20 %) within the order Squamata, and Geoemydidae (2 spp., 50 %) within the order Testudines. The order Crocodylia was represented only by one species. The families Corytophanidae, Diploglossidae, Hoplocercidae, Iguanidae, Phyllodactylidae, Teiidae, Tropiduridae, Elapidae, Tropidophiidae (order: Squamata), Cheloniidae and Kinosternidae (order: Testudines), and Alligatoridae (order: Crocodylia) also had one species each ([Appendix 1, Figure 4](#)).

On a global scale, the highest amphibian diversity is concentrated in the families Craugastoridae, with 832 species, followed by Hylidae, with 720 species ([Frost, 2019](#)). We found a similar trend, since both families contributed to the greatest number of species in the studied municipalities. In reptiles, the family Colubridae (1944 species) and the genus *Anolis* (family Dactyloidae, 429 species), are the most speciose taxa ([Uetz *et al.*, 2019](#)), similar to the pattern of diversity found in our study.

The municipality of Tumaco had a higher number of species (51 species) than Francisco Pizarro (39 species). Tumaco had 29 exclusive species, while 18 species were found only in Francisco Pizarro. In the latter municipality, 39 species and 18 exclusive species were found.

In Tumaco, localities with the highest number of species were Mar Agrícola (32 spp.) and Universidad Nacional, Sede Tumaco (36 spp.), while there were 20 species in Dimar and 12 species in Corpoica. Despite the lower diversity found in these localities, species such as *Diploglossus monotropis* and *Lepidodactylus lugubris* were recorded exclusively in Dimar and Corpoica, respectively. The municipality of Francisco Pizarro, despite having a smaller number of species, had greater number of exclusive amphibian species than Tumaco (9 vs. 5) such as *Pristimantis parvillus*, *P. walkeri* and *Caecilia guntheri*.

Before this publication, and from the same fieldwork done in the region, we published some new records of reptile species for Colombia: *Corallus blombergi* ([Pinto-Erazo & Medina-Rangel, 2018](#)) and *Anolis festae* ([Medina-Rangel *et al.* 2018a](#)), both of them previously known only from Ecuador. Additionally, in this study we expand the distribution of *Anolis auratus* and *Gonatodes*

albogularis. The former had been recorded up to the department of Valle del Cauca, and in the case of *G. albogularis*, up to Gorgona Island, department of Cauca (Castaño-Mora *et al.*, 2004; Castro-Herrera *et al.*, 2012). Records of these species correspond to the southernmost localities in the Chocó biogeographic region of Colombia.

Likewise, for amphibians we found new records for Colombia: *Pristimantis walkeri* (reported only in Ecuador, Arteaga *et al.*, 2013) and *Scinax tsachila* (recently described and reported in Ecuador, Ron *et al.* (2018)). Moreover, *Allobates talamancae*, *Dendropsophus ebraccatus* and *Scinax sugillatus*, are new records for the department of Nariño (Acosta-Galvis, 2019).



Figure 2. Some of the amphibian species reported in Tumaco and Francisco Pizarro, Nariño, Colombia. A, *Boana pellucens*; B, *Boana rosenbergi*; C, *Cochranella litoralis*; D, *Craugastor longirostris*; E, *Epipedobates boulengeri*; F, *Oophaga sylvatica*; G, *Pristimantis walkeri*; H, *Scinax tsachila*; I, *Trachycephalus jordani*; J, *Bolitoglossa biseriata*; K, *Caecilia guntheri*.

Photographs: Guido F. Medina-Rangel (B, E, F, G, J, K), María José Espejo (A, C, H, I) and Javier Ardila (D).

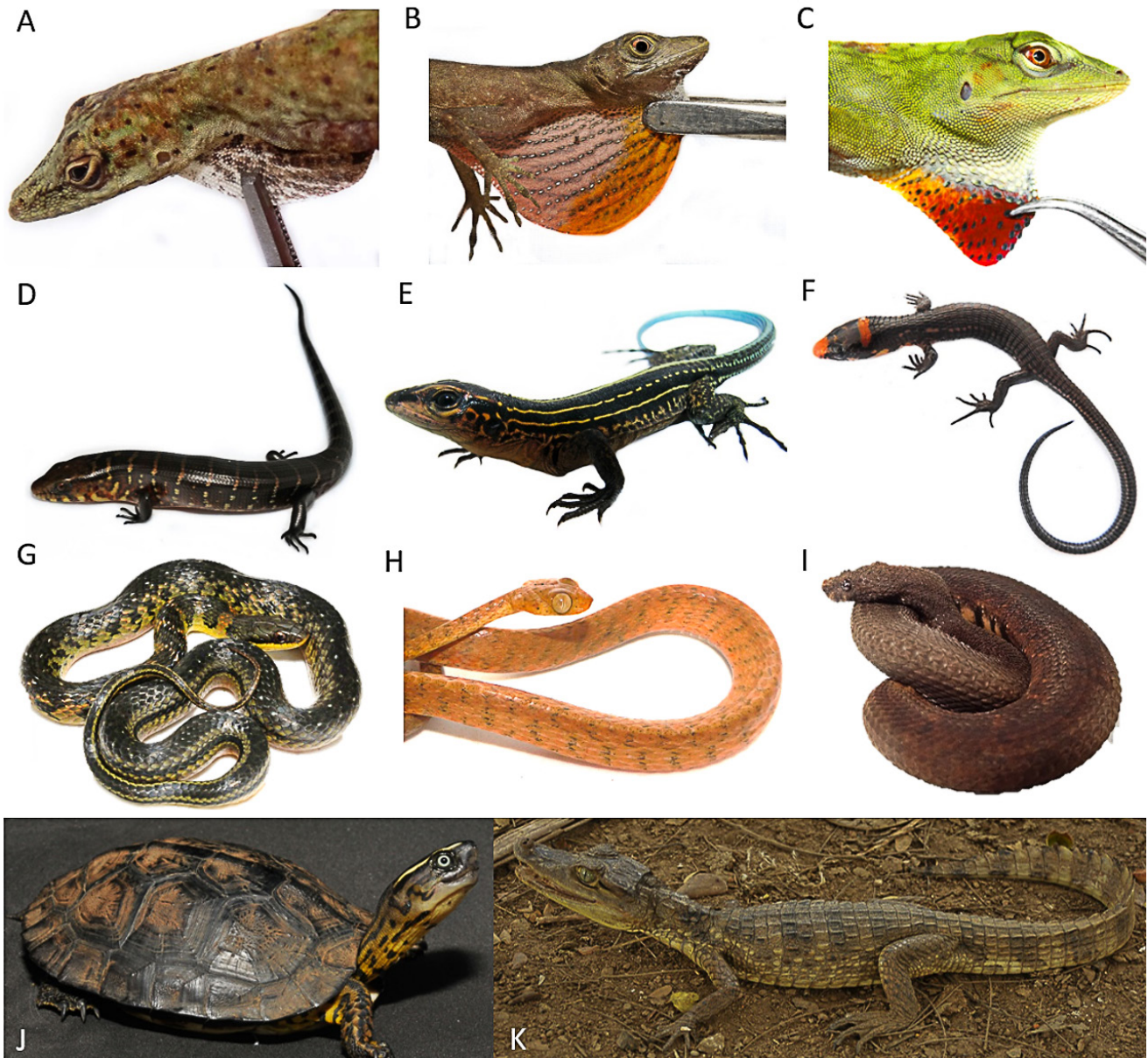


Figure 3. Some of the reptile species reported in Tumaco and Francisco Pizarro, Nariño, Colombia. A, *Anolis festae*; B, *Anolis maculiventris*; C, *Anolis parvaauritus*; D, *Diploglossus monotropis*; E, *Holcosus bridgesii*; F, *Ptychoglossus gorgonae*; G, *Erythrolamprus epinephelus*; H, *Imantodes inornatus*; I, *Trachyboa boulengeri*; J, *Rhinoclemmys melanosterna*; K, *Caiman crocodilus*.

Photographs: Guido F. Medina-Rangel (B, D, G, J, K), Javier Ardila (C), María José Espejo (A, E, I), Martha Calderón (H) and María Alejandra Pinto-Erazo (F).

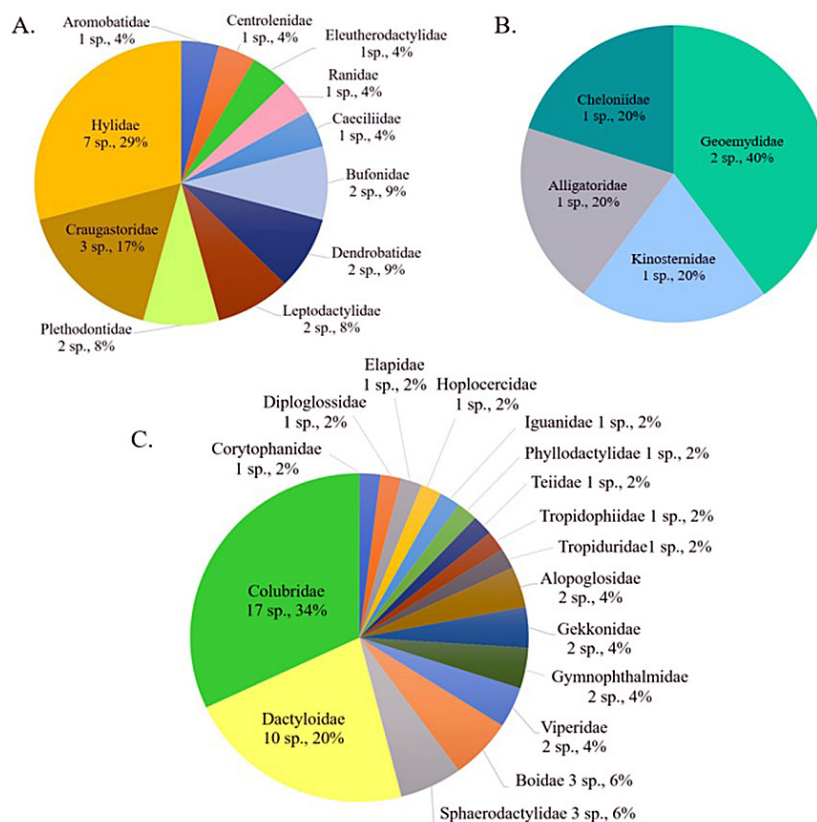


Figure 4. Number of species and richness percentage per family of amphibians and reptiles in Tumaco and Francisco Pizarro, Nariño, Colombia. A, Amphibia; B, Testudines and Crocodylia; C, Squamata.

Accumulation curves and sampling coverage.

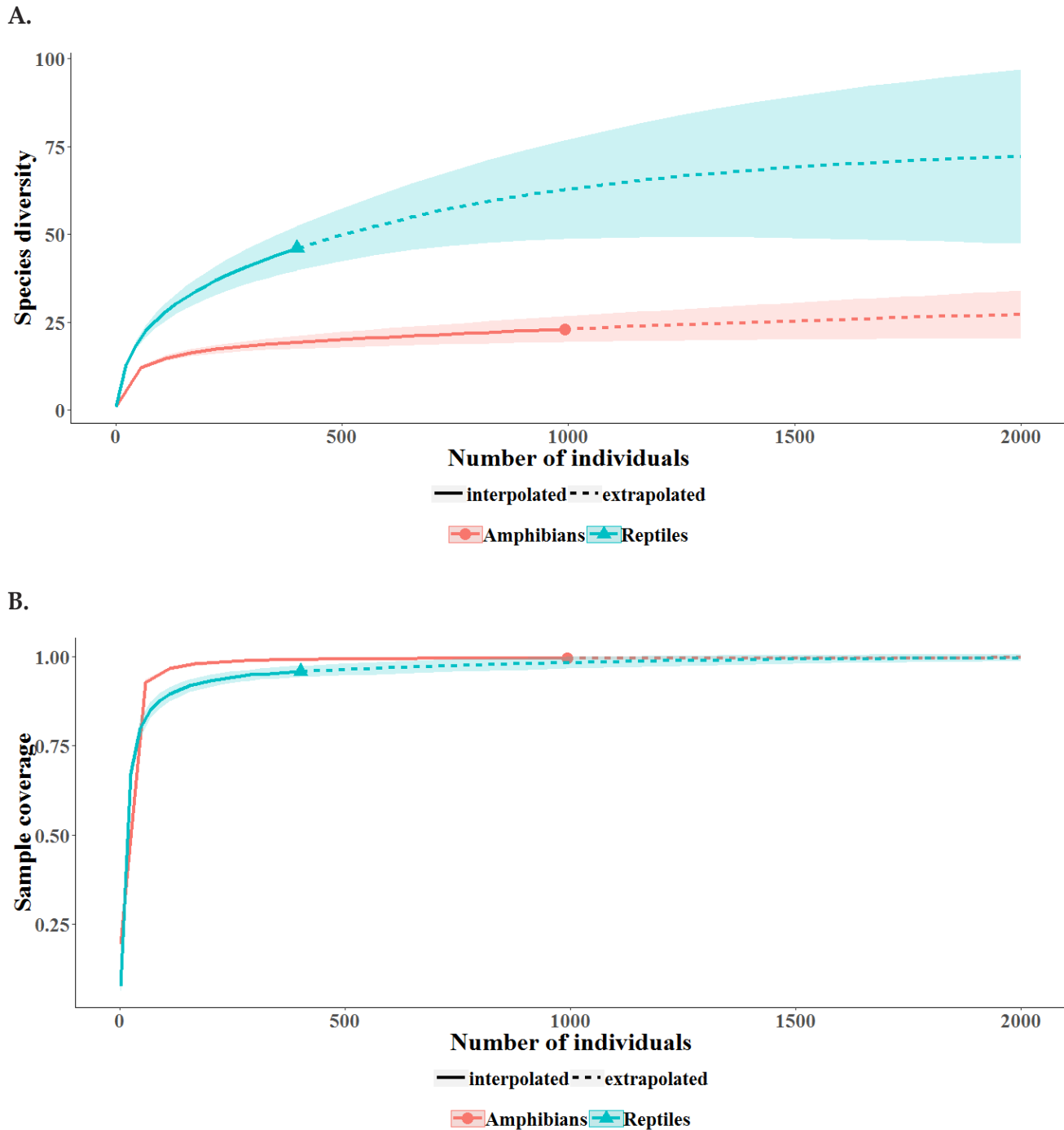
According to our data, we estimated that up to 111 species, around 36 amphibians and 75 reptiles, can be found with a greater sampling effort when sampling coverage higher than 99 % is reached (Figure 5A). In amphibians, with 991 individuals, we obtained a sampling coverage of 98 %, and in reptiles, with 401 individuals, we found a sampling coverage of 95 % (Figure 5B). This inventory has shown slightly better richness results for amphibians than reptiles.

Discussion

In comparison to the herpetofauna recorded for the province of Esmeraldas in Ecuador (MECN, 2010), adjacent to the southern lowlands of the department of Nariño, the municipalities of Tumaco and Salahonda have fewer species. The families Hemiphractidae, Microhylidae and Phyllomedusidae, found in Esmeraldas,

were not present in our study. Similarly, within reptiles, of the 24 families recorded in Esmeraldas, two families of lizards (Gymnophthalmidae and Polychrotidae), one of amphisbaenids (Amphisbaenidae), two of snakes (Anomalepididae and Leptotyphlopidae) and one of turtles (Chelydridae) were not found in Tumaco and Salahonda. These differences can be due to methodologies focused on ground-dwelling-species (Amphisbaenidae, Gymnophthalmidae, Leptotyphlopidae, Microhylidae), and that some environments such as aquatic habitat (where Chelydridae species may be found) or canopy habitat (for Hemiphractidae and Phyllomedusidae species) were not sampled at all in this study. Therefore, more sampling effort will be needed to maximize encounter success of some taxa, although our sampling coverage was high for both amphibians and reptiles.

The study region has been classified as a hotspot for deforestation in Colombia, with a probability of 70 % of forest cover being converted to agricultural uses (Etter *et al.*, 2006). This may partially explain, in addition to the lack of certain methodologies, why some of



the forest fossorial or leaf litter reptile species were not observed in this study. The same reason can be claimed to explain the absence of some amphibian records in this region, particularly species of the families Hemiphractidae and Phyllomedusidae, which are closely associated with tall-tree vegetation, and are found vocalizing (e.g. members of the genera *Agalychnis*, *Gastrotheca*) or perching, in the canopy (e.g. *Cruziohyla calcarifer*) (Castro-Herrera & Vargas-Salinas, 2008; MECN, 2010; Palacios-Rodríguez *et al.*, 2018). Furthermore, habitat fragmentation, agricultural development, and fumigation with chemicals are factors that reduce the population density of species like *Gastrotheca cornuta* in Cauca and Nariño (Coloma *et al.*, 2008).

In the Colombian Chocó biogeographic region, most of the amphibian families have slightly high endemism values. Particularly, the family with the highest percentage of endemism is Plethodontidae, since 35 % of species are found only in this region (Lynch & Suárez-Mayorga, 2004). In reptiles, there are 127 endemic species for Colombia, and 30 occur exclusively in this region, representing a 24 % rate of endemism (Castaño-Mora *et al.*, 2004). In this study we found 17 out of 25 species of amphibians and 27 out of 55 species of reptiles endemic for the Chocó Biogeographic region (Appendix 1). In consequence, this region is considered not only as a hotspot for deforestation in Colombia, but also as a hotspot for biodiversity and it acquires a significant relevance regarding the diversity and endemism of its fauna.

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Appendix 1. Taxon list, abundances and museum collection codes of amphibian and reptile species reported in Tumaco and Francisco Pizarro, Nariño, Colombia. #: Endemic species for the Chocó Biogeographic region. Localities: (1) DIMAR, (2) CORPOICA, (3) Mar Agrícola, (4) Universidad Nacional de Colombia, Sede Tumaco and Francisco Pizarro, (5) El Palmichal, (6) La Primavera, (7) the sanitary landfill, (8) Isla del Gallo, (9) Bosque del Acueducto. *Species reported in museum collection databases, in [Castaño-Mora et al., 2004](#) or [Lynch & Suárez-Mayorga, 2004](#). -: No data. O: Observed but not collected.

Family	Species	Localities	Abundance	Collection codes
Order Anura				
Aromobatidae	<i>Allobates talamancae</i> # (Cope, 1875)	4	8	ICN 57096
Bufonidae	<i>Rhinella alata</i> * # (Thomiot, 1884)		-	-
	<i>Rhinella horribilis</i> (Wiegmann, 1833)	1, 2, 3, 4	103	ICN 57097-99, 58382-83
Centrolenidae	<i>Cochranella litoralis</i> # (Ruiz-Carranza and Lynch, 1996)	4	3	-
Craugastoridae	<i>Craugastor longirostris</i> (Boulenger, 1898)	1, 3, 4, 5, 6, 7, 8, 9	45	ICN 57105-22
	<i>Pristimantis achatinus</i> (Boulenger, 1898)	4	2	ICN 57103
	<i>Pristimantis parvillus</i> # (Lynch, 1976)	5, 9	11	ICN 57123-29, 58380
	<i>Pristimantis walkeri</i> # (Lynch, 1974)	5	1	ICN 58379
	<i>Strabomantis anomalus</i> * (Boulenger, 1898)		-	-
Dendrobatidae	<i>Epipedobates boulengeri</i> # (Barbour, 1909)	1, 3, 4, 5, 6, 8, 9	380	ICN 57131-40, 58384-87
	<i>Oophaga sylvatica</i> # (Funkhouser, 1956)	5, 6, 9	14	ICN 57130, 58388
Eleutherodactylidae	<i>Diasporus gularis</i> # (Boulenger, 1898)	5, 9	15	ICN 57104
Hylidae	<i>Boana pellucens</i> # (Werner, 1901)	1, 3, 4, 5, 9	40	ICN 57141-51
	<i>Boana rosenbergi</i> # (Boulenger, 1898)	1, 3, 4, 5, 6, 9	45	ICN 57152-54
	<i>Dendropsophus ebraccatus</i> (Cope, 1874)	3	2	ICN 57155-56
	<i>Scinax tsachila</i> # Ron, Duellman, Caminer, and Pazmiño, 2018	1, 2, 3, 4, 5, 9	131	ICN 57157-69
	<i>Scinax sugillatus</i> # (Duellman, 1973)	3, 4	14	ICN 57170-74

	<i>Smilisca phaeota</i> (Cope, 1862)	1, 2, 3, 4, 5, 9	44	ICN 57175-83
	<i>Trachycephalus jordani</i> # (Stejneger and Test, 1891)	1, 3, 4, 5, 9	20	ICN 57184-90
Leptodactylidae	<i>Leptodactylus rhodomerus</i> # Heyer, 2005	5, 6	10	ICN 57191-93
	<i>Leptodactylus ventrimaculatus</i> # Boulenger, 1902	1, 2, 3, 4, 5	98	ICN 57194-207
Ranidae	<i>Lithobates vaillanti</i> (Brocchi, 1877)	5, 6, 7	4	ICN 57208
Order Caudata				
Plethodontidae	<i>Bolitoglossa biseriata</i> Tanner, 1962	5	1	ICN 57209
	<i>Bolitoglossa medemi</i> # Brame and Wake, 1972	5	1	ICN 57210
Order Gymnophiona				
Caeciliidae	<i>Caecilia guntheri</i> # Dunn, 1942	5	1	ICN 57211
Order Squamata				
Sauria				
Alopoglosidae	<i>Alopoglossus festae</i> # Peracca, 1904	5	1	ICN-R 12669
	<i>Ptychoglossus gorgonae</i> # Harris, 1994	5	1	ICN-R 12670
Corytophanidae	<i>Basiliscus galeritus</i> Duméril, 1851	2, 3, 4, 5, 8, 9	74	ICN-R 12627-28, 12660
Dactyloidae	<i>Anolis auratus</i> Daudin, 1802	1, 2, 3, 4	37	12630-32, 12634
	<i>Anolis anchicaya</i> *# Poe, Velasco, Miyata & Williams, 2009		-	ICN - R 3697
	<i>Anolis chloris</i> # Boulenger, 1898	1, 2, 3, 4	11	ICN-R 12629, 12633, 1265
	<i>Anolis festae</i> # Peracca, 1904	3	6	ICN-R 12644
	<i>Anolis granuliceps</i> # Boulenger, 1898	3	4	ICN-R 4158, 12723
	<i>Anolis lyra</i> # Poe, Velasco, Miyata & Williams, 2009	4	1	ICN-R12652
	<i>Anolis maculiventris</i> Boulenger, 1898	3, 4, 5	21	ICN-R 12659
	<i>Anolis parvaauritus</i> # (Williams, 1966)	2, 3, 4, 5, 9	21	ICN-R 12624-25, 12649, 12656,

	<i>Anolis princeps</i> *# Boulenger, 1902		-	ICN 3583
	<i>Anolis "malkini"</i> Cope, 1863	1	1	ICN-R 12635
Diploglossidae	<i>Diploglossus monotropis</i> # (Kuhl, 1820)	1	2	ICN-R 12623, 12722
Gekkonidae	<i>Hemidactylus frenatus</i> Duméril & bibron, 1836	1, 4, 5	19	ICN-R 12636-8, 12664, 12715, 12719
	<i>Lepidodactylus lugubris</i> (Duméril & Bibron, 1836)	2	2	ICN-R 12639
Gymnophthalmidae	<i>Anadia vittata</i> *# Boulenger, 1913		-	-
	<i>Echinosaura horrida</i> *# Boulenger, 1890		-	UVC 13189
Hoplocercidae	<i>Enyaliodes heterolepis</i> # (Bocourt, 1874)	5	2	ICN-R 12721
Iguanidae	<i>Iguana iguana</i> (Linnaeus, 1758)	1, 3	4	ICN-R 4619-20
Phyllodactylidae	<i>Thecadactylus rapicauda</i> (Houttuyn, 1782)	4, 5, 8, 9	7	ICN-R 12653, 12712- 14
Sphaerodactylidae	<i>Gonatodes albogularis</i> (Duméril & Bibron, 1836)	3	5	ICN-R 12640-43, 12811
	<i>Lepidoblepharis intermedius</i> # Boulenger, 1914	1, 4	18	ICN-R 12671-74
	<i>Lepidoblepharis ruthveni</i> # Parker, 1926	5, 9	3	ICN-R 12717, 12718, 12730
Teiidae	<i>Holcosus bridgesii</i> # Cope, 1869	1, 4, 5, 6, 8, 9	45	ICN-R 12622, 12626, 12661-62
Tropiduridae	<i>Stenocercus iridescens</i> *# (Günther, 1859)		-	ICN-R-4225
Serpentes				
Boidae	<i>Boa constrictor</i> Linnaeus, 1758	1	1	O
	<i>Corallus annulatus</i> (Cope, 1875)	5, 9	2	ICN-R 12654
	<i>Corallus blombergi</i> # (Rendahl & Vestergren, 1940)	4	1	ICN-R 12701
Colubridae	<i>Atractus iridescens</i> # Peracca, 1896	4	1	ICN-R 12812
	<i>Chironius flavopictus</i> # (Werner, 1909)	3	1	ICN-R 12699

	<i>Dipsas gracilis</i> # (Boulenger, 1902)	2, 3, 4, 5, 6, 9	28	ICN-R 12607, 12614, 12617-18, 12647, 12657, 12705
	<i>Erythrolamprus epinephelus</i> (Cope, 1862)	2, 3	3	ICN-R 12608, 12619, 12707
	<i>Imantodes cenchoa</i> (Linnaeus, 1758)	3, 4	5	ICN-R 12611-12, 12620, 12658
	<i>Imantodes inornatus</i> (Boulenger, 1896)	3	1	ICN-R 12610
	<i>Leptodeira annulata</i> (Linnaeus, 1758)	3, 4, 5	7	ICN-R 12609, 12613, 12615, 12655, 12700
	<i>Leptophis ahaetulla</i> (Linnaeus, 1758)	4	1	ICN-R 12605
	<i>Leptophis depressirostris</i> # (Cope, 1861)	5	1	ICN-R 12663
	<i>Mastigodryas pulchiceps</i> (Cope, 1868)	5	1	ICN-R 12703
	<i>Ninia teresitae</i> # Angarita-Sierra & Lynch, 2017	2, 3, 5	3	ICN-R 12616, 12621, 12702
	<i>Oxybelis aeneus</i> * (Wagler, 1824)		-	-
	<i>Oxybelis brevirostris</i> * (Cope, 1861)		-	ICN-R 2640
	<i>Oxyrhopus petolarius</i> (Linnaeus, 1758)	4	1	ICN-R 12706
	<i>Phrynonax shropshirei</i> # (Barbour & Amaral, 1924)	3	1	ICN-R 12646
	<i>Sibon nebulatus</i> (Linnaeus, 1758)	3, 4, 5, 6, 9	24	ICN-R 12645, 12648, 12650, 12704
	<i>Spilotes pullatus</i> (Linnaeus, 1758)	4, 5, 7	2	ICN-R 12597, 12711
Elapidae	<i>Micrurus dumerilii trasandinus</i> (Jan, 1858)	5	1	ICN-R 12709
Tropidophiidae	<i>Trachyboa boulengeri</i> # Peracca, 1910	4	1	ICN-R 12813
Viperidae	<i>Bothriechis schlegelii</i> (Berthold, 1846)	4	1	ICN-R 12606
	<i>Bothrops asper</i> (Garman, 1883)	5, 7	4	ICN-R 12708, 12710
Order Testudinata				
Cheloniidae	<i>Lepidochelys olivacea</i> * (Eschscholtz, 1829)		-	-

Geoemydidae	<i>Rhinoclemmys nasuta</i> ## (Boulenger, 1902)		-	ICN-R 7710,7711, 7750
	<i>Rhinoclemmys melanosterna</i> # (Gray, 1861)	1, 3, 4, 5	11	ICN-R 7704
Kinosternidae	<i>Kinosternon leucostomum</i> (Duméril, Bibron & Duméril, 1851)	1, 2, 3, 4, 5, 9	11	O
Order Crocodylia				
Alligatoridae	<i>Caiman crocodilus</i> (Linnaeus, 1758)	3	3	O
32	80	20	1392	

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