

# LIVING WORLD

Journal of the Trinidad and Tobago  
Field Naturalists' Club

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ISSN 1029-3299



TRINIDAD AND TOBAGO  
**FIELD NATURALISTS' CLUB**

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Auguste, R. J., Charles, S. P., Murphy, J. C. 2015. An Updated Checklist of the Amphibians and Reptiles of the Aripo Savannas. *Living World, Journal of The Trinidad and Tobago Field Naturalists' Club*, 2015, 37-43.

# An Updated Checklist of the Amphibians and Reptiles of the Aripo Savannas Scientific Reserve, Trinidad, West Indies

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## ABSTRACT

Amphibians and reptiles are among the most threatened vertebrate taxa. Protected areas represent a conservation management tool to preserve species and the Aripo Savannas Scientific Reserve in Trinidad is one example. The aim of our study was to update the species richness of amphibians and reptiles of the Aripo Savannas Scientific Reserve. Nine amphibian species and twenty-eight reptile species have previously been reported at Aripo Savannas. Our surveys detected 19 amphibian species (10 previously unrecorded) and 40 reptile species (12 previously unrecorded) in the reserve. The amended checklist of 19 amphibians and 40 reptiles may provide opportunities for more effective conservation management measures for these species within the reserve.

**Key words:** Aripo Savannas, conservation, herpetofauna, Trinidad.

## INTRODUCTION

Amphibians and reptiles (herpetofauna) are important components of ecosystems (Gibbons *et al.* 2000; Crump 2010). Herpetofauna play a key role in energy flow and nutrient cycling acting as herbivores, prey, and predators in ecosystems (Crump 2010). However, herpetofauna are among the most threatened vertebrate groups on Earth and especially in the Neotropics, even within protected areas (Stuart *et al.* 2004; Böhm *et al.* 2013).

Trinidad and Tobago's herpetofauna are incompletely documented (Hailey and Cazabon-Mannette 2011; Murphy and Downie 2012). Murphy (1997) listed 112 species of amphibians and reptiles for Trinidad and Tobago. This number has since risen due to scientific research including new discoveries (Murphy and Downie 2012). Trinidad and Tobago have a variety of habitats and most, if not all, are used by the herpetofauna. Some species are habitat specialists, such as *Flectonotus fitzgeraldi*, whereas others may be considered habitat generalists, for example *Rhinella marina* (Murphy 1997). One protected area which is also designated an Environmentally Sensitive Area in Trinidad is the Aripo Savannas Scientific Reserve (hereafter ASSR) (Hailey and Cazabon-Mannette 2011). Areas such as this are designed to protect all of the species found within them.

A faunal checklist compiled by Schwab (1988) for the ASSR reported nine amphibian species and 26 reptile species. Murphy (1997) noted two additional reptile species (*Gonatodes humeralis* and *Amerotyphlops cf. brongersmianus*) for ASSR based on museum materials. Since then, there have been no published reports on the herpetofauna within the ASSR. We provide a revised list of the known herpetofauna located within and on the

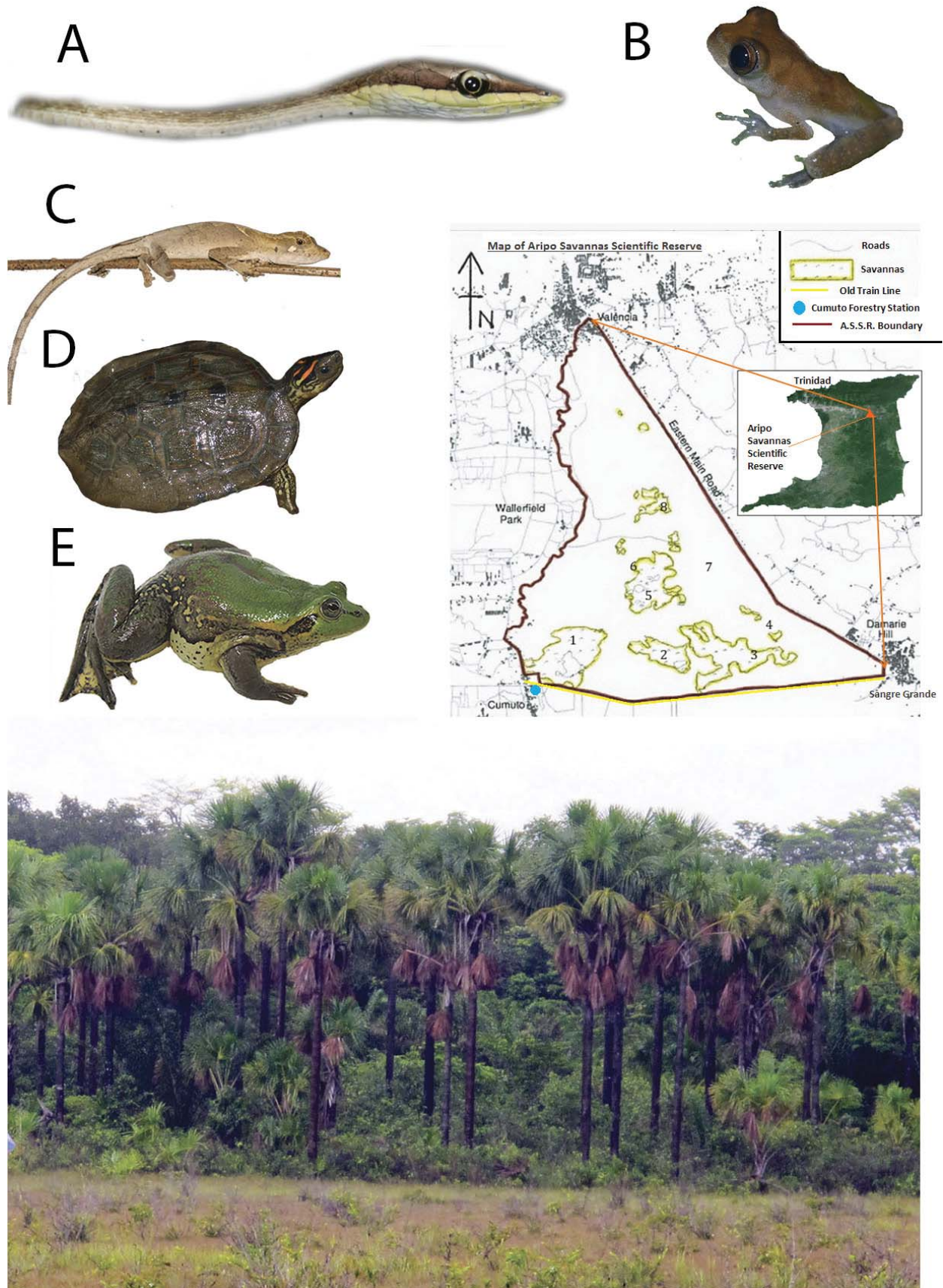
border of the ASSR and briefly describe the conservation implications.

## METHOD

### Study Area

The ASSR comprises 1800 ha in the east-central region of the northern basin of Trinidad, just south of the Quare Valley of the Northern Range, and flanked by the Quare River in the east, and the Aripo River in the west (10°35'30" N, 61°12'0" W). Mean monthly rainfall ranges from 2500mm to 2800mm and mean monthly temperature ranges from 20-32°C (Richardson 1963). The topography ranges from 30 to 45m in elevation (Richardson 1963). The region is typified by sandy topsoils overlaying impervious subsoil horizons (Panton 1953) that support a patchwork of savannas, interspersed with marsh forests and palm marshes (Beard 1946). Towns bordering the ASSR include Valencia to the north, Wallerfield to the west, Cumuto to the south and Sangre Grande to the east (Figure 1).

In addition to observations within the ASSR, we included observations made along the transect referred to as the Old Train Line (a wide open grass-lined, mainly forest-flanked dirt road that forms the entire southern border of the ASSR; start point of the transect was at the Cumuto Forestry Station: 10°35'35" N, 61°12'27" W and the end point of the transect was 2.5km east of this), as well as at the Cumuto Forestry Station (a small field station comprised of a few buildings and open garden areas which serves as the administrative centre for the ASSR and is located at the western end of the southern border of the reserve) (Figure 1).



**Fig. 1.** ASSR map, selected herpetofauna and habitat. **A.** *Oxybelis aeneus* (Brown Vine Snake), **B.** *Dendropsophus goughi* (formerly *D. minuta*) (Minute Tree Frog), **C.** *Anolis planiceps* (Leaf Anole), **D.** *Rhinoclemmys punctularia* (Galap), **E.** *Pseudis paradoxa* (Paradoxical Frog).

## Sampling Method

This study was divided into three sampling periods, one in 2011, one in 2014 and one in 2015. Data in 2011 were gathered by SPC and JCM, and data in 2014 and 2015 were gathered by RJA. The first sampling period was brief (17-19 June, 2011) but intense, and involved 1 to 2 hour searches conducted by 3 to 20 individuals at mid-morning, midday, mid-afternoon and just after night fall along trails that bisected and skirted savanna habitat (Savannas I, II and V) and that transected the intervening marsh forest habitat, as well as along the Old Train Line. In addition, chance observations were made around the buildings and garden areas at the Cumuto Forestry Station.

The second sampling period involved chance observations of amphibians and reptiles while participating in other faunal surveys taking place at daily time intervals similar to those of the 2011 sampling period. Sampling ran from April to December 2014 and was typically once per month. The third sampling period took place during the months of June and July 2015 and also involved chance observations.

For each survey period, we visually searched for herpetofauna by searching tree trunks, logs, bark, rocks, leaf litter, vegetation, and the margin of any water bodies encountered, as well as listened for frog calls. Each reptile or amphibian that was positively identified at least to genus level was recorded. Efforts were made to capture individual animals safely when species level identification at a distance was not possible. Upon confirmation of species identity, most animals were released at the site of capture. In 2011, a number of voucher specimens were taken, humanely euthanized using sodium pentobarbitone (at 60 mg/ml), fixed and stored in 70% ethanol, catalogued and lodged at the Zoology Museum of the St. Augustine Campus of the University of the West Indies. We recorded the habitat type (marsh forest, savanna, palm marsh, ecotone, trail line, forestry station) and the microhabitat of each species encountered.

## RESULTS

Based on our survey within and along the border of the ASSR, we recorded 19 amphibian species in 13 genera and 7 families, and 40 reptile species including one crocodylian species, two freshwater turtle species from two families, 14 saurians in 13 genera and 10 families, and 11 serpents in 11 genera and 4 families for the ASSR which represents approximately 42% of the herpetofauna for Trinidad and Tobago as listed by Murphy (1997) (see Table).

## DISCUSSION

### Species records

The results of our surveys were largely unsurprising

given that most of the species that we recorded have been cited as occurring in locales proximate to the ASSR (Murphy 1997). One species, *Hydrops triangularis*, had not been previously recorded in proximity to the ASSR. The distributions of most snakes are poorly assessed both globally (IUCN 2014) and in Trinidad. This record may thus be considered as likely to have been expected, considering that the specimen was observed in habitat and microhabitat that is generally typical for the species (Murphy 1997).

Eleven reptiles reported by Schwab (1988) and one by Murphy (1997) were not observed during our surveys. These included ten snakes (*Amerotyphlops cf. bronger-smianus*, *Boa constrictor*, *Corallus ruschenbergerii*, *Eunectes murinus*, *Leptophis coeruleodorsus*, *Mastigodryas boddaerti*, *Phrynonax poecilonotus*, *Cleia cleia*, *Pseudoboa newwiedii* and *Lachesis muta*), one freshwater turtle (*Mesoclemmys gibba*) and one tortoise (*Chelonoidis denticulata*). Given the relatively brief nature of our surveys, we can make no conclusions regarding the current status of these species in the ASSR. Many reptiles, in particular some turtles and many snakes, as a consequence of their specific microhabitat use and cryptic behaviour are fairly difficult to survey (Gibbons *et al.* 2000; Böhm *et al.* 2011). As such, it is possible that these undetected species are still present in the ASSR and that they, and others not recorded in this study or previously in the literature, are likely to be observed in future surveys.

### Habitat variation among species

Approximately forty-three percent of herpetofauna observed during our study were recorded solely within the marsh forests of the reserve. No species were recorded solely in the savannas. Generally, the diversity of herpetofauna in savannas is low compared to tropical forests (Stuart *et al.* 2004; Böhm *et al.* 2013). The remaining 57% of herpetofauna were observed in ecotone areas as well as on the border of the reserve, along the train line and the Forestry Station. Thus, it should be expected that more than half of our new records for the reserve (approximately 55%) comprise these species which may be considered habitat generalists.

### Conservation implications

Two frogs recorded in our study, *Pristimantis urichi* and *Flectonotus fitzgeraldi*, are currently considered endangered by the IUCN Red List (IUCN 2014). Their detection in the ASSR increases our knowledge of their distribution and further validates the conservation value of the reserve. The green iguana (*Iguana iguana*), matte (*Tupinambis teguixin*), and caiman (*Caiman crocodilus*) are reptiles that have been historically hunted for food in Trinidad (Hailey and Cazabon-Mannette 2011) whereas

**Table.** Herpetofauna recorded for the Aripo Savannas Scientific Reserve in this study and in the literature. \* New Record; Habitat: S – Savanna, MF – Marsh Forest, E – Ecotone, ASB – Aripo Savanna Border, TL – Train Line, FS – Forestry Station; Survey: D – Diurnal, N – Nocturnal.

TAXA/SPECIES NAME	COMMON NAME	HABITAT	MICROHABITAT	SURVEY
<b>AMPHIBIANS</b>				
<b>Family Bufonidae</b>				
<i>Rhinella beebei</i>	Beebe's toad	MF, S, (TL)	Grass, Muddy track	D and N
<i>Rhinella marina</i>	Crapaud	MF, (TL)	Muddy track	D and N
<b>Family Hemiphractidae</b>				
<i>Flectonotus fitzgeraldi</i>	Trinidad and Tobago marsupial frog	MF	Tree branch	D and N
<b>Family Hylidae</b>				
<i>Dendropsophus microcephalus</i>	Small-headed tree frog	MF, E, (TL)	Vegetation above pool of water	N
<i>Dendropsophus goughi</i> (formerly <i>D. minuta</i> )	Minute tree frog	MF, ASB	Vegetation near ditch	N
<i>Hypsiboas geographicus</i> *	Map tree frog	MF	Tree branch	N
<i>Hypsiboas punctatus</i> *	Lesser green tree frog	MF, (TL)	Vegetation on ground	N
<i>Phyllomedusa trinitatis</i> *	Trinidad leaf frog	MF, ASB	Vegetation above pool of water	N
<i>Pseudis paradoxa</i> *	Paradoxical frog	E, (MF/S), (TL)	Flooded ditch	N
<i>Scinax ruber</i>	Lesser brown tree frog	E, (MF/S), (TL)	Vegetation near ponds and ditches	N
<i>Sphaenorhynchus lacteus</i> *	Lime tree frog	MF	Vegetation near pool of water	N
<i>Trachycephalus typhonius</i> *	Warty tree frog	MF	Tree branch	D and N
<b>Family Leiuperidae</b>				
<i>Engystomops pustulosus</i> *	Tungara frog	E, (MF/S), (TL)	Muddy track	N
<b>Family Leptodactylidae</b>				
<i>Leptodactylus fuscus</i> *	Whistling frog	MF, S, (TL)	Forest floor, muddy track, ditch	D and N
<i>Leptodactylus</i> cf. <i>hylaedactylus</i> *	Lesser dark-spotted thin-toed frog	MF	Leaf litter on forest floor	N
<i>Leptodactylus validus</i>	Garmin's thin-toed frog	MF	Forest floor and ditch	D and N
<b>Family Microhylidae</b>				
<i>Elachistocleis ovalis</i>	Common narrow-mouthed frog	MF	Pool edge, forest floor	D and N
<i>Elachistocleis surinamensis</i>	Flashy narrow-mouth frog	MF, S, (TL)	Muddy track	N
<b>Family Craugastoridae</b>				
<i>Pristimantis urichi</i> *	Urlich's litter frog	MF	Forest floor	N
<b>REPTILES</b>				
<b>TURTLES</b>				
<b>Family Chelidae</b>				
<i>Mesoclemmys gibba</i>	Gibba turtle	Recorded in Schwab 1988		
<b>Family Geomydidae</b>				
<i>Rhinoclemmys punctularia</i>	Galap	MF, S	Muddy track, forest floor	D and N
<b>Family Kinosternidae</b>				

TAXA/SPECIES NAME	COMMON NAME	HABITAT	MICROHABITAT	SURVEY
<i>Kinosternon scorpioides</i>	Scorpion mud turtle	MF	Forest floor	D
<b>Family Testudinidae</b>				
<i>Chelonoidis denticulata</i>	Yellow-footed morocoy	Recorded in Schwab (1988)		
<b>CROCODILIAN</b>				
<b>Family Alligatoridae</b>				
<i>Caiman crocodilus</i>	Spectacled caiman	MF, S	Pool of water, stream	D and N
<b>LIZARDS</b>				
<b>Family Amphisbaenidae</b>				
<i>Amphisbaena fuliginosa</i> *	Black and white worm lizard	ASB (FS)	Driveway	D
<b>Family Dactyloidae</b>				
<i>Anolis planiceps</i>	Jungle anole	MF	Vegetation	D and N
<b>Family Gekkonidae</b>				
<i>Hemidactylus mabouia</i> *	Wood slave	ASB (FS)	Wall of field station building	D
<b>Family Phyllodactylidae</b>				
<i>Thecadactylus rapicauda</i> *	Chec-a-chec	MF	Tree branch, bunker wall	D
<b>Family Sphaerodactylidae</b>				
<i>Gonatodes humeralis</i>	Spot-nosed gecko	MF	Tree bark	D
<i>Gonatodes vittatus</i> *	Streaked lizard	E, (MF/S), (FS)	Walls of buildings	D
<i>Sphaerodactylus molei</i> *	Mole's day gecko	ASB (FS)	Wall of building	D
<b>Family Iguanidae</b>				
<i>Iguana iguana</i>	Green iguana	MF, ASB	Forest floor, tree branch	D and N
<b>Family Hoplocercidae</b>				
<i>Polychrus marmoratus</i>	Multi-coloured tree lizard	MF	Tree branch	D
<b>Family Scincidae</b>				
<i>Copeoglossum aurae</i>	Greater Windward skink	MF	Tree branch	D
<b>Family Teiidae</b>				
<i>Ameiva atrigularis</i>	Zandolie	MF, E (MF/S), (FS)	Forest floor, open trail, lawn	D
<i>Cnemidophorus lemniscatus</i>	Striped runner	ASB (FS)	Lawn	D
<i>Tupinambis teguixin</i>	Matte	MF, E, (MF/S)	Grassy trail	D
<b>Family Tropiduridae</b>				
<i>Plica caribbeana</i> *	Caribbean treerunner	MF	Tree trunk	D
<b>SNAKES</b>				
<b>Family Typhlopidae</b>				
<i>Amerotyphlops cf. brongersmianus</i>	Trinidad blind snake	Recorded in Murphy 1997		
<b>Family Boidae</b>				
<i>Boa constrictor</i>	Macajuel	Recorded in Schwab 1988		
<i>Corallus ruschenbergerii</i>	Cascabel dormillon	Recorded in Schwab 1988		
<i>Eunectes murinus</i>	Anaconda	Recorded in Schwab 1988		
<b>Family Colubridae</b>				

TAXA/SPECIES NAME	COMMON NAME	HABITAT	MICROHABITAT	SURVEY
<i>Chironius</i> sp.	Machete savane	MF	Forest floor	D
<i>Leptophis coeruleodorsus</i>	Green lora		Recorded in Schwab 1988	
<i>Mastigodryas boddaerti</i>	Machete couresse		Recorded in Schwab 1988	
<i>Oxybelis aeneus</i>	Horse whip	E, (MF/S), (FS)	Tree branch, garden fence	D
<i>Phrynonax poecilonotus</i>	Dos cocorite		Recorded in Schwab 1988	
<i>Spilotes pullatus</i>	Tigre	MF	Forest floor, flooded ditch	D
<b>Family Dipsadidae</b>				
<i>Cleia cleia</i>	Black cribo		Recorded in Schwab 1988	
<i>Erythrolamprus melanotus nesos</i> *	Beh-belle chemin	MF	Tree branch	D
<i>Helicops angulatus</i>	Water mapepire	MF, S	Pool of water, flooded trail	N
<i>Hydrops triangularis</i> *	Water coral	E, (MF/S)	In pool of water	N
<i>Imantodes cenchoa</i> *	Blunt-headed snake	MF	Fallen tree log at forest edge	N
<i>Leptodeira annulata</i> *	Cat-eyed snake	E, (MF/S), (TL)	Muddy track	N
<i>Pseudoboa neuwiedii</i>	Ratonel		Recorded in Schwab 1988	
<i>Siphlophis compressus</i> *	False coral snake	E, (MF/S)	Small tree	N
<b>Family Elapidae</b>				
<i>Micrurus lemniscatus diutius</i> *	Large coral snake	MF	Forest floor	N
<b>Family Viperidae</b>				
<i>Bothrops</i> sp.	Mapepire balsain	MF, S	Forest floor, savanna floor	D and N
<i>Lachesis muta</i>	Mapepire zanana		Recorded in Schwab 1988	

turtles like the Galap (*Rhinoclemmys punctularia*) and Scorpion mud turtle (*Kinosternon scorpioides*) have been utilized in the pet trade both globally (Ceballos and Fitzgerald 2004) and locally (SPC pers. obs.; Stephen Smith pers. comm.). The ASSR may represent an area where populations of these species may experience reduced levels of human exploitation because of its protected status and may provide us with useful baseline data for measuring the impact of human exploitation in unprotected areas. Our study addressed mainly species richness, which represents only one component of the biodiversity and the wider general ecology of the reserve. We highly recommend that species abundance and composition studies are undertaken within the reserve and compared to similar studies from other areas in order to more vigorously assess the reserve's conservation standing.

#### ACKNOWLEDGEMENTS

The authors would like to thank the Forestry Division and its Wildlife Section for providing the permits to enter the reserve and to collect specimens, as well as for use of the facilities at the Cumuto Forestry Station. Thanks also go to some members of the Trinidad and Tobago Field Naturalists' Club (especially Mike Rutherford, Edmund Charles, Graham White, Dan Jaggernath, Darshan Narang and Imran Khan), the visiting students of the Glasgow University 2011, 2014 and 2015 Trinidad Expeditions,

as well as Joshua Traub, Srishti Mohais, Kevin Mahabir, Javed Omardeen, Rachel Campbell, Danielle Morong and other field assistants for contributing to this list. Many thanks must also go out to the Green Fund for funding the surveys within the ASSR in 2014.

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