RESEARCH ARTICLE

New records of the Saint George Island Gecko (*aristelliger georgeensis*) in the Seaflower Biosphere Reserve, Colombia

Nuevos registros del geco pestañudo (Aristelliger georgeensis) en la Reserva de la Biósfera Seaflower, Colombia

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ABSTRACT

The Saint George Island Gecko is a Caribbean species recorded on the coasts and islands of Mexico, Belize and Honduras, which prefers rocky substrates, trees and shrubs. Its distribution in Colombia is limited to the archipelago of San Andrés, Providencia and Santa Catalina in the Seaflower Biosphere Reserve, where it has been recorded on the three most populated islands and on Roncador Bank. During the scientific expeditions to the Reserve between 2014 and 2021, the search for this species was intensified through surveys in the emerged areas (islands and cays) of Serranilla, Serrana, Roncador, Southwest, Old Providence and Ketlina. This species of gecko was recorded in all the localities visited, which broadens our knowledge of its geographic distribution. Since this is a nationally threatened species, these new records represent potential opportunities for its conservation. However, the introduced and invasive species recorded in most localities (i.e., *Rattus* spp., *Gallus gallus domesticus*, *Hemidactylus frenatus* and *Periplaneta americana*) pose a threat to this gecko and require urgent management measures.

KEYWORDS: Caribbean islands; invasive species; threats

RESUMEN

El geco pestañudo es una especie caribeña, registrada en las costas e islas de México, Belice y Honduras, y que tiene preferencia por sustratos rocosos, árboles y arbustos. Su distribución en Colombia se limita al archipiélago de San Andrés, Providencia y Santa Catalina en la Reserva de la Biósfera Seaflower, en donde había sido registrada en las tres islas más pobladas y en la isla Cayos de Roncador. Durante las expediciones científicas a la Reserva entre 2014 y 2021, se intensificó la búsqueda de esta especie a partir de recorridos en las áreas emergidas de las islas y cayos de Serranilla, Serrana, Roncador, Alburquerque, Providencia y Santa Catalina. En todas las localidades visitadas se registró esta especie de geco, lo que amplía el conocimiento sobre su distribución geográfica. Por tratarse de una especie amenazada a nivel nacional, estos nuevos registros constituyen potenciales oportunidades para su conservación. Empero, las especies introducidas e invasoras registradas en la mayoría de las localidades (i.e., Rattus spp., Gallus gallus domesticus, Hemidactylus frenatus y Periplaneta americana) suponen una amenaza para este geco, que demandan medidas urgentes de manejo.

PALABRAS CLAVE: *islas del Caribe; especies invasoras; amenazas*

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Introduction

The Saint George Island gecko (*Aristelliger georgeensis*, Bocourt, 1873) is a species of gecko discovered on Saint George Island, Belize, in the Caribbean, which belongs to a genus that includes several species of lizards endemic to the West Indies and coastal areas of Central America (Bauer and Russell, 1993). It exhibits typical characteristics of the genus *Aristelliger*, such as a robust body and a short tail relative to its total body length (Bauer and Russell, 1993). It is a small to medium-sized gecko with adult specimens between 7 and 10 cm in total length. Their coloration varies from brown and gray to lighter tones, with orange spots on their sides (Bauer and Russell, 1993). It is nocturnal, preferring coral rocks, low trees and shrubs. It has been recorded in human buildings, where it seems to have being displaced by the common house gecko (*Hemidactylus frenatus*; Caicedo-Portilla, & Dulcey-Cala, 2011).

In Colombia, this species has only been recorded in the Archipelago department of San Andrés, Providencia and Santa Catalina, and at the national level it is considered threatened (Vulnerable category: VUD2) due to its reduced distribution (<26 km^2), and to the negative effect that invasive species can have on its populations (Caicedo-Portilla and López-Victoria, 2015). At the international level, it is considered a species of least concern (LC: Caicedo-Portilla, Mandujano, and Lee, 2016). The most recent published record of this species in Colombia corresponds to that of Roncador Bank, which is part of the Seaflower Biosphere Reserve (SBR), where it inhabits rocky coral substrates and human-made buildings (López-Victoria and Daza, 2015).

As part of the comprehensive assessment of the status of terrestrial tetrapod populations present in the SBR islands, and with the aim of contributing to the knowledge about the distribution of this threatened gecko species, the purpose of this study was: 1) to establish the presence/absence of the Saint George Island gecko on the SBR islands visited, and 2) to estimate the potential risks (e.g., habitat quality, introduced species, human activities) faced by populations of this species on those islands. This study seeks to contribute to the analyses and classifications that are carried out on threatened reptiles in Colombia, within the framework of the update of the red books.

Study Area

Between 2014 and 2021, intensive searches for the Saint George Island gecko were conducted on all the islands and cays visited during the the Seaflower scientific expeditions. The islands, cays and sandbanks visited included the following coral complexes, from north to south and from east to west: Serranilla Bank, Serrana Bank, Roncador Bank, Southwest Cays, and the Old Providence and Ketlina Island; no visit was made to the island of Courtown Cays (Bolívar), nor were any observations made on San Andres Island, a locality about which there is sufficient information and records of this species (Fig. 1). Except for Old Providence and Ketlina, which have emerged surfaces of volcanic origin, all the islands and cays visited are of coral origin, featuring flat relief, with sand soils and coral debris of various sizes. Shrub vegetation, some trees, and coconut palms are present on all the main cays of the different coral- origin islands. In Serranilla, Serrana, Roncador and Southwest or Alburquerque, there are buildings of different sizes that correspond to the prominent posts of the Colombian Navy (ARC). In the cays and other smaller emerged portions (i.e., sandbanks) only small patches of shrubs and creeping plants were found.

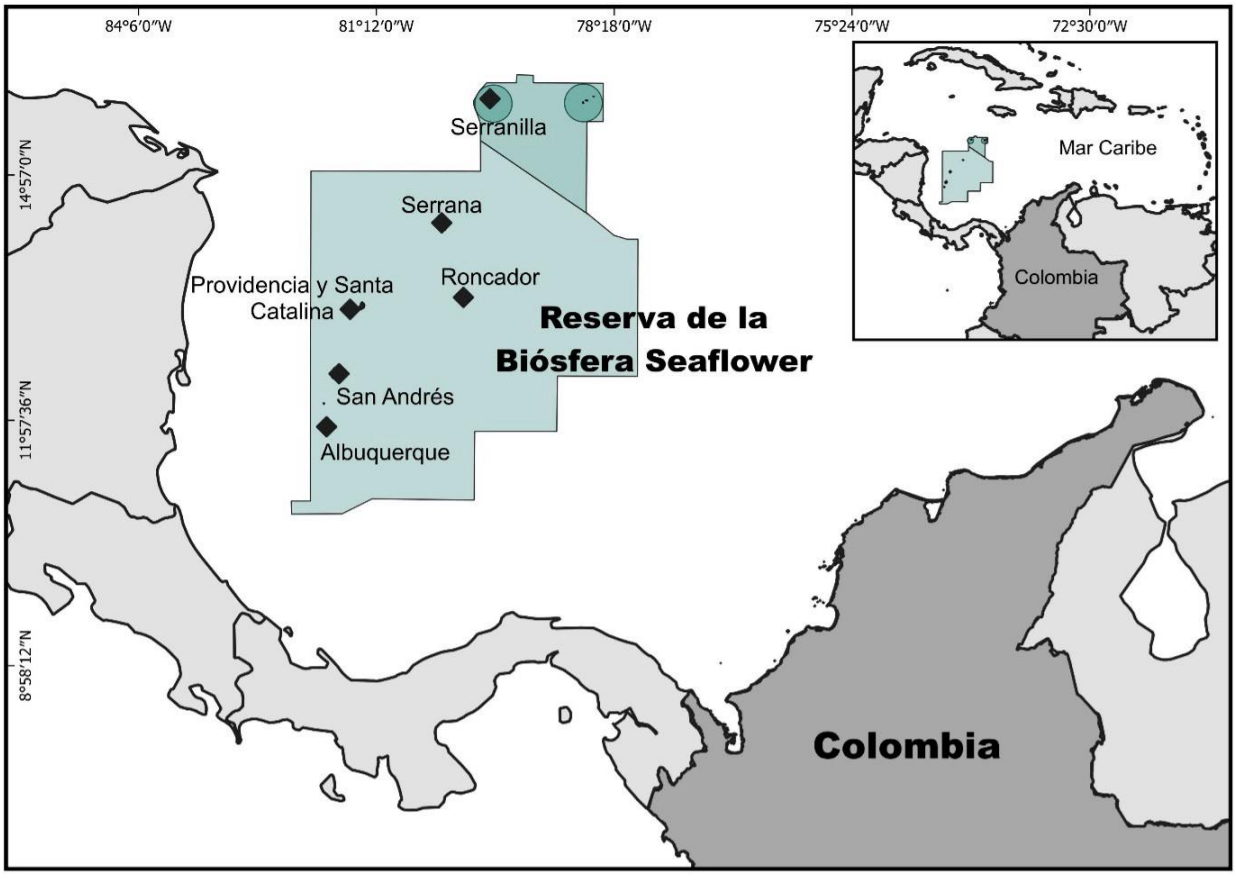

Figure 1. Islands and cays visited in the Seaflower Biosphere Reserve in search of the Saint George Island gecko during the 2014 and 2021 Seaflower expeditions.

METHODOLOGY

Previous records of the Saint George Island gecko and its respective localities were obtained from databases of published scientific literature (Bauer & Russell, 1993; Caicedo-Portilla & López- Victoria, 2015; Charruau, Díaz de la Vega Pérez, & Méndez de la Cruz, 2015; López-Victoria & Daza, 2015). They were then complemented with records from the iNaturalist platform (inaturalist. org) and ratified using the reptile database (Uetz, Freed, Aguilar, Reyes, Kudera, & Hošek, 2024). From all the consolidated records, the distribution map shown in Figure 2 was generated. Doubtful records or without a specified location were discarded.

Records in the new locations were obtained during exhaustive tours (*e.g.*, routes lasting between 1 h and 2 h), primarily conducted at night. These explorations involved inspecting areas between and beneath rocks and coral debris, as well as among the branches and foliage of trees and shrubs. Explorations were also made in the buildings of the ARC. No individuals were counted or marked.

The potential threats to the Saint George Island gecko are the result of direct field observations, mainly focused on the presence of invasive species with predatory potential or transmission of pathogens, widely known for their negative effects on island fauna (in particular introduced species such as rodents and insects). In this sense, particular emphasis was placed in and around the ARC facilities. The threats were synthesized in a summary table, and for each threat the respective observation/recommendation was made.

Results

The new records of the Saint George Island gecko on the islands of Serranilla, Serrana and Southwest represent new island and remote locations where this species has been observed. Serranilla is the furthest town from the continent of Central America, more than 350 km in linear distance, and, in turn, the most isolated locality known; the closest locality to Serranilla is 160 km in linear distance (Serrana). Altogether, the records in the islands and cays of the SBR constitute the largest number of oceanic locations where this species is present (Fig. 2).

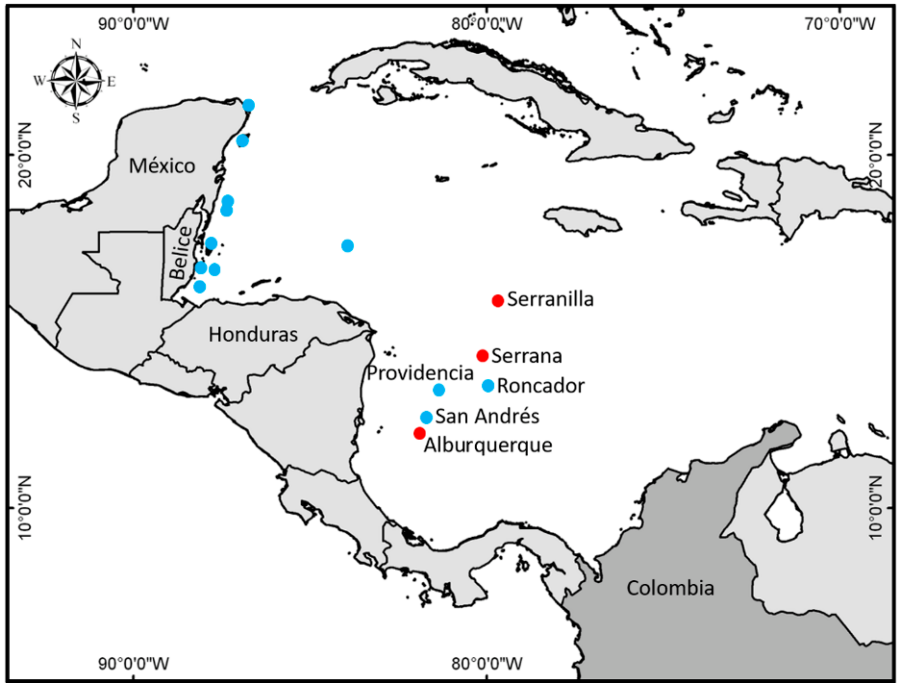

Figure 2. Previously known and documented distribution of the Saint George Island gecko (blue circles) and the new locations provided by this study (red circles).

Individuals of the Saint George Island gecko were observed in different microhabitats on the islands, including debris and coral rocks, shrubs, palm trees, and human-made buildings (Fig. 3). Although the samplings were not focused in population size estimates, the highest concentration of individuals was observed in Cangrejo Cay, in the coral complex of Old Providence, where more than 30 individuals occupied the branches and foliage of a beach grape (Fig. 3D).

Figure 3. The Saint George Island gecko on the islands of the Seaflower Reserve: **A)** juvenile caught and released among coral rocks, on the Serranilla Bank, **B)** adult on a coconut palm, on the Serranilla Bank, **C)** adult on a leaf of beach grape (*Coccoloba uvifera*), in Cangrejo Cay, Old Providence. (Photo: Laura Giraldo).

The presence of introduced and invasive species was found to be a threat present on all the main islands (i.e., permanently inhabited) and, to a lesser extent, on smaller cays and sandbanks (Table 1). In particular, the case of rats (*Rattus* spp.) on the Serranilla Bank, cockroaches (*Periplaneta americana)* on the Serrana Bank, and chickens and hens (*Gallus gallus domesticus*) on the Southwest Cays were striking (Fig. 3). In all the locations visited that correspond to new records for the Saint George Island gecko, the common house gecko (*Hemidactylus frenatus*) was also observed. Garbage was another striking aspect, due to its large accumulation, particularly on the southern island of Southwest Cays (Fig. 4).

Table 1. Introduced and invasive species considered to be a potential threat to the populations of the Saint George Island gecko on the islands of the Seaflower Reserve visited. Some management measures are suggested.

Location	Introduced /invader species	Observation	Potential risk	Potential risk
Serranilla Bank	*Rattus* spp.	The two species of common rats (*R. rattus* and *R. norvegicus*) are probably found.	Direct predation on the gecko.	Direct competition (Caicedo-Portilla & Dulcey-Cala, 2011).
	Periplaneta americana	In particular in the vicinity of the ARC buildings.	Direct predation on the gecko. (Pérez, 1989).	Optimize the management of garbage and waste, and carry out cockroach control from natural baits.
	Hemidactylus frenatus	In particular in the buildings of the ARC.	Direct competition (Caicedo-Portilla & Dulcey-Cala, 2011).	Manual removal of introduced geckos, under the supervision of biologists (herpetologists).
Serrana Bank	Same species	Same observations	Ditto.	Same recommendations.
Southwest Cays (main island)	Same species	Same observations	Ditto.	Same recommendations
Southwest Cays (South Island)	*Gallus gallus domesticus*	Apparently introduced by fishermen as an alternative source of protein.	Direct predation on the gecko.	Removal of these hens and chickens from the island.

As for the Southwest Cays, and in general in all the islands and cays of the SBR, the presence of garbage was a constant. On the Southwest Cays, this garbage seems to be derived from temporary permanence of people and not from garbage dragged by the sea currents, since it was observed agglomerated in the interior area of the island, associated with improvised houses (tents) present there (Fig. 4).

Figure 4. Panoramic view of the area for improvised shelters and garbage associated with the temporary camps south of the coral complex of the Southwest Cays. (Photo: Felipe Estela).

DISCUSSION

The new distribution records reported in this study for the Saint George Island gecko represent conservation opportunities for this threatened species (Caicedo-Portilla & López-Victoria, 2015; López-Victoria & Daza, 2015). This is mainly because the three islands (and associated islets) are part of the SBR, which is a vocation towards the care of the organisms that inhabit this reserve. Additionally, these three locations are aligned in a south-north direction, and they are the southernmost and northernmost records of this species in Colombian territory, and the records of Colombia are the easternmost of this species, expanding its distribution considerably (Fig. 2).

Regarding the biogeography of this species of gecko, and although it continues to be treated as a species, it should be noted that Cloud's study (1993), supported by molecular tools, suggests that Aristelliger praesignis forms a complex of species with A. georgeensis nested inside. Since this study did not account for the entire distribution of A. georgeensis, including the new locations, it is possible that it represents a clade with multiple taxa, which is worth examining in depth, especially if we consider the fact that it has been catalogued under some degree of threat or potential conflict with species introduced in some locations throughout its distribution (Caicedo-Portilla & López-Victoria, 2015; Charruau et al., 2015).

Particular attention has been drawn to the threat posed by the introduction of the species Hemidactylus frenatus, a species of gecko of Asian origin, currently present worldwide, which appears to be a potential competitor of *A. georgeensis* in San Andres and Old Providence (Colombia) and in the Chinchorro Bank (Mexico) (Caicedo-Portilla and Dulcey-Cala, 2011; Charruau *et al.,* 2015). This species of introduced gecko was observed in the three new locations for the Saint George Island gecko in the SBR, which poses a challenge for its conservation.

In addition to the impact that the introduced gecko species may have, the other invasive species recorded (i.e., rats, chickens and cockroaches) are also a concern, due to their devastating effect on native species, especially on islands around the world (Holmes et al., 2019; GISD, 2024). Timely management of these invasive species would be beneficial for all native species, especially for

seabirds that nest on those islands, for other resident (non-marine) birds, for sea turtles that use the islands for nesting, for terrestrial invertebrates, such as crabs of the family Gecarcinidae, and, of course, for the Saint George Island geckos.

Finally, solid waste of different origin (*i.e.,* dragged by sea currents or abandoned by visitors on the islands) requires immediate management, due to the multiple health problems and risk of death that they present to the tetrapod fauna of the SBR islands. So far, its effects on turtles and birds have been widely studied (Wilcox, Sebille, & Hardesty, 2015; Moon, Shim, & Hong, 2023), but there are no published studies on their effects on geckos.

With the new locations reported in this study, the geographical distribution of this species of terrestrial reptile, common to almost all the islands within the SBR is considerably expanded. Future studies should focus on estimates of the population sizes of this species, as well as its genetic structures. In the meantime, measures to manage the threats that loom over this and other native species of the Reserve are more than urgent.

Conclusions

The Saint George Island gecko has a broader geographical distribution than previously reported for the SBR. These new locations represent potential opportunities for its conservation, since it is a threatened species at the national level. Despite this opportunity, introduced and invasive species, as well as poor disposal of solid waste on the islands, must be mitigated urgently, as they pose a threat of extinction not only to *Aristelliger georgeensis*, but also to all native fauna of the islands and cays of the SBR. Seaflower is home to a considerable number of endemic species (McNish, 2011; Caicedo-Portilla, 2014), therefore, as part of the substantive commitment to a biosphere reserve, environmental authorities, both local and national, must take urgent measures to dispel these possible threats, especially considering that the localities in Colombia correspond to the southernmost and easternmost distribution of this species.

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