“Conservation of a unique crevice and litter-dwelling herpetofauna on Union Island, St. Vincent and the Grenadines.”

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Introduction

- The islands of the West Indies are geographically isolated and have a relatively mild and stable climate.
- These islands support a number of unique island ecosystems, with diverse natural floral and faunal communities (e.g., Whittaker and Fernandez-Palacios 2007).
- Because many island ecosystems are small, they are more vulnerable to human mediated changes than those on the mainland (Vitousek 1988).

Introduction

- With the arrival of humans, the natural resources of these islands have been heavily exploited (Newsom and Wing 2004), and many of the natural ecosystems have been replaced by human-dominated landscapes.

- Only about 10% of the original vegetation still exists on these islands (Hedges 2006).

- The few remaining largely natural areas in the West Indies are invaluable resources of special biological interest that are becoming increasingly rare and are deserving of study and conservation efforts.

Introduction

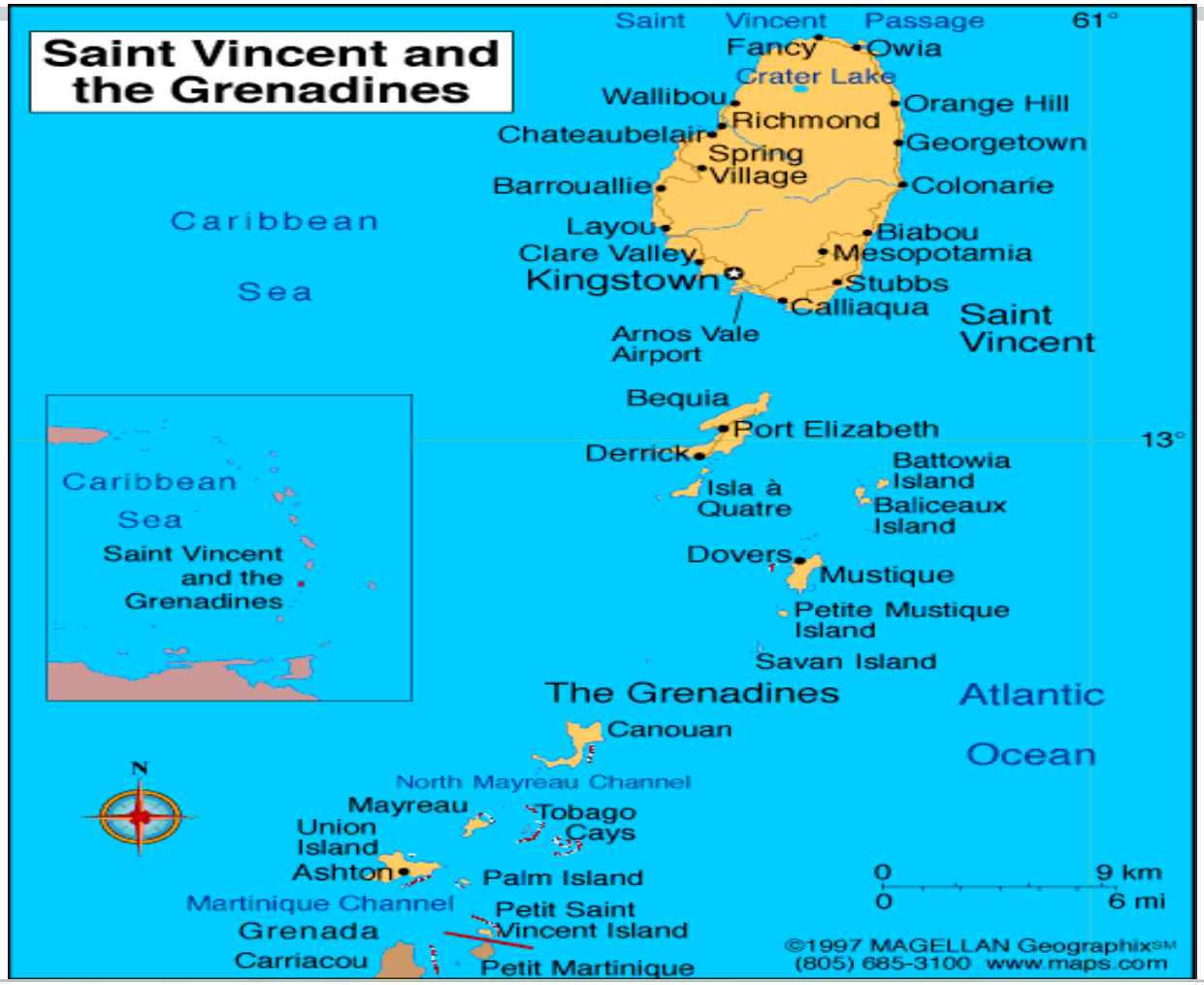
- Union Island, St. Vincent and the Grenadines is a relatively small (8.4 km^2) West Indian island in the Grenadine Archipelago located between the larger islands of St. Vincent and Grenada.

- The peak of Mt. Taboi, the highest point on the island, has a maximum elevation of 330 m.

- It is characterized by seasonal dry forest habitat (Fiard 2003) that has seen dramatic transformations in the past (Wilson et al. 2006).

Union Island

http://www.infoplease.com/atlas/country/saintvincentandthegrenadines.html



Introduction

- The area located above Chatham Bay, on the northwestern slope of Mt. Taboi, holds one of the few relatively intact stands of old secondary forest remaining in the Grenadines (Fiard 2003).

Chatham Bay

Mt. Taboi

Introduction

- Despite the area's small size (~37 ha), it supports a surprisingly diverse herpetofauna.
- All but one (*Gymnophthalmus underwoodi*) of the 15 reptilian species recorded from the island have been found there (Quinn et al. 2010).
- Our research focused primarily on four cryptic reptilian species that are known to occur together only in the area above Chatham Bay.

Gonatodes daudini

Sphaerodactylus kirbyi

Bachia heteropa

Typhlops tasimycris

Objectives

- We examined population sizes and densities, activity periods, and microhabitat use of these four sympatric and presumably syntopic species in order to better understand their natural history in the unique ecological system on the forest floor of this biologically important site.

Methods

- From 4–22 June 2010, we conducted surveys of the forest floor on the north- and west-facing hillsides above Chatham Bay at elevations of 31–234 m on the northwestern slope of Mt. Taboi.

- We employed 19 transects in leaf litter and 10 consisting mostly of large rocks.

Methods

- We conducted initial surveys and litter transects at all times of day, with approximately equal effort employed from before dawn (0430) to well after dark (2100).

- Because suitable habitat did not occur elsewhere on the island, we used population densities calculated from our transects extrapolated to the total area of suitable habitat in the area above Chatham Bay to estimate total island population sizes.

Results

Population densities and total population sizes

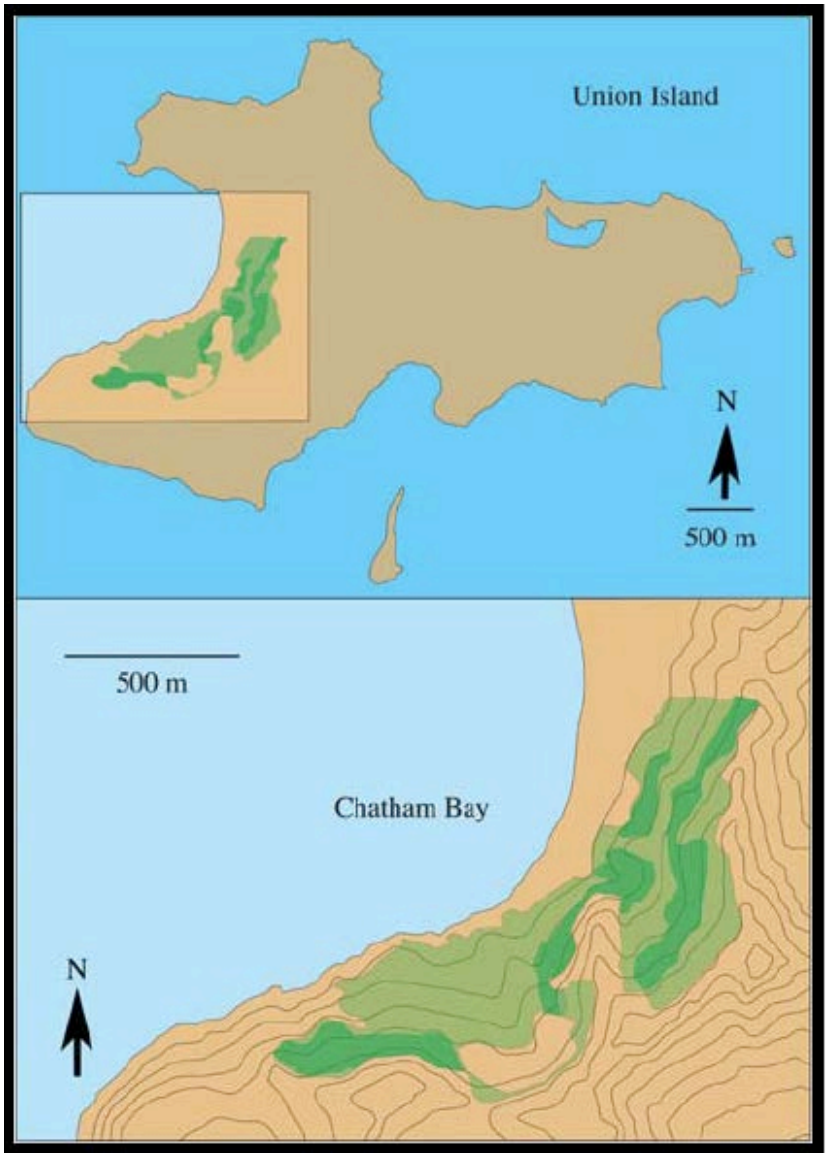
TABLE 1. Numbers of animals encountered in transects and extrapolated population density estimates for four species of reptiles from the slopes above Chatham Bay, Union Island.

	No. Individuals		Estimated Individuals/m²		Individuals/ha		
Species	Litter (459.8 m²)	Rock (1,056.7 m²)	Litter	Rocks	Litter	Rocks	Total Population
Bachia heteropa	34	0	0.0739	0	739	0	38620
Gonatodes daudini	6	23	0.0087	0.02180	87	218	6562
Sphaerodactylus kirbyi	9	1	0.0196	0.00095	196	9	3170
Typhlops tasymicris	2	0	--	--	--	--	--

Results

Microhabitat use

Area of critical habitat above Chatham Bay (green), Union Island, St. Vincent and the Grenadines, and areas within that habitat with moist litter associated with rocky outcrops (dark green). Contour interval = 30.5 m (100 ft).



Results

Microhabitat use

- The areas in which we found the highest densities of *G. daudini* were rock outcroppings of large boulders with small crevices at their base.
- We saw 27 of 33 active geckos hanging upside down on the upper edges of crevices.
- Generally, only one gecko occupied each crevice. Individuals found outside rocky outcrops were generally associated with insulating cover.

Results

Microhabitat use

- We found nine of 10 active *S. kirbyi* in leaf litter
- Six inactive geckos were under rocks and termite mounds.
- One individual was in the moist area under the same termite mound on the dry southern face of Mt. Taboi

Results

Microhabitat use

- We found 43 *B. heteropa*, of which 36 were under relatively small rocks resting on the surface.
- We found no exposed individuals.
- One *B. heteropa* egg was found under a rock with two adults.

Results

Microhabitat use

- We found five *Typhlops tasymicris* over the course of our study, but only two during surveys.

- Two were in litter, two under rocks, and one individual was under a termite mound < 5 cm from a *B. heteropa*.

Rediscovery of the Grenada Bank Endemic *Typhlops tasymicris* (Squamata: Typhlopidae)

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- *Typhlops tasymicris* was known previously from only two specimens, both immature females collected on Grenada in 1968.

- June 2010, we rediscovered the species on Union Island, St. Vincent and the Grenadines, where we encountered five individuals.

- This first record of a typhlopid snake in the Grenadines suggests a greater range than indicated by the earlier specimens.

T. tasymicris

Discussion

- Due to the size and secretive nature of the species included in the study, we undoubtedly missed animals during surveys.
- Consequently, our estimates of population densities are conservative.
- When those numbers are extrapolated to the estimated area of suitable habitat, the resulting figures present only a rough estimate of total population sizes.

Discussion

- Although approximations, they almost certainly provide an accurate representation of relative numbers, showing an approximate ratio of 2:1:12 for *G. daudini , S. kirbyi , and B. heteropa*, respectively.

Discussion

- Microhabitat use differed greatly between the geckos (*G. daudini* and *S. kirbyi*) and the semi-fossorial to fossorial species (*B. heteropa* and *T. tasymicris*).

- Geckos consistently exposed themselves when active, exploiting rocks and crevices or the upper layers of leaf litter, and used cover objects only while inactive.

- In contrast, *B. heteropa* and *T. tasymicris* appeared to remain under cover at all times.

A note on conservation

- This assemblage of small and secretive crevice- and litter-dwelling reptiles is dependent on conditions available only in relatively mature forest situated to receive and hold moisture on an otherwise dry island.

- That environment, equally important for the ten other reptilian species known to occur there as well as for the entire biota, occurs only in the area above Chatham Bay.

A note on conservation

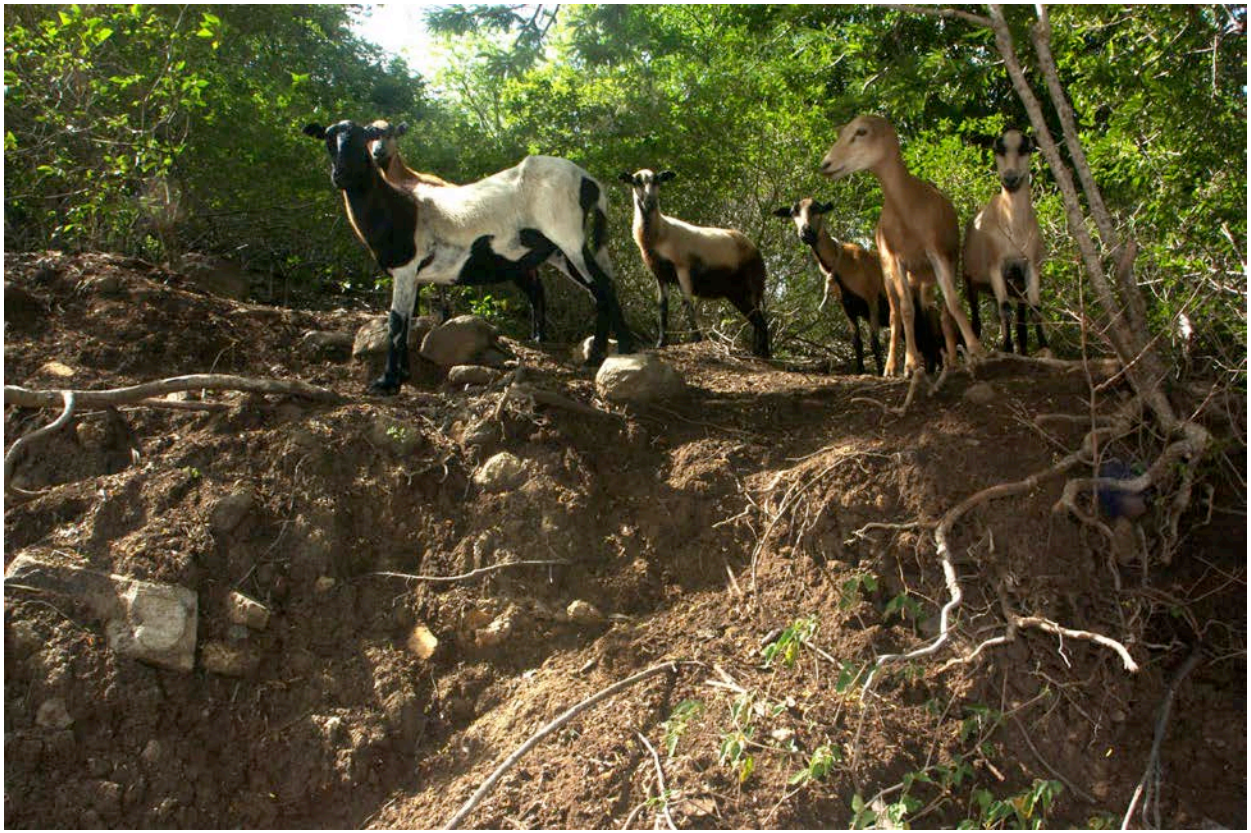
- This unique assemblage of reptiles and the forest on which they depend are again under severe and imminent threat, specifically by exotic mammals and development.

- Protected from human activity for many years by its relative inaccessibility, a road constructed on the island in 2005 now provides ready access into the study area, and plans are in place to extend the road through the heart of the site.

Opossum ("manicou")

Didelphis sp.

Feral goats



Road constructed in 2005

A note on conservation

- Unfortunately, even recommendations from the SVG Department of Forestry, which is supportive of conservation efforts, carry little weight when balanced against revenue-enhancing developmental interests.

- Because this biotic community is unique in the Grenadines its preservation is of the utmost concern.

Acknowledgments

- Joseph P. Burgess brought the presence of *Sphaerodactylus kirbyi* on Union to our attention. John S. Parmerlee, Jr. prepared the digitized map of Union Island and assisted with digital measurements. Permits to conduct research on Union Island (# 2010/01) were issued by Mr. Brian Johnson, Director, Department of Forestry, St. Vincent and the Grenadines. Protocols were approved by the Avila University Animal Care and Use Committee (IACUC # 2007-01). Fieldwork was funded by a grant from the National Science Foundation (USA) to Robert Powell (DBI-0851610). And to Carib-PARC for this opportunity to participate in this symposium.

References

- Fiard, J.-P. 2003. The phytosociologic and dynamic outline of the main forestry groups of Union Island. Pp. 47–53 In A Natural History Monograph of Union Island. Daudin, J. (Ed.). Désormeaux, Martinique, French West Indies.
- Hedges, S.B. 2006. An overview of the evolution and conservation of West Indian amphibians and reptiles. Applied Herpetology 3:281–292.
- Newsom, L.A., and E.S. Wing. 2004. On Land and Sea: Native American Uses of Biological Resources in the West Indies. University of Alabama Press, Tuscaloosa, Alabama, USA.
- Quinn, D.P., A.L. McTaggart, T.A. Bellah, E.J. Bentz, L.G. Chambers, H.D. Hedman, R.R. John, D.N. Muñiz Pagan, and M.J. Rivera Rodríguez. 2010. An annotated checklist of the reptiles of Union Island, St. Vincent and the Grenadines. Reptiles and Amphibians 17:222–233.
- Vitousek, P.M. 1988. Diversity and biological invasions of oceanic islands. Pp. 181–189 In Biodiversity. Wilson, E.O., and F.M. Peter (Eds.). National Academy Press, Washington, D.C., USA.
- Whittaker, R.J., and J.M. Fernandez-Palacios. 2007. Island Biogeography: Ecology, Evolution, and Conservation. Oxford University Press Inc., New York, New York, USA.
- Wilson, B.S., J.A. Horrocks, and A. Hailey. 2006. Conservation of insular herpetofaunas in the West Indies. Applied Herpetology 3:181–195.