

Successful Gekkonid Invasion on Curaçao: The Saga of a Superior Competitor



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ABSTRACT

Invasive species possess an ability to displace and replace native fauna which makes the monitoring of these species of paramount importance. Introductions of Gekkonid fauna is of a frequent concern and a dynamic component of them are the group of geckos found inhabiting buildings. With this background in mind we set out to investigate the ecology of the gecko assemblage occupying buildings at the Marazul Dive Resort, on the coast of Curaçao. In order to determine the status of gecko species, eighteen sites were censused amid a five night expanse in January of 2013. Of the five gecko species known to inhabit the island, two were detected during this study. Of the 455 gecko observations, 81% comprised of the recently introduced Woodslave Gecko, while 11% consisted of the native Dutch Leaf-footed Gecko. The Woodslave Gecko appears to be a superior competitor and is seemingly incapable of a stable coexistence with syntopic gecko species in developed locations on Curaçao.

Introduction

- Introductions of Gekkonid fauna is a concern in Florida (Meshaka et al., 2005), the Caribbean (Van-Buurt, 2005) and the Tropical Pacific Islands (Case, 1994)
- Dynamic component of Gekkonid introductions are "house geckos", which focus insectivorous efforts around synthetic illuminations
- The Woodslave Gecko, *Hemidactylus mabouia*, represents the most well-known and pervasive Gekkonid invasion (Case 1996; Meshaka et al., 2005)
- Curaçao's first documentation *H. mabouia* was in the late 1980s (Van-Buurt, 2005).
- I set out to investigate the status of the gecko species inhabiting the buildings on the Caribbean island of Curaçao
- I intended to address the postulation that the Woodslave Gecko is a superior competitor and cannot stably co-exist with gecko species on artificial structures on Curaçao
- I want to understand the ecology of "house geckos" on Curaçao with implications for invasive species management and native species conservation

Research Question

In the 20+ years since first being reported on Curaçao, has the Woodslave Gecko dominated buildings as it has in Florida, and has it marginalized native geckos that are ecologically analogous to it as it has to ecologically similar exotic geckos elsewhere?

Study Region

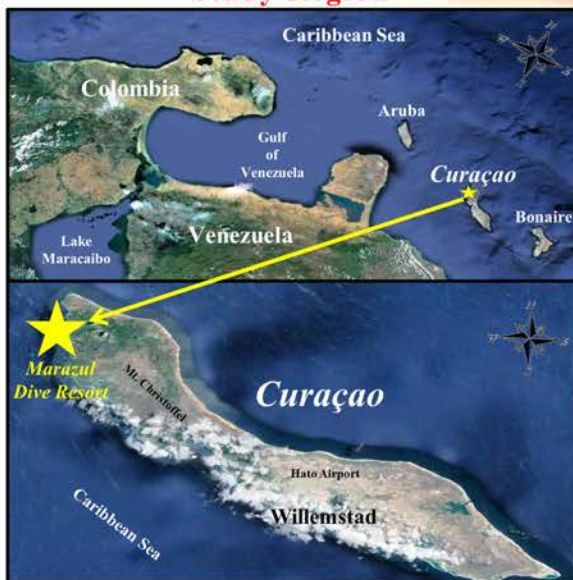


Figure 1: Location of Curaçao, the study site Marazul Dive Resort, and areas of interest. (Modified from Google Earth®)

STUDY SITE: The Marazul Dive Resort



Figure 2: The study site, Marazul Dive Resort, with buildings 1-17 labeled and site 18 (wall). (Modified from Google Earth®)

Methods

- Study site: Marazul Dive Resort (Fig. 2); Northwest coast of Curaçao (Fig. 1)
- 10 visits to 18 sites (17 buildings, 1 peripheral wall) (Fig. 2)
 - 11th - 18th January 2013
- Relative abundance was measured by counting all geckos during two nightly surveys (Fig. 5)
- Gecko detection rates are presented as averages of observed geckos per minute of sampling effort
- Gecko densities are displayed as total gecko observations per square meter of surfaces across all sites
- Proximity to light sources were noted of each individual

Results

- 455 total gecko observations
- Two gecko species detected:
 - The invasive (Fig. 3): Woodslave Gecko, *Hemidactylus mabouia*
 - The native (Fig. 3): Dutch Leaf-footed Gecko, *Phyllodactylus martini*
- Detection rate: 0.99 geckos/min of the invasive species to 0.13 geckos/min of the native species
 - Thus, the invasive gecko was detected at a 7.69 times greater rate than the native gecko
- Density: 1.39 geckos/m² of the invasive species to 0.186 geckos/m² of the native species
 - Thus, the invasive gecko was found at a density 7.49 times greater than the native gecko
- The invasive gecko outnumbered the native across sites of co-occurrence (6:1)
- The invasive gecko outnumbered the native at seven different sites (average 11:1)



Figure 3: The native Dutch Leaf-footed Gecko, *Phyllodactylus martini*, the invasive Woodslave Gecko, *Hemidactylus mabouia*.



Figure 5: Common gecko locations across the buildings.

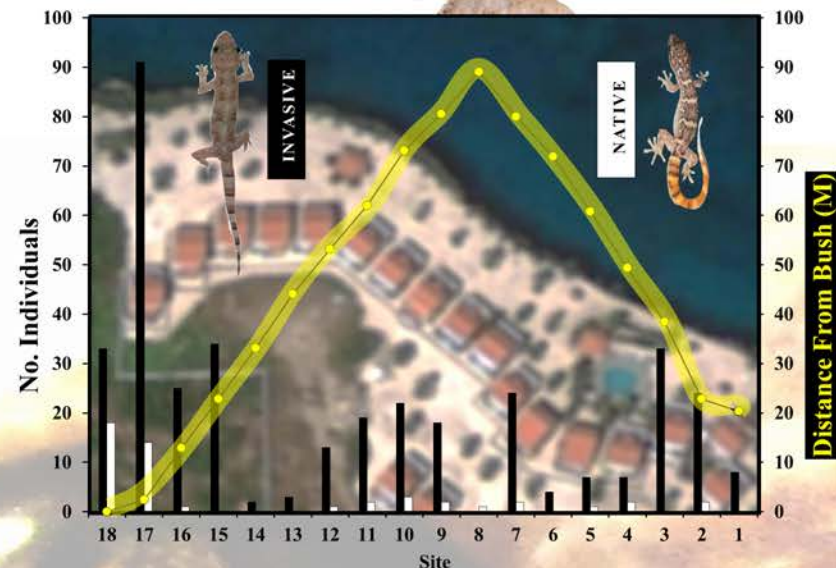


Figure 6: Relative abundance of the Woodslave and Dutch Leaf-footed geckos, on 17 buildings and one wall (site 18) at the Marazul Dive Resort, and distance from the natural (bush) habitat, indicated by yellow circles, from each site, in meters.

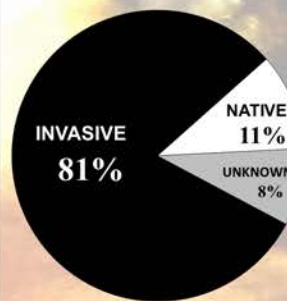


Figure 4: Relative abundance.



Figure 7: The ratio of invasive to native geckos on light sources.

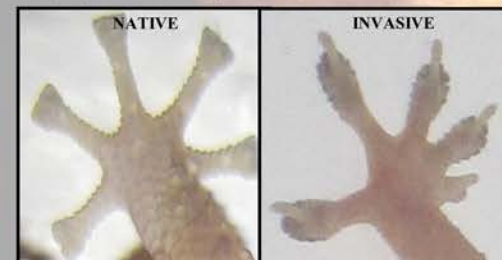


Figure 8: Morphological differences between adhesive pads of native and invasive geckos.

- Morphological advantage favoring the climbing ability of the invasive gecko:
 - Enlarged surface area of adhesive pad
 - Elongated nail for enhanced clinging ability

Discussion

- Major mechanisms displacing the native gecko species:
 - Competitive displacement (Fig. 7)
 - Social dominance, aggressive defense of territories
 - Saurorhagy (lizard diet)
 - Morphological advantage; superior adhesive pads (Fig. 8)
 - Buildings serve as habitat sinks for the native gecko species (Fig. 6)
- Further research is required to determine the dominant method manipulating the structure of the "house gecko" assemblages across the entirety Curaçao

Conclusions

The invasive gecko species, *Hemidactylus mabouia*, appears to be the superior colonizer and competitor across these buildings compared to the native gecko species, *Phyllodactylus martini*, and has all but replaced the syntopic native species. Additionally, two native geckos known to occupy buildings on Curaçao, the Antilles Gecko, *Gonotodes antillensis*, and the Turnip-tail Gecko, *Thecadactylus rapicauda*, were not detected at all. These findings have provided insight on the colonization process of a synanthropic invasive species and contributed to our understanding of the impact of invasive species on native species on Curaçao, with implications for invasive species management and native species conservation.

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