



# Discovery of a New Population of Boas on the Turks Bank, Turks and Caicos Islands

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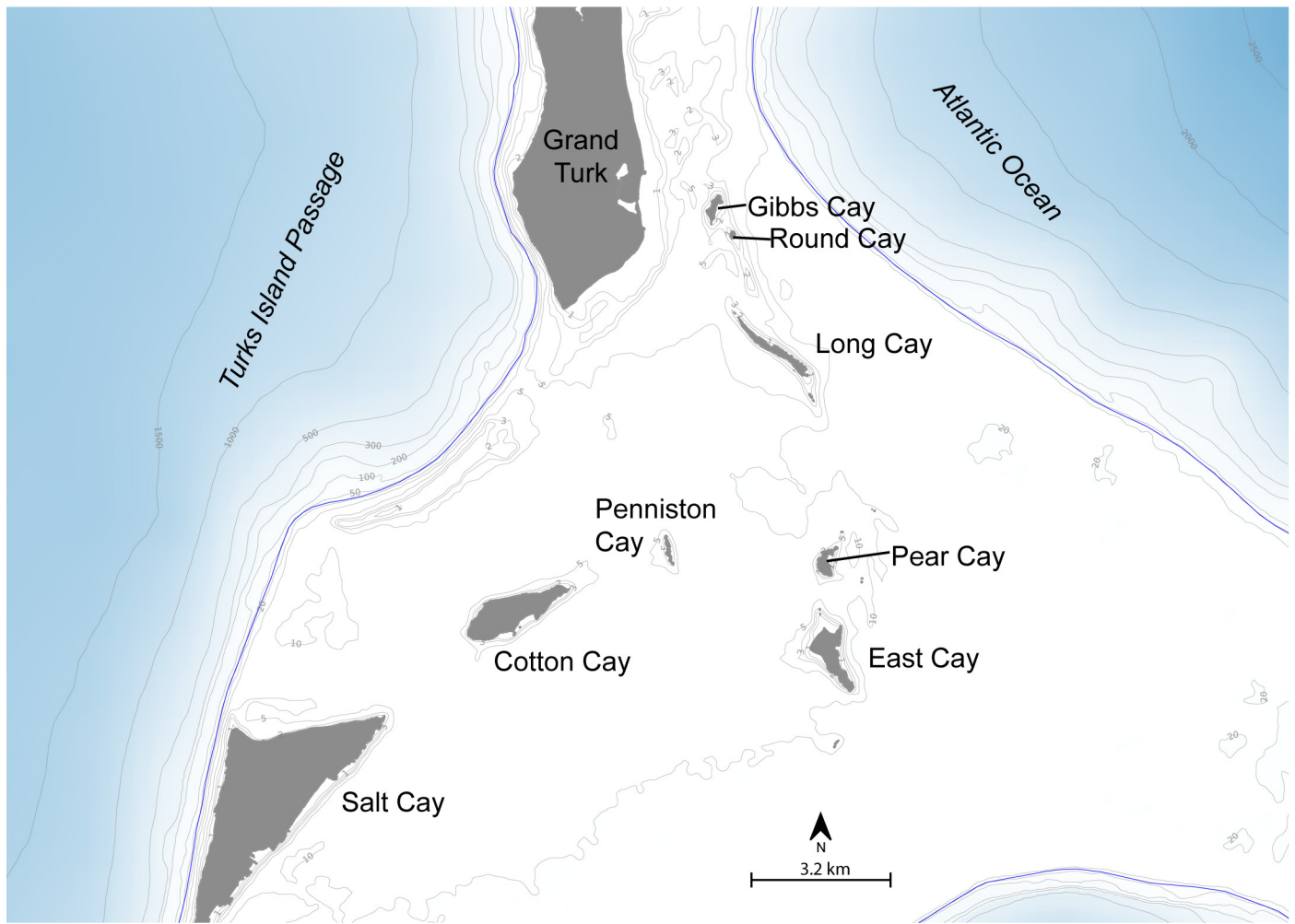
**Abstract.**—The Turks & Caicos Boa, *Chilabothrus chrysogaster*, is among the best-studied snakes in the Caribbean. With nearly 20 years of annual study, much is known about the species’ biology, but most of this information comes from a single population on Big Ambergris Cay on the Caicos Bank. Other populations are poorly known, and, indeed, one subspecies (*C. chrysogaster relicquus*) is almost entirely unknown. Turks & Caicos Boas have been recorded from 10 islands on the Caicos Bank, and historically only from Grand Turk on the Turks Bank. The Grand Turk population is now functionally extirpated. In 2008 we documented a new Turks Bank population on Gibbs Cay, a very small islet east of Grand Turk. Additional surveys of some of the Turks Cays did not reveal additional populations, although the island of East Cay remained unsurveyed. In March 2022 I conducted nocturnal herpetofaunal surveys on three of the Turks Cays, including East Cay. I found a total of nine boas in just over four hours on East Cay and three boas in under six hours on Gibbs Cay, but none on Long Cay. Herein I report the discovery of the East Cay population, some morphometric data, and the first record of the striped color morph from the Turks Bank.

The herpetofauna of islands in the Caribbean is generally very well characterized, with most major and minor islands having been surveyed at least diurnally, and with most having produced herpetological records (Powell and Henderson 2012). This certainly is the case for the Lucayan Archipelago, a chain of islands stretching for 1,360 km from the northern Abaconian islands (Commonwealth of the Bahamas) to the southeastern Turks and Caicos Islands (Turks and Caicos Island Government). Despite the large size of this island archipelago, dotted with 21 emergent island banks and thousands of islands, many are considered well surveyed herpetologically (Buckner et al. 2012; Reynolds and Giery 2023). Nevertheless, some surprises have occurred, particularly when some islands are surveyed nocturnally. For example, in 2015 a new species of boa was found on the Conception Island Bank (Reynolds et al. 2016a) and new island records are added annually (S. Buckner and Reynolds, unpubl. data).

The Turks and Caicos comprise two island banks, each with emergent islands. The Caicos Bank (~6,140 km<sup>2</sup>) supports nine terrestrial squamate species on five large islands and dozens of smaller ones, with three of these species being endemic (Reynolds 2011; Buckner et al. 2012). The Turks Bank (~324 km<sup>2</sup>), the easternmost emergent bank of the Lucayan Archipelago, is ~125 km north of Hispaniola. Other banks at the eastern terminus of the Lucayan Archipelago are

the Mouchoir, Silver, and Navidad Banks, none of which support terrestrial habitats. Six species of terrestrial squamates are present on the Turks Bank, with two endemic species (Buckner et al. 2012; Hedges and Conn 2012). The Turks Cays constitute a group of islands and islets, bounded by the largest and only inhabited islands on the bank, Grand Turk (17.4 km<sup>2</sup>) to the west and north and Salt Cay (6.7 km<sup>2</sup>) to the south and west. The most remote islands on the bank are the Sand Cays, the largest of which is Big Sand Cay (58 ha), located ~11.3 km south of Salt Cay. Within the core of the Turks Bank is a series of islands commonly called the Turks Cays (Fig. 1). None of these islands are inhabited, and most constitute the Grand Turk Cays Land and Sea National Park. Clockwise from Grand Turk, they include Gibbs Cay (6 ha), Round Cay (1 ha), Long Cay (23 ha), Pear Cay (11 ha), East Cay (46 ha), Cotton Cay (113 ha), and Peniston Cay (3 ha).

To my knowledge, none of the Turks Cays had been formally surveyed nocturnally for herpetofauna prior to 2022. While all species of terrestrial squamates that occur on the Turks Bank are capable of being found diurnally, the boa *Chilabothrus chrysogaster* is the most difficult to find during the day. *Chilabothrus chrysogaster* is considered to have been functionally extirpated from Grand Turk (Reynolds 2011; Reynolds et al. 2023) and was not formally recorded from any other island on the Turks Banks, although some anecdotal reports exist. For example, Barbour (1935) noted that



**Figure 1.** The Turks Cays, located on the central Turks Bank, Turks and Caicos Islands. Bathymetry contour depths are in meters. Map redrawn from the Marine Spatial Planning Tools for Turks and Caicos (<https://webgis.gov.tc>).

“it [*Chilabothrus chrysogaster*] is said to be rather common on some of the Turks Island Cays.” Barbour did not support this statement otherwise, although locals on Grand Turk have suggested to me over the years that “big snakes” can be found on some of the cays, and Buden (1975) noted that he heard that snakes could be found on East Cay; nevertheless, he suggested that “certainly the Turks Islands, as a group, are the least likely of places for finding any form of *Epicrates* [*Chilabothrus*].”

In 2008 I (with Matthew Niemiller) visited Gibbs Cay, Long Cay, Cotton Cay, and Salt Cay to conduct diurnal herpetofaunal surveys as part of a larger territory-wide assessment (Reynolds 2011). We recorded *Leiocephalus psammadromus* (Turks and Caicos Curly-tailed Lizard), *Anolis scriptus* (Silver Cay Anole), and *Sphaerodactylus underwoodi* (Turks Island Dwarf Gecko), all three of which were abundant on all cays (Reynolds and Niemiller 2009). We observed *Cyclura carinata* (Turks and Caicos Rock Iguana) on Long Cay and Salt Cay, and we documented *Spondylurus turksae* (Turks Bank Skink) only on Cotton Cay. We found introduced House

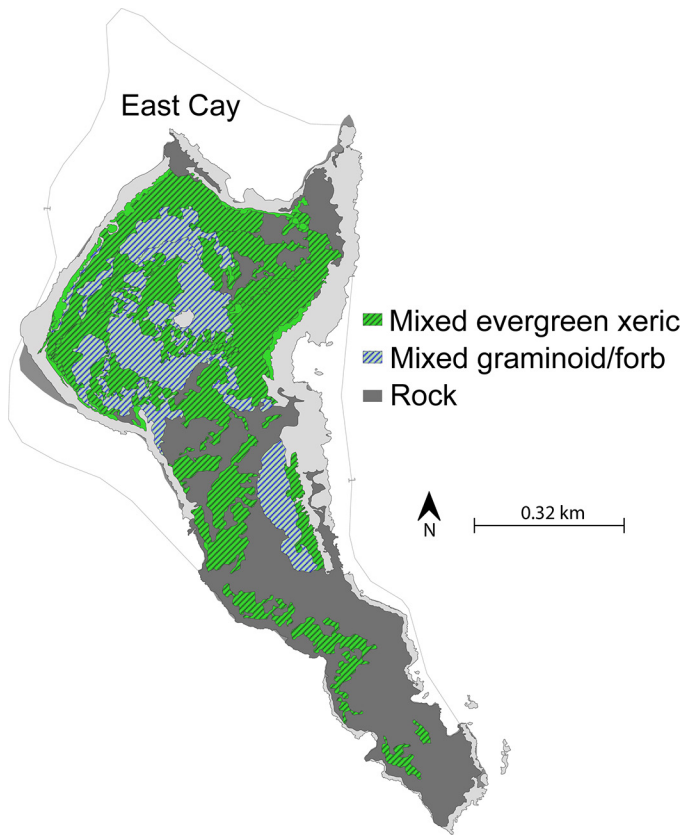
Geckos (*Hemidactylus mabouia*) to be common on Salt Cay but did not observe them on the other cays (Reynolds and Niemiller 2009). Of additional significance, we found three *Chilabothrus chrysogaster* on Gibbs Cay (Reynolds and Niemiller 2010), which constituted the first published records of the species from the Turks Bank in almost a century and a half (Cope 1871).

In March 2022 I conducted diurnal and nocturnal surveys of East Cay (Figs. 2–3), an island that I had not previously visited. The island is known as a regionally significant breeding site for Audubon’s Shearwaters, Laughing Gulls, and possibly White-tailed Tropicbirds (Pienkowski et al. 2005; Pienkowski 2006), and is protected within the Grand Turk Cays Land and Sea Park. I discovered a robust population of *Chilabothrus chrysogaster* in addition to an abundance of *Leiocephalus psammadromus*, *Anolis scriptus*, and *Sphaerodactylus underwoodi*. This constitutes the first record of the boa from East Cay, and only the third island record for the Turks Bank. I also report the first striped-morph boas from the Turks Bank (Reynolds et al. 2020).



## Methods

I conducted herpetological surveys on East Cay (sometimes called Pinzon or Martin Alonso Pinzon after the captain of the Colombian ship “La Pinta”), Long Cay, and Gibbs Cay, spending one night on each island on 1–3 March 2022. I conducted random walking surveys of each entire island, including the circumference. I conducted diurnal surveys between 1200 and 1630 h, and nocturnal surveys between 1830 and ~2330 h. For every boa encountered, I recorded activity and a GPS location, then placed the snake into a clean cloth pillowcase. At the end of the survey, I processed each snake by sexing it with a ball-tipped probe, weighed it with a Pesola® scale, and recorded snout-vent length (SVL) and tail length using a collapsible ruler. I took head measurements using dial calipers consisting of the following quantitative traits (after Reynolds et al. 2016b): head width (HW: widest head width), head length (HL: anterior of the rostral scale to the posterior of the mandible), labial length (LL: posterior-most labial scale to the anterior tip of the rostral scale), ocular length (OL: horizontal diameter of ocular scale), nares-ocular length (NO: anterior edge of ocular to posterior edge of nares), rostral-ocular length (RO: anterior edge of ocular to anterior edge of rostral scale), internares length (IN: narrowest internarial distance), and labial-ocular length (LO: posterior most labial scale to the proximal edge of the orbit). I obtained DNA samples in the form of tail clips for later analysis. I released each snake within three hours of capture at the exact spot where I first encountered it.



**Figure 2.** East Cay, sometimes called Martin Pinzon, a 46-ha island located on the eastern margin of the Turks Bank, Turks and Caicos Islands. Major habitats used by the boas are shown, based on observations made on 1 March 2022. Point locations are intentionally masked. The contour line is the 1-m depth line. Map redrawn from the Marine Spatial Planning Tools for Turks and Caicos (<https://webgis.gov.tc>).



**Figure 3.** East Cay, view from the northeast end looking to the southeast. Note the elevational rise in the background, which is a hill that reaches 21 m in elevation. This is the highest point in the Turks Cays. The vegetation in the photo is mostly graminoid/forb with some mixed evergreen/xeric visible. The dominant species in the photo is a forb (*Ambrosia hispida*). Photograph by the author.



### Results

On 1 March 2022, I reached East Cay at 1500 h and found three abundant species during diurnal surveys on 1 and on 2 March: *Anolis scriptus*, *Leiocephalus psammadromus* (Fig. 4), and *Sphaerodactylus underwoodi*. *Leiocephalus* was most common in grassy areas along the beaches, where sand is available for nesting. These areas hold a huge abundance of insects, particularly orthopterans (*Schistocerca serialis*). *Sphaerodactylus underwoodi* was common underneath limestone rocks on hillsides away from ocean spray zones. *Anolis scriptus* was found



**Figure 4.** Prey is abundant on the island, including curly-tailed lizards (*Leiocephalus psammadromus*). *Chilabothrus chrysogaster* is highly saurophagous and curly-tailed lizards are one of the most frequently taken prey items elsewhere in their range. Photograph by the author.

mostly on short vegetation on the hillsides, as well as among the rocks. The anoles on East Cay are far more saxicolous than elsewhere in their range, given that very little vegetation reaches more than 1 m in height, and they readily flee into rock crevices. I found the first boa (Fig. 5) at 1845 h crawling across a large limestone slab. I found the last boa at 2259 h. Five of the nine boas were females and five of the boas were of the striped morph (Fig. 5). The mean SVL of the nine boas was 704 mm and the mean mass was 110.4 g (Table 1).

On Long Cay I observed *Cyclura carinata*, *Anolis scriptus*, *Leiocephalus psammadromus*, and *Sphaerodactylus underwoodi* on 2 March 2022. I did not find any boas in five hours of nocturnal searching (1830–2330 h). On Gibbs Cay I documented *Anolis scriptus*, *Leiocephalus psammadromus*, and *Sphaerodactylus underwoodi* on 3 March 2022. I found three boas active at night between 1830 and 0026 h. Two were females and one was a male, with an average SVL of 579.7 mm and mass of 50 g, all were spotted (Table 1). Boas are significantly shorter on Gibbs Cay (580.7 mm SVL) than on East Cay (704 mm SVL; t-test:  $P = 0.008$ ).

### Discussion

A comprehensive analysis of the distribution of herpetofauna on Caribbean islands was published in 2012, bringing together centuries of records (Powell and Henderson 2012). Despite so much effort over this time to document species presence on islands, many gaps clearly remain, even for larger squamates. This is the first record of boas on East Cay and only the third island record for the Turks Bank. The earliest record of boas on this bank dates to Cope (1871) and is from a specimen collected by Adrian J. Ebell from “Turks Island,” what presumably (but not certainly; Buden 1975) is Grand Turk. However, boas on Grand Turk are effectively extirpated (Buden 1975; Reynolds et al. 2023), with only one known



**Figure 5.** First *Chilabothrus chrysogaster* found on East Cay, an adult female with an SVL of 663 mm (left). The first striped morphs documented from the Turks Bank were found during this expedition. This is boa #9, a male with an SVL of 675 mm (right). Photographs by the author.

**Table 1.** Morphometric measurements of boas from East Cay and Gibbs Cay, Turks and Caicos Islands. Boas were captured on 1 March 2022 (East Cay) and 3 March 2022 (Gibbs Cay). Three boas captured on Gibbs Cay in 2008 also are included. All measurements are in mm. HL = head length, HW = head width, LL = labial length, OL = ocular length, NO = nares-ocular length, RO = rostral-ocular length, IN = internares distance, and LO = labial-ocular length (also see text).

ID	Time	SVL	Tail	Sex	Mass	Pattern	HL	HW	LL	OL	NO	RO	IN	LO
<b>East Cay</b>														
EC1	1845	663	52 (blunt)	F	96	spotted	23.5	15.9	19.1	3.6	7.2	9.2	4.0	8.6
EC2	1846	860	126	F	142	striped	27.3	15.7	22.3	3.4	8.2	10.1	4.6	9.1
EC3	1918	525	115	M	63	spotted	22.0	13.0	17.3	2.75	6.2	7.8	3.6	6.9
EC4	1933	710	136	F	105	spotted	24.3	15.5	19.9	3.1	6.8	9.3	4.7	7.6
EC5	2047	730	138	F	98	striped	25.3	15.1	21.1	3.1	8.0	10.5	4.7	9.2
EC6	2100	707	70 (blunt)	F	140	spotted	24.7	15.5	21.3	3.4	7.6	9.6	4.2	9.1
EC7	2122	770	82 (blunt)	M	150	striped	25.8	16.0	21.9	2.9	8.1	9.8	4.9	9.4
EC8	2154	695	122	M	110	striped	23.9	14.6	20.2	3.1	7.3	9.2	4.2	7.7
EC9	2259	675	98	M	90	striped	24.0	15.0	20.9	3.1	7.2	8.8	3.9	9.1
<b>Summary</b>		704	104.3	1.25 F-M ratio	110.4	1.25 striped to spotted ratio	24.5	15.1	20.4	3.2	7.4	9.4	4.3	8.5
<b>Gibbs Cay</b>														
GC1 (2008)	1532	596	115	F	101	spotted	—	15.0	—	—	—	—	—	—
GC2 (2008)	1539	520	116	F	49	spotted	—	9.5	—	—	—	—	—	—
GC3 (2008)	1604	629	120	M	87	spotted	—	11.1	—	—	—	—	—	—
GC4 (2022)	1952	572	105	F	42	spotted	19.9	10.9	15.7	6.8	5.9	7.4	3.5	6.7
GC5 (2022)	2225	695	95	F	85	spotted	23.9	14.3	20.4	9.5	7.3	9.4	4.8	9.3
GC6 (2022)	0034	472	71	juv	23	spotted	17.2	9.1	14.1	6.4	4.8	6.0	3.2	5.9
<b>Summary</b>		580.7	103.7	4:1 F-M ratio	64.5		20.3	11.7	16.7	7.6	6.0	7.6	3.8	7.3

sighting in the last 20 years by a local who reported seeing it to me (RGR, unpubl. data). Boas were anecdotally reported from Gibbs Cay in the 1970s (RGR, unpubl. data) but not officially documented in the literature until 2010 (Reynolds and Niemiller 2010). The Gibbs Cay census population size is almost certainly less than 100 animals. Hence, the discovery of boas on East Cay is of tremendous conservation value, and more than doubles the likely census size of boas on the Turks Bank, as well as more than septuples the area of occupancy of boas on this bank. Further, boas on East Cay appear to be larger than boas on Gibbs Cay ( $P = 0.008$ ), with East Cay boas similar in average size to those from Ambergris Cay on the Caicos Bank. This could be indicative of boas on Gibbs Cay being “miniature,” given the apparent resource limitations on that island. Additional observations on these populations are needed to assess whether these size differences are robust.

The Turks & Caicos Boa is unique among boas (family Boidae) in having dimorphic color phases in a single population (Reynolds et al. 2023). Boas are either striped or spotted, with some variation of dorsal background and pattern colors

(Reynolds et al. 2020). These color phases are not necessarily binary, in that some intergradation of patterning exists, with some individuals exhibiting a gradient between spotted and striped (Reynolds et al. 2023). Further, some individuals are known to be copper or even red in color, rather than the usual light to dark gray. All these color morphs are documented from the Caicos Bank, and the only color morph known from the Turks Bank was the spotted (light gray background/dark gray pattern) morph (Fig. 5). This is the first report of striped boas (Fig. 5) from the Turks Bank, which indicates that the morph is present in these populations as well. Further, the striped morph appears to be at a higher frequency on East Cay (55%,  $n = 9$ ) versus Big Ambergris Cay on the Caicos Bank (15%,  $n = 737$ ; Reynolds et al. 2020). Thus, the last population of these boas not known to have a striped morph is the subspecies *C. chrysogaster relicquus* on the Great Inagua Bank (Reynolds et al. 2023).

#### Acknowledgements

I owe a huge thank you to Captain Tim Dunn, who was generous to assist me with transportation to the Turks Cays. I



also thank Matt Bishop, who helped with trip logistics, and who has been a project partner for a number of years. Glenn Gerber has been my long-time project partner in the Turks and Caicos, as has Giuliano Colosimo, and I thank them for all their efforts to study boas in the Turks and Caicos Islands. Thanks as well to Matthew Niemiller for invaluable assistance in earlier surveys of the Turks Cays. I thank the Department of Environment and Coastal Resources (DECR) for research permits. This work is approved by the UNC Asheville Institutional Animal Care and Use Committee and was funded by the Reynolds Lab at UNC Asheville.

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