



INTRODUCED SPECIES

Establishment of the Eastern Narrow-mouthed Frog (*Gastrophryne carolinensis*) on Abaco Island in The Bahamas, with Notes on the Species' Current Distribution in the West Indies

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The Eastern Narrow-mouthed Frog (*Gastrophryne carolinensis*) is a small (2.2–3.2 cm), terrestrial amphibian native to the southeastern United States (Dodd 2014). However, populations also have become established in the West Indies. Here, we report the first confirmed observations of Eastern Narrow-mouthed Frogs on Abaco Island, which extends the known introduced distribution of *G. carolinensis* in the Bahamas (Buckner et al. 2012; Reynolds and Giery, in press).

Abaco is a large island (~165 km long) on the Little Bahama Bank, which is located along the northeastern edge of the Bahamas Archipelago. The first evidence of an established population of Eastern Narrow-mouthed Frogs on Abaco came in May 2015. A chorus was heard during an evening rainstorm from a shallow pond at the northern edge of Marsh Harbour (Dundastown, 26.542199°, -77.080064°). The chorus consisted of at least one dozen adult males calling in association with Cuban Treefrogs (*Osteopilus septentrionalis*). Unfortunately, no visual confirmation was made at that time. However, several residents of Marsh Harbour reported hearing these distinctive choruses from other areas in Marsh Harbour during previous years.

An established population was confirmed on 25 May 2016, when a single adult female *G. carolinensis* was found underneath a rock in Marsh Harbour. The captured frog appeared to be in good physical condition (Fig. 1). A photograph was accessioned into the Florida Museum of Natural History (FMNH photographic voucher 178596); Dr. Kenneth L. Krysko verified the identity of the frog. This frog was in a low-density residential area of Marsh Harbour, Abaco (26.536299°, -77.084513°). This location is approximately 800 m from where the chorus had previously been heard, suggestive of an established population in northern Marsh Harbour. At both sites, the native vegetation had been

cleared and replaced by shrubby undergrowth, lawn, fruit trees, and pavement (Fig. 2). Permanent freshwater habitats are limited in the immediate area; however, ephemeral pools that form in drainage ditches during the rainy season apparently provide sufficient habitat for breeding.

Although these observations constitute the first records of this species on Abaco, we are unable to determine how long the population has existed. Residents (J. Richard, pers. comm.) reported that choruses were commonly heard years prior to our observations. Additionally, the inhabited area extends at least 800 m across, which suggests that the population has spread since an initial introduction. Further surveys are necessary for delineating the distribution of the population.



Fig. 1. An adult female Eastern Narrow-mouthed Frog (*Gastrophryne carolinensis*) found in Marsh Harbour, Abaco Island, The Bahamas. Photograph by Sean T. Giery.



Fig. 2. Eastern Narrow-mouthed Frogs (*Gastrophryne carolinensis*) in The Bahamas inhabit developed habitats. The image on the left depicts the site of a chorus on Abaco Island initially noted in May 2015. Despite being present in The Bahamas since 1972, these frogs do not appear to have invaded natural habitats such as the extensive pinelands on Grand Bahama and Abaco Islands depicted in the right panel. Photographs by James Richard (left) and Sean T. Giery (right).

West Indian Distribution of *G. carolinensis*

Within an extensive native distribution (Fig. 3), *G. carolinensis* is found in habitats ranging from bottomland forest to upland grasslands (Dodd 2013). *Gastrophryne carolinensis* also occurs in coastal habitats subject to saltwater influence (Neill 1958), suggesting a tolerance of slightly saline habitats and/or use of ephemeral, rainwater-filled pools for breeding — traits shared with other introduced amphibians in the region (Reynolds and Giery, in press).

Introduced populations of *G. carolinensis* have been established in the Greater Caribbean since the early 1970s (Fig. 3).

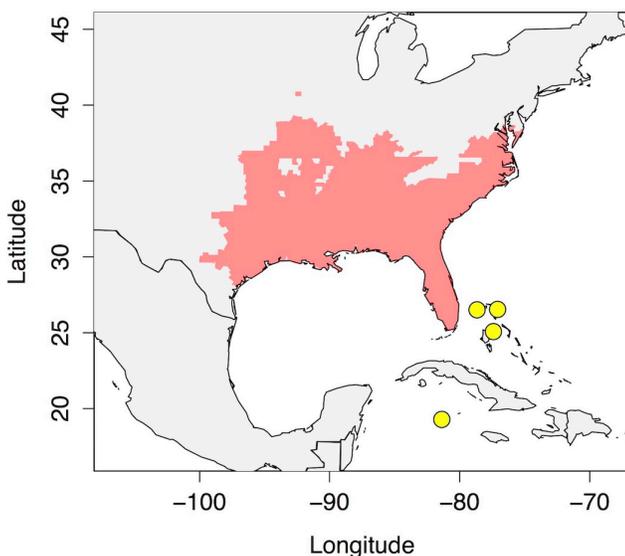


Fig. 3. The native (pink shade) and non-native (yellow dots) global distribution of Eastern Narrow-mouthed Frogs (*Gastrophryne carolinensis*). Distribution data were provided by IUCN SSC Amphibian Specialist Group (2014).

Jacobs (1973) first observed them in Freeport, Grand Bahama Island, The Bahamas in 1972. Six years later established populations were confirmed from several locations on New Providence as well (Crother 1986; Reynolds and Giery, in press). Outside of the Bahamas, *G. carolinensis* is well established on Grand Cayman Island since at least 1986 (Schwartz and Henderson 1991; Seidel and Franz 1994). Records contributing to range maps in Schwartz and Henderson (1991) indicated that populations were widespread and abundant on the western peninsula of Grand Cayman extending several miles north of George Town. Seidel and Franz (1994) also noted that *G. carolinensis* was widespread within agricultural areas on Grand Cayman, suggestive of rapid expansion and/or an earlier introduction date.

In combination, these records show that *G. carolinensis* is an able invader of oceanic islands. The route of invasion appears to be international trade in horticulture and landscaping plants (Kraus 2009), a common phenomenon for several species of invasive herpetofauna in the greater region (Powell et al. 2011; Giery 2013; Stroud et al. 2017; Reynolds and Giery, in press). However, other than these initial records of establishment and periodic reassessments of the population's extant status (Knapp et al. 2011; Buckner et al. 2012), no assessments have addressed within-island expansion of *G. carolinensis* or its potential impact on native flora and fauna.

Acknowledgements

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