

## INVASIVE SPECIES

# Is the Northern African Python (*Python sebae*) Established in Southern Florida?

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More than 45 species of nonindigenous amphibians and reptiles are currently established in Florida, largely as a consequence of international trade in live animals as pets (Meshaka et al. 2004, Kraus 2009, K. Krysko, unpubl. data). Among these, the Burmese Python (*Python molurus bivittatus* Kuhl 1820) has expanded its range through several thousand square kilometers of the southern Everglades and adjacent areas (Snow et al. 2007). The Boa Constrictor (*Boa constrictor* Linnaeus 1758) also is established in a forested county park in southeastern Miami, Miami-Dade County (Snow et al. 2007), but delineating the geographic distribution of this population is difficult because boas found nearby could be either dispersers from the known population or recently released or escaped animals from captivity. Free-ranging individuals of several additional species of large constrictors (e.g., Green Anaconda, *Eunectes murinus* Linnaeus 1758; Yellow Anaconda, *E. notatus* Cope 1862; Reticulated Python, *Broghammerus reticulatus* Schneider 1801; and White-lipped Python, *Leiopython albertisii* Peters and Doria 1878) have been found in various parts of Florida, but evidence of reproduction for these species is presently lacking. Herein, we provide evidence suggesting the possibility of a reproducing population of a third species of giant constrictor in Florida, the Northern African Python (*Python sebae* Gmelin 1788; Fig. 1).

In 2002, a large (ca. 4.9 m total length) *Python sebae* was found at the intersection of SW 26th Street and SW 147th Avenue, Miami, Miami-Dade County (25.74298°N, -80.43221°W; datum WGS84; Fig. 2A), and recovered, but not retained, by the Miami-Dade Venom Response Unit (A. Cruz, pers. comm.; Internet Broadcasting Systems 2005). A snake of this size would almost certainly be female, as this species exhibits female-biased sexual size dimorphism, and males are not known to attain such sizes in its native range (Reed and Rodda 2009).



Fig. 1. Northern African Python (*Python sebae*) captured by Anthony Flanagan on 19 December 2009.

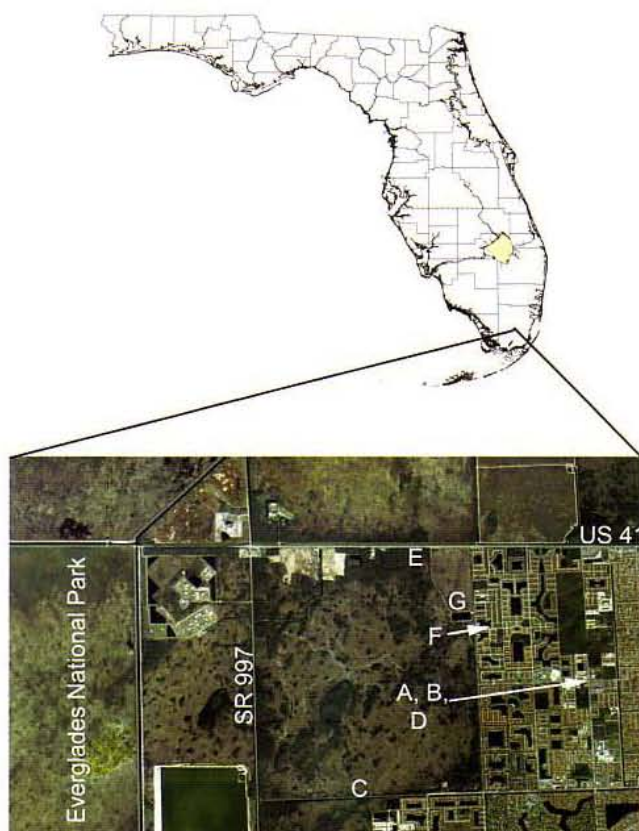


Fig. 2. Specimens and observations of the Northern African Python (*Python sebae*) in Miami, Miami-Dade County, Florida. Localities (see text) include: A = 2002, B = 11 October 2005, C = November 2008, D = 30 May 2009, E = 5 August 2009, F = 16 August 2009, G = 19 December 2009.

On 11 October 2005, an adult (ca. 3 m total length) *Python sebae* (photographic voucher UF 153699) was found in a plant nursery just north of the same intersection (Fig. 2B). The snake had entered an outdoor enclosure for raising fowl, and had consumed a domestic turkey (A. Cruz, pers. comm.; Internet Broadcasting Systems 2005).

In November 2008, an experienced snake collector observed a large (3.5–4.0 m total length) adult python along a canal bank (25.72739°N, -80.46548°W), 3.7 km southwest of the intersection cited above (Fig. 2C; A. Flanagan, pers. comm. 2009). He attempted to capture the snake, but it escaped from his grasp after a brief struggle. This observer has captured 100 *P. molurus* in southern Florida, and was confident of his identification of this snake as *P. sebae*, including the observation that the individual bore an aberrant middorsal dark stripe.

On 30 May 2009, an approximately 2.75 m-long *Python sebae* was struck by a motor vehicle at the same intersection cited above (Fig. 2D), and recovered by the Miami-Dade Venom Response Unit (A. Cruz, pers. comm.). This snake subsequently died from its injuries, and dissection revealed that it was an adult female with 37 “undeveloped ova” (unknown whether these were ovarian follicles or oviductal eggs, as they were discarded prior to preservation). This specimen, along with photographic images, was transferred to the Florida Museum of Natural History (UF 155725) for preservation and documentation.

On 5 August 2009, a neonate (59 cm SVL) *Python sebae* (UF 155500) was found dead on US 41, 0.09 km west of 160th Avenue (25.76089°N, -80.45596°W; Fig. 2E), which is 3.0 km northwest of the intersection cited above. On 16 August 2009, another juvenile *P. sebae* (110 g, UF 155726) was collected at 15527 SW 18th Street, Miami (25.74984°N, -80.44637°W; Fig. 2F), and recovered by the Miami-Dade Venom Response Unit (L. Woods, pers. comm.). Dissection revealed a 72-g Boat-tailed Grackle (*Quiscalus major*) in the stomach of the python. See Table 1 for body lengths and disposition of specimens.

Most recently, on 19 December 2009, an adult male *P. sebae* (UF 157193, 249 cm SVL, 281 cm total length, 10.374 kg) was collected from a *Melaleuca* slash pile (Fig. 3) just west of 157th Avenue south of US 41 (25.75245°N, -80.45079°W; specimen not yet accessioned into FLMNH). The snake was basking on top of dead logs and appeared reproductively competent; its testes were swollen and mildly turgid, sperm ducts were convoluted, and microscopic examination of fluid expressed from the ducts revealed multiple spermatozoa.

The above specimens and observations are presently confined to a small (~10 km<sup>2</sup>) area of Miami, just 1.6 km east of Everglades National Park (Fig. 2). All seven pythons were found southeast of the intersection of US 41 and SR 997, an area often referred to as Bird Drive Basin. Taken as a whole, these seven observations over a seven-year period, including multiple adults, a gravid female, and young-of-year hatchlings suggest the possibility of a reproducing population of *Python sebae*. Recovery of adults over several years followed by recently hatched juveniles argues against the notion that all of these individuals were the result of a single release of multiple individuals, leaving multiple releases or a reproducing population as the most likely explanations. These observations do not represent definitive evidence of a reproducing population, and some would argue that only the discovery of a female brooding eggs would qualify as definitive evidence. By the time such discoveries are typically made, of course, a species is often well established. Indeed, the observations of *Python sebae* in Miami highlight the difficulty of declaring when a population of extremely cryptic reptiles has become established.

Three of the five adult pythons were from a small area just south of Tree Island Park, which is south of US 41 and bounded on the east and west by SW 146th Street and SW 149th Street, respectively. The two hatchlings were found farther to the west and north, and could conceivably represent dispersing individuals. Habitats in this area include high-density single-family housing developments, undeveloped but highly disturbed habitats with a



Fig. 3. Scott Goetz (U.S. Geological Survey) precariously makes his way through a large pile of dead *Melaleuca* logs while searching for pythons in Bird Drive Basin. The python pictured in Fig. 1 had been captured from this pile.

preponderance of invasive *Melaleuca* trees, small man-made canals and lakes, agricultural areas (primarily to the southwest), and seasonally flooded wetlands. Land ownership in the area is complex, with various parcels belonging to homeowners, housing developers, plant nursery and agricultural interests, Miami-Dade County, South Florida Water Management District, Miccosukee Tribe of Indians, State of Florida, and others.

The area described above is within or adjacent to the eastern edge of the known distribution of invasive Burmese Pythons (*Python molurus bivittatus*; Snow et al. 2007). Distinguishing between *P. molurus* and *P. sebae* can be challenging, and often hinges on color pattern; although meristic characters (e.g., scale counts) are sufficient to distinguish many individuals, moderate overlap exists among these species in many of those characters. *Python molurus* and *P. sebae* are known to hybridize in captivity (Branch and Erasmus 1984 and references therein), which could further complicate the identification of a python recovered from this area. Fertility and fitness of hybrids is unknown, as are the potential implications of adding *P. sebae* genes to the existing population of *P. molurus*. The potential difficulty of accurately identifying free-ranging individuals of different species of exotic pythons is exemplified by two *P. sebae* recovered from southwestern Florida (east of Sarasota) in 2006 and 2009. Both of these specimens were originally reported as a different species (one identified as *P. molurus* and one as a Reticulated Python, *Broghammerus* [formerly *Python*] *reticulatus*). As the population of Burmese Pythons continues to expand within Florida, accurate identification of large snakes will be crucial to identifying incipient populations of other species before their populations become too widespread for effective eradication programs.

Efforts are currently underway to develop education and outreach materials that will allow discrimination among these and other giant constrictor species by citizens and resource managers lacking herpetological

Table 1. Specimen information for seven *P. sebae* recovered from the western boundaries of greater Miami, FL from 2002 to 2009. When available, specimens were accessioned into the Florida Museum of Natural History in Gainesville, FL.

Date	Specimen No.	Specimen Type	Approx. Total Length
19 December 2009	157193	Whole body	2.81 m
16 August 2009	155726	Whole body	0.71 m
05 August 2009	155500	Whole body	0.67 m
30 May 2009	155725	Whole body	2.75 m
November 2008	N/A	Credible sighting	~3.7 m
11 October 2005	153699	Media account	3.05 m
2002	N/A	Credible sighting	4.9 m

expertise. Stakeholders from various federal, state, tribal, and local agencies also plan to partner with non-governmental cooperators to conduct intensive surveys for *Python sebae* in the Bird Drive Basin area in 2010 (D. Giardina, Florida Fish and Wildlife Conservation Commission, pers. comm. 2009). Such surveys will aim to delineate the size and geographic extent of the incipient population and attempt eradication of remaining individuals.

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