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Arboreal Habitat Use by Invasive Burmese Pythons in Southern Florida

Lisa M. McBride[1,8], Amanda M. Kissel[2], Amy A. Yackel Adams[2], Matthew F. Metcalf[1], Austin L. Fitzgerald[1], Grant S. McCargar[3], Sarah R. Sherburne[1], Génesis Aponte Santiago[4], Matthew F. McCollister[5], Gretchen E. Anderson[1], Travis R. Mangione[5], Jacquelyn C. Guzy[6], Andrea F. Currylow[1,7], Kristen M. Hart[6], Christina M. Romagosa[4] and Mark R. Sandfoss[1]

[1]*U.S. Geological Survey, Fort Collins Science Center - South Florida Field Station in Everglades National Park, 40001 SR 9336, Homestead, Florida, 33034, USA*
[2]*U.S. Geological Survey, Fort Collins Science Center, 2150 Centre Ave., Fort Collins, Colorado, 80526, USA*
[3]*University of Florida and U.S. Geological Survey Intern Program, University of Florida, stationed in Big Cypress National Preserve, Ochopee, Florida, 34141, USA*
[4]*Department of Wildlife Ecology and Conservation, University of Florida, 110 Newins-Ziegler Hall, Gainesville, Florida, 32611, USA*
[5]*National Park Service, Big Cypress National Preserve, 33100 Tamiami Trail East, Ochopee, Florida, 34141, USA*
[6]*U.S. Geological Survey, Wetland and Aquatic Research Center, 3321 College Avenue, Davie, Florida, 33314, USA*
[7]*Present address: Department of Biology & Marine Biology, University of North Carolina at Wilmington, Dobo Hall 1010, Wilmington, North Carolina, 28403, USA*

Abstract.—Understanding habitat use and behavior is critical to developing effective management strategies for a species. Burmese Pythons (*Python bivittatus*) are large-bodied snakes native to southeastern Asia that have become prolific invaders throughout the Greater Everglades Ecosystem in southern Florida, USA. We radio-tracked 188 adult and 168 juvenile Burmese Pythons to investigate arboreal microhabitat use and quantify the likelihood of observing Burmese Pythons in arboreal habitat. We observed adult pythons basking, resting, aggregating with other pythons, or brooding eggs in arboreal habitat, whereas we observed juvenile pythons resting, basking, or moving between tree limbs. Both adult and juvenile pythons were more likely to use arboreal habitat during the cooler months of December and January in southern Florida's dry season. A higher percentage of individual juvenile pythons than adult pythons used arboreal habitat, and the probability that a python occupied arboreal habitat decreased as its weight increased. Brazilian peppertrees (*Schinus terebinthifolia*) and live oaks (*Quercus virginiana*) supported heavier pythons. Information on the seasonal use of arboreal habitats by Burmese Pythons could improve the effectiveness of removal efforts by management agencies and enhance our understanding of the threats these snakes pose to vulnerable species, particularly arboreal-nesting birds.

Wildlife management fundamentally relies on understanding how target species use habitats because this knowledge underpins the development of effective management strategies. This understanding is especially critical for invasive species, which pose substantial threats to biodiversity and the integrity of natural ecosystems (Simberloff et al., 2013). Understanding the habitat use of invasive species can also highlight their potential effects on native ecosystems (Mayfield et al., 2021). In regions such as southern Florida, where habitats are ecologically diverse, rapidly changing, and undergoing restoration, these insights are vital (Guzy et al., 2023). Moreover, linking habitat use with species-specific behaviors can help refine control efforts and improve long-term management outcomes (Lettoof et al., 2023; Bartoszek et al., 2024).

Burmese Pythons (*Python bivittatus*) Kuhl, 1820, are nonvenomous constrictors native to southeastern Asia (Barker and Barker, 2008) that have become invasive throughout southern Florida (Snow et al., 2007; Willson et al., 2011). Researchers first recognized pythons as an established invasive species in Everglades National Park in the early 2000s (Meshaka et al., 2000), and their subsequent population expansion has severely affected native species and ecosystems (Dorcas et al., 2012; McCleery et al., 2015; Guzy et al., 2023). Burmese Pythons are novel predators of native fauna in Florida because they are the largest snakes in the ecosystem, reach lengths of more than 5 m, and consume a wide range of vertebrate prey (Romagosa et al., 2023). The species is difficult to manage because of its low detectability (Nafus et al., 2020; Guzy et al., 2023) and high reproductive output (Currylow et al., 2022, 2023a, 2025).

Although certain snake species have developed adaptations for highly specialized environments, such as arboreal canopies or aquatic systems (Pizzatto et al., 2007; Brischoux and Shine, 2011), many species are generalists that occupy a broad range of habitats (Heatwole, 1977; Shine et al., 2005; Pierce et al., 2008). As in their native range (Smith et al., 2021, 2024), Burmese Pythons in Florida are a generalist species that occupies nearly all habitat types in their invasive range (reviewed in Guzy et al., 2023). Habitat selection by Burmese Pythons in southern Florida appears to be influenced by elevation (Hart et al., 2015; Walters et al., 2016; Bartoszek et al., 2021) and includes the use of underground refugia (Bartoszek et al., 2024), freshwater and estuarine wetlands and canals (Hart et al., 2015; Mutascio et al., 2018; Bartoszek et al., 2021; Pittman and Bartoszek, 2021), and anthropogenic structures (Hanslowe et al., 2016; Currylow et al., 2025).

Compared with arboreal snake species, Burmese Pythons generally lack specialized morphological features such as narrow, laterally compressed bodies, long tails, and lighter body mass (Pizzatto et al., 2007; Alencar et al., 2017; Harrington et al., 2018). Nevertheless, researchers have occasionally observed Burmese Pythons and other heavy-bodied snake species using arboreal habitats (Wall, 1921; Starin and Burghardt, 1992; Murphy and Henderson, 1997; Meshaka et al., 2004; Reed and Rodda, 2009; Dorcas et al., 2011; Bruton, 2013; Sanchez et al., 2017; Mukherjee et al., 2018; Lozorio et al., 2023). Reports of arboreal habitat use by Burmese Pythons in southern Florida have been limited to observations of a few basking pythons (Meshaka et al., 2004) or pythons climbing trees in rookeries to consume

[8]Corresponding author. E-mail: Lmcbride@usgs.gov
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wading birds (Orzechowski et al., 2019). However, the extent to which Burmese Pythons in Florida use arboreal habitats across life stages and ecological contexts remains poorly understood.

In this study, we document arboreal habitat use and behavior by Burmese Pythons throughout Big Cypress National Preserve (BICY) in Collier, Monroe, and Miami-Dade Counties, Florida, USA. We evaluate how body size and season influence the probability of observing a python in an arboreal setting and identify the tree and shrub species most frequently associated with these observations. Our findings offer insight into how this invasive species exploits novel environments and contribute to broader knowledge of its microhabitat use, with implications for understanding the ecological effects of pythons.

Materials and Methods

Study Area.—Since 2017, we have radio-tracked wild Burmese Pythons within BICY (Fig. 1), which encompasses nearly 295,000 ha in southern Florida (Muss et al., 2003). The climate in BICY is humid and subtropical, with distinct wet (May–October) and dry (November–April) seasons. Most rainfall occurs from May through October, and approximately 30% of the annual rainfall occurs in June and August (Abiy et al., 2019; Western Regional Climate Center, 2025; Fig. 2). During the wet season, air temperatures average 27.3 °C, whereas temperatures during the dry season average 21.5 °C (Western Regional Climate Center, 2025; Fig. 2). Peak summer temperatures range from 22 °C to 33 °C in July and August, whereas winter temperatures range from 11 °C to 23 °C in January (Solecki and Walker, 2001; Western Regional Climate Center, 2025; Fig. 2). The preserve contains several habitat types, including cypress forests, prairies, pinelands, hardwood hammocks, mixed hardwood swamps, marshes, and mangroves (Prats et al., 2020), which collectively support more than 800 native plant species (Duever et al., 1986). Forested habitats are dominated by Bald Cypresses (*Taxodium distichum*), Pond Cypresses (*T. ascendens*), and Slash Pines (*Pinus elliottii*) (Feeley et al., 2024). Other common tree and shrub species include Red Maples (*Acer rubrum*), Pond Apples (*Annona glabra*), Cocoplums (*Chrysobalanus icaco*), Pop Ashes (*Fraxinus caroliniana*), Dahoon Hollies (*Ilex*

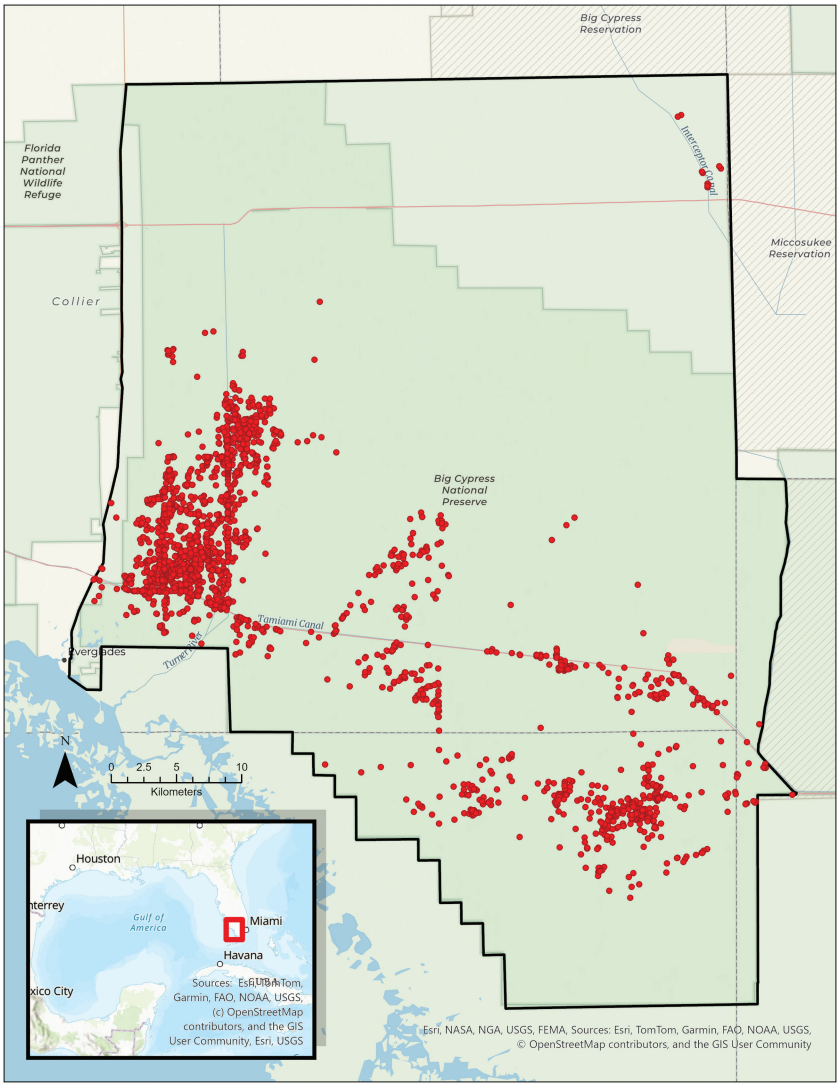


Fig. 1. Map of the study area in which we assessed arboreal habitat use by 188 adult and 168 juvenile radio-tracked invasive Burmese Pythons (*Python bivittatus*) in southern Florida. Big Cypress National Preserve, a National Park Service unit spanning Collier, Monroe, and Miami-Dade Counties, Florida, USA, was the study area in which we tracked adult pythons from November 2017 through December 2024 and juvenile pythons from July 2020 through December 2024 during 4,186 radio-tracking events.

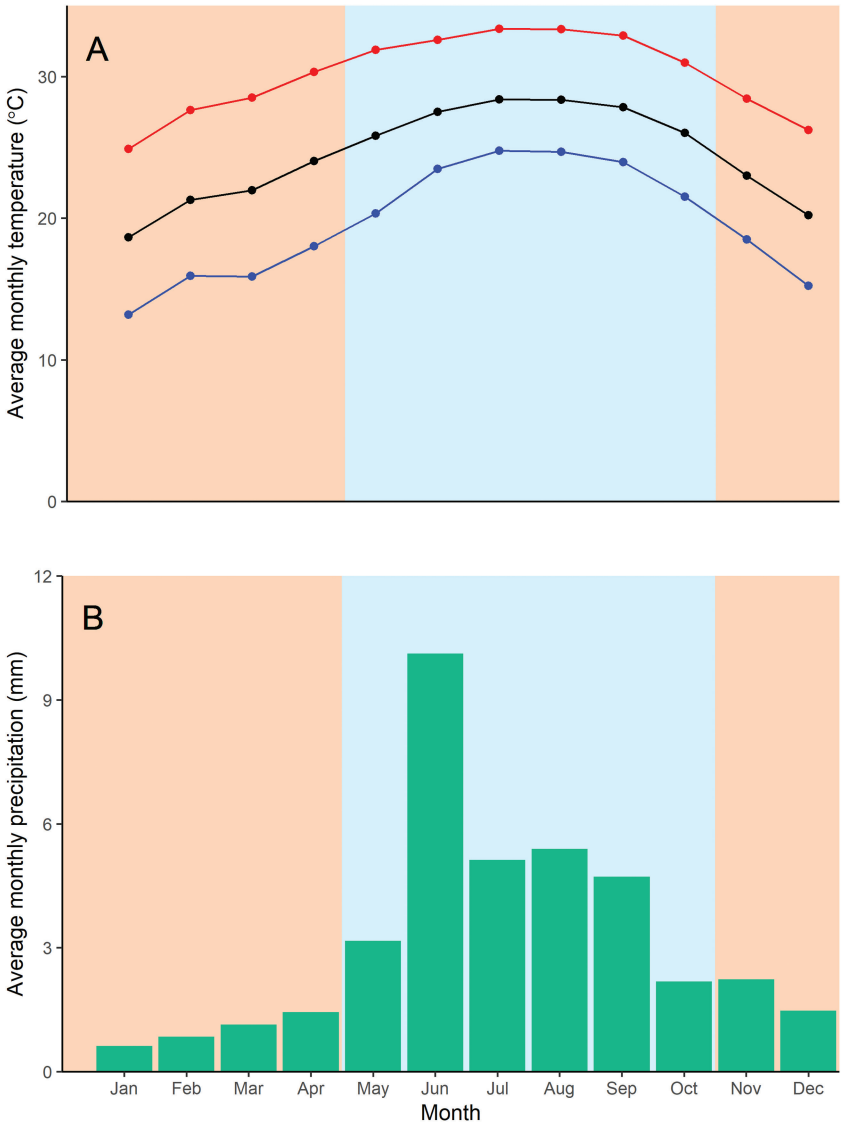


FIG. 2. Monthly (A) air temperature and (B) precipitation in Big Cypress National Preserve, Ochopee, Florida, USA, from November 2017 through December 2024, showing southern Florida's dry and wet seasons. Dry-season months (November–April) are shaded light pink, and wet-season months (May–October) are shaded light blue. (A) Average monthly air temperature values (°C) are represented by maximums (red line), means (black line), and minimums (blue line). (B) Average monthly precipitation values (mm) are represented by a green bar graph. Daily temperature and precipitation values were downloaded from the USA Climate Archive (https://raws.dri.edu/; Western Regional Climate Center, 2025).

cassine), Wax Myrtles (*Myrica cerifera*), Live Oaks (*Quercus virginiana*), Cabbage Palms (*Sabal palmetto*), Coastal Plain Willows (*Salix caroliniana*), Saw Palmettos (*Serenoa repens*), and invasive Brazilian Peppertrees (*Schinus terebinthifolia*) (Muss et al., 2003).

Python Recruitment and Transmitter Implantation.—We recruited adult pythons through road cruising, opportunistic field encounters, and active associate searches conducted while tracking other radio-tagged individuals (Smith et al., 2016). We added juvenile pythons to the study either as hatchlings from eggs laid by radio-tagged females or through opportunistic captures during road surveys. We assigned each python to one of two age classes based on snout–vent length (SVL): adults (males: >125.0 cm SVL; females: >151.0 cm SVL) or juveniles (males: 42.0–124.9 cm SVL; females: 39.0–150.9 cm SVL), following the size classifications of Currylow et al. (2022). We measured, weighed, and sexed all recruited individuals and surgically implanted them with VHF radiotelemetry transmitters (Holohil Systems Ltd., Ontario, Canada) following standardized procedures (Reinert and Cundall, 1982). We used three Holohil transmitter models: RI-2 (6.2–6.9 g), SI-2 (11–15 g), and AI-2 (28–36 g). We released the pythons at their original capture locations approximately 24 h after surgery.

Radio-Tracking Pythons.—Between 1 November 2017 and 31 December 2024, we tracked juvenile and adult pythons using a TR-8 handheld scanning receiver (Telonics, Mesa, Arizona, USA) attached to either an RA-23 K directional H antenna (Telonics, Mesa, Arizona, USA) or a three-element Yagi antenna (Advanced Telemetry Systems, Inc., Isanti, Minnesota, USA). We located adult pythons once per week on foot during the python breeding season (December–March; Currylow et al., 2022) and twice per month during the remainder of the year (April–November). We visually confirmed the locations of adult pythons during each ground-tracking event when possible. We tracked juvenile pythons once per week throughout the year and obtained visual confirmation one or two times per month.

Upon visual confirmation, we recorded the python's Universal Transverse Mercator (UTM) coordinates (WGS84 datum), general habitat and microhabitat features, and any observed behaviors described below. Project objectives, transmitter functionality, or field mortality determined how long each python participated in the study. For example, we released juveniles sourced from eggs annually in late July or August, and mortality rates were generally high during the first few months, which reduced the number of observations from November through June of the following year.

Arboreal Habitat Use.—We defined arboreal habitat as aboveground woody vegetation, such as trees or shrubs (Lillywhite and Henderson, 1993; Scheffers et al., 2013; Harrington et al., 2018; Cannon et al., 2021). When we observed a python in arboreal habitat, we identified the plant species, measured the python's height above the ground, and classified its behavior. We included only undisturbed observations in which pythons were already in arboreal vegetation when first observed; we excluded instances in which pythons climbed trees or shrubs in response to the presence of field crews.

We classified python behavior into six types: aggregating, basking, eating, moving, brooding eggs, and resting. We classified pythons as aggregating when we observed two or more individuals together within 1 m of one another in the same tree or shrub (Thomas, 2019). We defined basking as a python lying outstretched or loosely coiled with its body uncovered by vegetation or substrate and exposed to the sun (Slip and Shine, 1988; Wisler et al., 2008). We classified a python as eating when it was actively constricting or consuming prey and as moving when we observed it changing location within the arboreal matrix. We identified egg brooding when a female python was coiled around eggs. We classified a python as resting when it remained stationary with its body completely covered by vegetation or substrate (Kane et al., 2023).

Data Analysis.—We fitted two Bayesian linear models, one for adult pythons and one for juvenile pythons, to estimate the probability of observing a python in arboreal habitat. We used a Bernoulli distribution for both age classes. The adult model included weight and month as covariates, with month included as a quadratic term, whereas the juvenile model included weight, month as a quadratic term, and sex. We excluded sex as a covariate from the adult model because of its confounding relationship with weight, as female pythons typically weigh more than males. We included individual python as a random effect in both models to account for repeated observations throughout the study. To assess whether specific tree or shrub species supported pythons of different sizes, we fitted an additional model using a gamma distribution, with python weight as the response variable and plant species as a covariate. We excluded plant species with fewer than five arboreal-python observations to ensure robust estimates. We fitted the models using the brms package (version 2.22.0; Bürkner, 2017) in the statistical programming language R (version 4.4.2; R Core Team, 2024) through RStudio (version 2026.04.0; Posit Team, 2026). We used default flat priors for the coefficients and a Student-t prior for the intercept with 3 degrees of freedom, a mean of 0, and a σ of 2.5. We centered and standardized all continuous covariates (Schielzeth, 2010) and ran three chains with 3,000 iterations each and a burn-in of 1,000 iterations. We assessed model convergence by confirming mixing of the chains and calculating R-hat values, with values <1.1 considered acceptable (Gelman and Rubin, 1992).

Table 1. Total number of radio-tracking events (TRE) and arboreal radio-tracking events (ARE) by sex and size for adult Burmese Pythons observed in arboreal habitat. SVL is snout–vent length (cm) and TL is total length (cm). SVL and TL values are the most recent morphometric data for each python. P represents the number of radio-tracking events of pythons observed in arboreal habitat in proportion to TRE. Data from these observations are included in McBride et al. (2026).

ID	Sex	Weight (g)	SVL (cm)	TL (cm)	Days in project	TRE	ARE	P
PyBi-001	F	30,400	376.1	423.6	1,414	76	8	0.105
PyBi-002	F	26,000	334.6	376.6	41	5	2	0.400
PyBi-003	M	20,400	292.9	332.3	840	27	1	0.037
PyBi-004	M	16,100	280.0	322.0	1,148	65	5	0.077
PyBi-005	M	12,500	250.7	286.2	14	3	1	0.333
PyBi-006	M	12,411	236.2	272.5	1	1	1	1.000
PyBi-007	M	11,400	249.4	287.5	576	26	2	0.077
PyBi-008	M	11,080	269.0	309.0	657	16	1	0.063
PyBi-009	F	10,300	264.2	297.3	468	25	1	0.040
PyBi-010	M	10,300	243.3	280.0	361	25	1	0.040
PyBi-011	M	9,514	230.3	266.0	1,203	49	1	0.020
PyBi-012	M	9,419	234.8	270.7	1	1	1	1.000
PyBi-013	M	9,084	246.5	283.3	1	1	1	1.000
PyBi-014	M	7,640	249.9	287.7	517	19	2	0.105
PyBi-015	M	7,200	223.0	255.6	1,434	79	1	0.013
PyBi-016	M	7,152	247.2	279.6	1,840	61	1	0.016
PyBi-017	M	7,140	220.0	253.0	475	35	1	0.029
PyBi-018	M	6,750	230.0	265.0	1,342	62	1	0.016
PyBi-019	M	6,220	312.9	345.1	1,482	61	1	0.016
PyBi-020	M	5,834	202.9	233.1	891	27	2	0.074
PyBi-021	M	5,450	212.5	245.6	1,218	68	2	0.029
PyBi-022	M	5,260	205.0	233.5	460	27	1	0.037
PyBi-023	M	5,200	201.5	234.6	1	1	1	1.000
PyBi-024	M	4,800	193.0	221.0	376	10	1	0.100
PyBi-025	M	4,386	195.7	225.0	655	23	1	0.043
PyBi-026	M	4,257	192.0	220.7	504	29	3	0.103
PyBi-027	M	2,355	170.0	195.0	159	21	1	0.048

TABLE 2. Total number of radio-tracking events (TRE) and arboreal radio-tracking events (ARE) by sex and size for juvenile Burmese Pythons observed in arboreal habitat. SVL is snout–vent length (cm) and TL is total length (cm). SVL and TL values are the most recent morphometric data for each python. P represents the number of radio-tracking events of pythons observed in arboreal habitat in proportion to TRE. Data from these observations are included in McBride et al. (2026).

ID	Sex	Weight (g)	SVL (cm)	TL (cm)	Days in Project	TRE	ARE	P
PyBi-028	F	1,700.0	102.8	107	436	71	24	0.338
PyBi-029	F	825.0	107.5	121.8	174	163	4	0.025
PyBi-030	F	396.0	94.0	106.0	313	40	8	0.200
PyBi-031	F	162.4	69.2	79.4	42	4	1	0.250
PyBi-032	M	145.9	54.0	61.8	97	3	1	0.333
PyBi-033	F	145.0	60.5	69.2	35	19	3	0.158
PyBi-034	M	143.3	58.1	67.3	167	9	1	0.111
PyBi-035	M	142.2	56.9	65.4	167	5	1	0.200
PyBi-036	F	141.6	57.8	66.7	154	12	1	0.083
PyBi-037	M	141.4	54.6	62.8	99	3	1	0.333
PyBi-038	F	139.3	61.6	71.0	61	3	1	0.333
PyBi-039	F	138.0	61.3	70.3	31	16	1	0.063
PyBi-040	F	132.5	66.8	76.2	88	17	1	0.059
PyBi-041	F	132.0	58.6	67.0	48	18	1	0.056
PyBi-042	F	131.0	55.8	64.9	65	6	1	0.167
PyBi-043	M	130.6	58.2	66.4	440	16	1	0.063
PyBi-044	F	129.0	61.1	70.3	38	23	2	0.087
PyBi-045	F	128.0	58.5	67.9	121	64	1	0.016
PyBi-046	M	128.0	56.2	64.2	153	5	1	0.200
PyBi-047	F	126.5	69.3	78.8	33	7	1	0.143
PyBi-048	F	123.0	56.7	64.9	22	14	1	0.071
PyBi-049	F	122.0	57.5	65.9	152	63	1	0.016
PyBi-050	F	121.9	63.6	73.0	39	8	1	0.125
PyBi-051	F	119.8	63.1	72.6	64	9	1	0.111
PyBi-052	F	118.9	63.2	72.3	115	13	1	0.077
PyBi-053	F	118.7	63.3	73.3	90	4	1	0.250
PyBi-054	F	114.8	62.6	71.6	218	21	2	0.095
PyBi-055	F	107.0	53.7	62.0	147	45	2	0.044
PyBi-056	F	98.4	57.4	66.4	152	24	1	0.042

RESULTS

From 1 November 2017 to 31 December 2024, we visually confirmed 4,186 python locations during ground radio-tracking events (adults: $n = 2,357$; juveniles: $n = 1,829$). In total, we tracked 188 individual adult pythons (females: $n = 73$; males: $n = 115$). From 1 July 2020 to 31 December 2024, we tracked 168 individual juvenile pythons (females: $n = 134$; males: $n = 34$) (McBride et al., 2026). We observed arboreal habitat use by 27 adults (14%) and 29 juveniles (17%) (Tables 1, 2) during 112 unique radio-tracking events, representing 2.7% of all tracking occasions. Four observations of arboreal habitat use by adult pythons involved associate pythons (i.e., new individuals that were not radio-tagged but were observed during a search for a radio-tagged individual); these pythons participated in the study for 1 d and had one observation each (Table 1). Among radio-tagged adult pythons observed in arboreal habitat, excluding the associate pythons described above, the proportion of observations in arboreal habitat (i.e., the number of observations in trees or shrubs divided by the total number of observations of the individual) varied from 0.013 to 0.400 (mean = 0.079; Table 1). Among juvenile pythons observed in arboreal habitat, the proportion varied from 0.016 to 0.338 (mean = 0.140; Table 2).

Arboreal Habitat Use by Python Size Class.—Juvenile pythons used arboreal habitat more frequently than adult pythons. We recorded 45 arboreal observations of adult pythons (1.9% of adult radio-tracking events; Table 1) and 67 observations of juvenile pythons (3.7% of juvenile radio-tracking events; Table 2). Adult male pythons accounted for 34 of the 45 arboreal observations, whereas only 3 adult female pythons contributed the remaining 11. In contrast, juvenile female pythons accounted for most arboreal observations, comprising 61 of the 67 observations. One individual (PyBi-028) accounted for 24 observations (34% of its total radio-tracking events) over 436 d, the second-longest tracking duration for a juvenile python in our study (Table 2).

We observed adult pythons basking ($n = 39$; Fig. 3A), resting ($n = 3$), aggregating ($n = 2$), and brooding eggs ($n = 1$) in arboreal habitat. One adult female python (PyBi-001) was observed most frequently in arboreal habitat ($n = 8$) and was the only adult female python documented aggregating with conspecifics and brooding eggs (Table 1; Fig. 3B). We observed juvenile pythons basking ($n = 39$; Figs. 4A, B), resting ($n = 25$), or moving between tree limbs ($n = 3$; Fig. 4C) in arboreal habitat. The greatest observed height above the ground was 8 m for adult pythons (PyBi-004; Fig. 3C) and 10 m for juvenile pythons (PyBi-028).

Probability of Observation in Arboreal Habitat.—For adult pythons, the standard deviation of the random effect of individual python was strongly positive, with credible intervals (CIs) that did not overlap zero, suggesting substantial individual variation in tree use. Although body weight negatively influenced the probability of an arboreal observation (Table 1; Fig. 5A), the effect of weight was generally small. During January, when arboreal habitat use was highest (Fig. 5B), the probability ranged from 0.002 (95% CI: 0.00004–0.03) for a python weighing 80,400 g to 0.09 (95% CI: 0.03–0.25) for a python weighing 2,355 g (Fig. 5A). Month also had a strong quadratic effect (i.e., CIs did not overlap zero), with the lowest probabilities occurring in summer. We found no adult pythons in arboreal habitat during June, July, or August. The probability of observing a



FIG. 3. Three adult Burmese Pythons (*Python bivittatus*) in arboreal habitats in Big Cypress National Preserve, Ochopee, Florida, USA. (A) Male python PyBi-019 basking in a Coastal Plain Willow (*Salix caroliniana*) 3.5 m above an Alligator Flag (*Thalia geniculata*) marsh in December. (B) Female python PyBi-001 brooding eggs in a fallen, hollow cypress tree (*Taxodium* spp.) 2 m above the ground in May. Two red circles indicate eggs laid outside the coils of PyBi-001. (C) Male python PyBi-004 basking in a Coastal Plain Willow 8 m above a Sawgrass (*Cladium jamaicense*) and willow marsh in December. Photo credits: (A) L. M. McBride; (B) M. F. Metcalf; (C) A. F. Larroque. Video and additional photographs of adult Burmese Pythons in arboreal habitat are included in a US Geological Survey data release (McBride et al., 2026).



FIG. 4. Three juvenile Burmese Pythons (*Python bivittatus*) in arboreal habitats in Big Cypress National Preserve, Ochopee, Florida, USA. (A) Female python PyBi-030 basking on a cypress tree (*Taxodium* spp.) branch 2 m above the ground in April. (B) Female python PyBi-055 basking in a Wax Myrtle (*Myrica cerifera*) 1 m above the ground in October. (C) Female python PyBi-029 moving in a Dahoon Holly (*Ilex cassine*) 2 m above the ground in August. Photo credits: (A) L. M. McBride; (B) G. S. McCargar; (C) G. E. Anderson. Additional photographs of juvenile Burmese Pythons in arboreal habitat are included in a US Geological Survey data release (McBride et al., 2026).

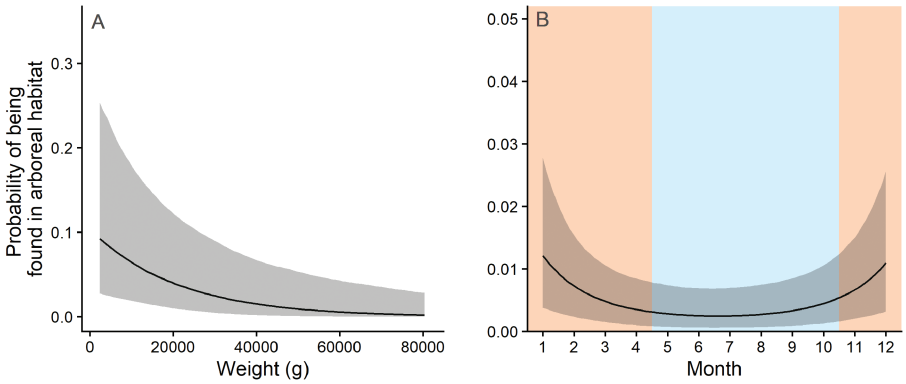


FIG. 5. Marginal-effects plots showing the effects of (A) weight and (B) month on the probability of finding adult Burmese Pythons (*Python bivittatus*) in arboreal habitat in Big Cypress National Preserve, Ochopee, Florida, USA. Black lines represent median estimates, and gray shaded areas represent 95% CIs. Panel B also depicts southern Florida's seasonal climate, with dry-season months (November–April) shaded light pink and wet-season months (May–October) shaded light blue.

python in arboreal habitat was generally higher during the dry season (Fig. 5B). For an adult python of average weight in our analysis (25,564.55 g), the probability of an arboreal observation ranged from 0.002 (95% CI: 0.0006–0.006) in June to 0.012 (95% CI: 0.004–0.03) in January (Fig. 5B).

For juvenile pythons, the standard deviation of the random effect of individual python was also strongly positive, with CIs that did not overlap zero, suggesting substantial individual variation. Weight had a weak negative effect on the probability of an arboreal observation (Table 2; Fig. 6A). During January, when arboreal habitat use was highest (Fig. 6B), the probability of an arboreal observation varied from 0.04 (95% CI: 0.0009–0.22) for a juvenile male python weighing 84 g to 0.006 (95% CI: 0.00–0.44) for a python weighing 998 g (Fig. 6A). The quadratic effect of month was weakly supported, with the lowest probability of observing a juvenile python in arboreal habitat occurring in summer. Like adult pythons, juvenile pythons generally had higher probabilities of arboreal habitat use during the dry

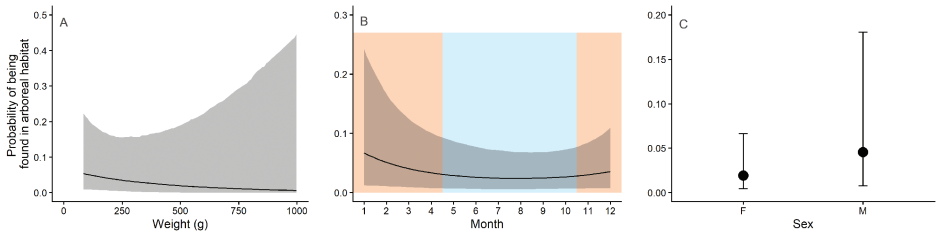


Fig. 6. Marginal-effects plots showing the effects of (A) weight, (B) month, and (C) sex on the probability of finding juvenile Burmese Pythons (*Python bivittatus*) in arboreal habitat in Big Cypress National Preserve, Ochopee, Florida, USA. In panels A and B, black lines represent median probabilities, and gray shaded areas represent 95% CIs. Panel B also depicts southern Florida's seasonal climate, with dry-season months (November–April) shaded light pink and wet-season months (May–October) shaded light blue. In panel C, points represent median probabilities, and lines represent 95% CIs.

season (Fig. 6B). June was the only month without observations of juvenile pythons in arboreal habitat. For an average-weight juvenile male python in our analysis (146.64 g), the probability of an arboreal observation ranged from 0.03 (95% CI: 0.006–0.07) in July to 0.07 (95% CI: 0.01–0.24) in January (Fig. 6B). Juvenile male pythons were more likely than juvenile female pythons to be found in arboreal habitat, but this relationship was not significant (Fig. 6C).

Tree and Shrub Species Used by Pythons.—We observed adult pythons most frequently in cypress species ($n = 11$) and coastal plain willows ($n = 8$) (McBride et al., 2026). We observed juvenile pythons most frequently in cabbage palms ($n = 16$) and cypress species ($n = 15$). Our model indicated that Brazilian peppertrees and live oaks supported the heaviest pythons (Fig. 7), with predicted average weights of 13,197 g (95% CI: 4,064–86,299 g) and 10,362 g (95% CI: 3,193–68,255 g), respectively. The model predicted that only pythons weighing less than 300 g (i.e., juvenile pythons) would be found in pond apples, pop ashes, or saw palmettos. It predicted that pythons weighing between 3,266 g and 7,746 g would be found in five additional tree species: cypress species, coastal plain willows, wax myrtles, cabbage palms, and cocoplums (Fig. 7).

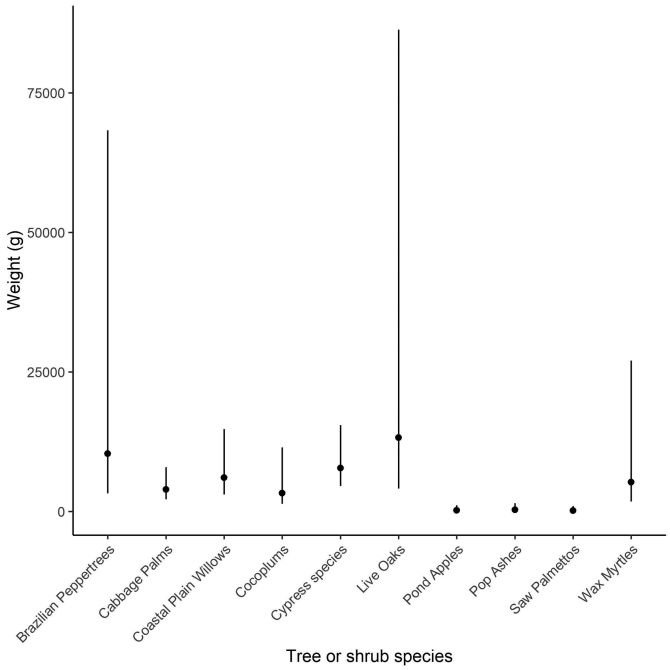


Fig. 7. Median estimates (points) and 95% CIs (lines) for the weights of Burmese Pythons (*Python bivittatus*) found in 10 tree and shrub species in Big Cypress National Preserve, Ochopee, Florida, USA, from November 2017 through December 2024.

Discussion

We found that both juvenile and adult Burmese Pythons used arboreal habitats in southern Florida, although rates of use were relatively low (<2% of adult radio-tracking events and <4% of juvenile radio-tracking events), and individuals varied substantially in their use of these habitats (Tables 1, 2). Of the 188 adult pythons in our study, 14.4% were observed in arboreal habitat, compared with 17.3% of the 168 juveniles. We found adult pythons in arboreal habitat more often during the colder months of the dry season, and most adults observed during December and January were basking ($n = 26$). These observations suggest that adult pythons primarily use arboreal vegetation for thermoregulation. We observed all but two basking adult pythons during the dry season ($n = 37$), when air temperatures are lowest in southern Florida (Western Regional Climate Center, 2025; Fig. 2). Juvenile pythons were also more likely to use arboreal habitat during the dry season. Juveniles basked more often than they rested or moved, suggesting that they may also use arboreal habitat for thermoregulation.

Our results suggest a possible ontogenetic shift away from arboreal habitat between the juvenile and adult life stages because we observed a higher percentage of juvenile pythons than adult pythons in trees. Additionally, individual juvenile pythons observed in arboreal habitat generally had a higher percentage of observations in arboreal habitat than did adult pythons observed in trees (Tables 1, 2). The greater use of arboreal habitat by juvenile Burmese Pythons in our study aligns with patterns observed in other python and boa species, such as Carpet Pythons (*Morelia spilota imbricata*) (Pearson et al., 2005). Juvenile Reticulated Pythons (*Malayopython reticulatus*) have been observed intentionally selecting arboreal habitat above bodies of water to evade predators (Van Rooijen and Van Rooijen, 2002; O'Shea et al., 2004). Juvenile boas in Saint Lucia and Costa Rica frequently climbed trees, with some individuals reaching heights of 12 m above the ground (Lazell, 1964; Greene, 1983). Ontogenetic shifts in habitat use are relatively common among reptiles, particularly arboreal species, and are largely explained by changes in body size, prey selection, and predation risk (Blouin-Demers et al., 2007; Rivas et al., 2016; Currylow et al., 2023b).

We found that juvenile and adult pythons were more likely to use arboreal habitats during the dry season, which also corresponds with seasonally cooler temperatures (Figs. 2, 5B, 6B).

Seasonal use of arboreal habitat has been documented in other large snake species. Lawson (2004) observed an African Rock Python (*Python sebae*) in arboreal habitat more often during the dry season in Cameroon (December–February; average temperature = 31.8 °C; average rainfall = 57.3 mm) than during the wet season (March–November; average temperature = 30.2 °C; average rainfall = 701.5 mm) (Chuyong et al., 2004). Although Cameroon receives less rainfall during the dry season, as does southern Florida, its average ambient temperatures vary less between seasons. Carpet Pythons (*Morelia spilota*) in New South Wales, Australia, used arboreal habitat more frequently during winter (52% of locations) than during summer (20% of locations) (Shine and Fitzgerald, 1996). Researchers observed Burmese Pythons in outdoor enclosures in the more temperate state of South Carolina, USA, basking in arboreal habitat from August through October before moving underground to avoid lethally low temperatures as ambient temperatures continued to decline (Dorcas et al., 2011). In our Florida study, we estimated that smaller adult pythons may be observed in arboreal habitat approximately 10% of the time during winter. Recognizing that invasive pythons exhibit seasonal changes in arboreal habitat use can help managers and state contractors identify habitats to target during periods when pythons are more likely to be exposed while basking, potentially improving removal efficiency. This information is particularly important given the low individual detection probability (i.e., the probability that an individual is observed when present) of invasive Burmese Pythons, which is estimated to be less than 5% (Nafus et al., 2020) and has been a defining feature of the invasion (Guzy et al., 2023).

Although we did not observe predation events in arboreal habitat during our study, Orzechowski et al. (2019) confirmed that pythons preyed on the midcanopy nests of Great Egrets (*Ardea alba*) and White Ibises (*Eudocimus albus*) in Everglades bird rookeries at the end of the 2017 dry season. This behavior is especially concerning for imperiled avian species such as the federally endangered Wood Stork (*Mycteria americana*), the state-threatened Roseate Spoonbill (*Platalea ajaja*), and numerous heron and egret species, all of which have been documented in analyses of Burmese Python diets (Dove et al., 2011; Romagosa et al., 2023). Furthermore, the wading-bird nesting season directly overlaps with the period of greater arboreal use by adult pythons (i.e., the dry season; Frederick et al., 2009).

The ability of Burmese Pythons to climb likely depends on both an individual snake's weight and the structural integrity of the tree or shrub species. Body size varies considerably among Burmese Pythons in Florida, with weights ranging from 40–84,800 g (Currylow et al., 2022). We found that the probability of adult pythons using arboreal habitat decreased as python weight increased (Fig. 5A). In Florida, the arboreal habitats that supported the largest pythons (>10 kg) consisted of species with strong branches, such as Brazilian peppertrees and live oaks (Fig. 7). We observed adult male pythons in arboreal habitat more frequently than adult female pythons, but we did not include sex in our adult model because it is confounded with weight. Sex was not statistically significant for juvenile pythons. The cause of sex differences among adult pythons is unclear. Adult females tend to be larger, potentially limiting their ability to climb vegetation; however, they may use arboreal habitat for oviposition. We observed an adult female python (PyBi-001) brooding eggs in a fallen, hollow cypress tree 2 m above the ground in a cypress swamp (Fig. 3B). This behavior may represent a response to the seasonally flooded environment of the Greater Everglades Ecosystem (Hart et al., 2015; Bartoszek et al., 2021) and suggests that selecting arboreal habitat for oviposition may benefit female pythons. Notably, we observed 100% egg mortality in a clutch laid directly on the ground that became completely submerged after seasonal flooding (Sandfoss et al., 2024).

This study provides the first detailed assessment of arboreal microhabitat use by Burmese Pythons within their invaded range in Florida. Although arboreal observations were uncommon, we identified three key attributes—body size, age class, and time of year—that predict the likelihood of arboreal habitat use by this species. Our observation of greater arboreal habitat use by juvenile Burmese Pythons than by adults adds to our knowledge of how different life stages of this invasive species use microhabitats. We also identified plant species that pythons of different size classes were more likely to use, providing insight into habitat preferences across ontogeny. Our findings build on previous research on Burmese Python habitat use in Florida that establishes the species as a habitat generalist (Hart et al., 2015; Walters et al., 2016; Bartoszek et al., 2021, 2024) and contribute to an improved understanding of the factors influencing specific habitat use by invasive pythons. These insights can inform refinements to detection protocols and increase the efficacy of targeted management strategies.

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