



INTRODUCED SPECIES

New Verified Nonindigenous Amphibians and Reptiles in Florida through 2015, with a Summary of over 152 Years of Introductions

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Abstract: More nonindigenous species occur in Florida, USA, than any other region worldwide and may threaten many of Florida's natural resources. The frequency of new reports mandates the need for regular updates. Herein, we use photographic and specimen vouchers in addition to literature records to provide updated information on verified nonindigenous amphibians and reptiles in Florida. Between our most recent summary in 2012 and the end of 2015, 38 additional species are known to have been intercepted ($n = 2$) or introduced ($n = 36$). We also update the invasion stage of seven species previously reported from Florida and report that five additional taxa are now established. In total, 191 independent known introductions of 180 herpetofaunal taxa led to the establishment of 63 taxa. This suggests that one in three introduced herpetofaunal species becomes established in Florida. The pet trade represents the most common introduction pathway among these species and a single animal importer in Hollywood, Broward County, is the probable source for introduction of a quarter of all herpetofauna introduced to Florida.

“In most instances, once introductions have been allowed to establish, no amount of money or effort can change the situation — much as is widely recognized for other lamentable and irreversible developments such as death, amputation, or the invention of disco music.”

Fred Kraus (2009)

Florida has the largest number of established nonindigenous herpetofaunal species in the world (Krysko et al. 2011a, 2012; Fujisaki et al. 2015). In this paper, we update our previous lists of nonindigenous herpetofaunal species (Krysko et al. 2011a, 2012) by adding newly confirmed introductions and interceptions, and by providing taxonomic corrections, updated inva-

sion stages, introduction pathways, and earliest introduction dates to previously documented species.

Methods

Vouchers and recent literature were used to add newly-confirmed introduced and intercepted nonindigenous her-

petofaunal species to the Florida list and update taxonomy, nomenclature, introduction pathways, and earliest introduction dates. We used photographic vouchers when physical specimens were not donated by collectors (Krysko et al. 2012), eluded capture, or were subsequently lost.

Following Krysko et al. (2011a), we document the current invasion stage of each species using a biological invasion model (Colautti and MacIsaac 2004) that consists of a series of six consecutive obligatory stages:

- Stage 0 = Potential invader begins as a resident in its native or a donor region.
- Stage 1 = Potential invader is transported to a new area and is intercepted without becoming introduced.
- Stage 2 = Potential invader survives transport, escapes, or is released (i.e., becomes introduced), and is thus nonindigenous to the new area.
- Stage 3 = Nonindigenous species survives and establishes (reproduces) in the new suitable environment but remains uncommon and localized.
- Stage 4 = Nonindigenous species becomes either (a) widespread but is uncommon, or (b) dominant in abundance or density but is geographically localized.
- Stage 5 = Nonindigenous species becomes both widespread and dominant.

We did not seek to provide additional vouchered data on introduced species that have already been documented without evidence of establishment or a new invasion pathway. We did: (1) assess the number of independent invasion pathways (Cargo, Biological Control, Zoo and Pet Trade, as defined by Kraus [2009]) of introduced (Stages 2–5) taxa for each decade from 1860 through 2015 (note that intercepted taxa are not included); (2) accumulate the total number of independent introduction pathways of both introduced and established (Stages 3–5) taxa for each decade (calculated using the first year a taxon became established); and (3) statistically compare the number of indigenous species (Krysko et al. 2011b) and established nonindigenous taxa among various groups (salamanders, frogs, turtles, crocodylians, amphisbaenians, lizards, and snakes).

Vouchered species that are known as pets, but not escapees from local zoos, nor used in biological control programs or obviously introduced from cargo, were categorized in the Pet Trade pathway. We have no evidence that any of these were released through other pathways. Because some sample sizes were small and the data were thus not normally distributed, we conducted nonparametric tests (Sokal and Rohlf 2012) to determine differences in the distribution of nonindigenous taxa among the invasion pathways (each pathway was counted only once for each taxon, even if that taxon has been introduced multiple times via the same pathway) and compare the numbers of indigenous species and established nonindigenous

taxa among groups. Statistical analyses were conducted using JMP (ver. 11. SAS Institute Inc., Cary, North Carolina) with $\alpha = 0.05$.

Species accounts are provided for new nonindigenous species documented for the first time from Florida, although the species might have been previously reported in the literature. For each species account, we provide comprehensive literature on their indigenous and nonindigenous distributions, and necessary taxonomic and nomenclatural literature as crucial resources for future researchers studying these species. Nomenclature primarily follows Gamble et al. (2008), Fritz and Havaš (2013), Iverson et al. (2013), Olson and David (2014), Ruane et al. (2014), Turtle and Tortoise Working Group [TTWG] (2014), Wallach et al. (2014), Barker et al. (2015), Frost (2015), Maddison and Schulz (2015), and Uetz and Hošek (2015).

Results

From 1863 through 2010, voucher specimens and photographs confirmed three interceptions (Stage 1) and 137 introductions (Stages 2–5) of nonindigenous amphibian and reptilian taxa in Florida (Krysko et al. 2011a, 2012), 56 of which were established (Stages 3–5). Literature records document with vouchers the introduction of ten additional species since the original nonindigenous herpetofaunal species list (Krysko et al. 2011a, 2012): *Ambystoma gracile* in 2014 (Rochford et al. 2015), *Chelydra serpentina* in the Florida Keys in 2013 (Cove and Maurer 2015), multiple introductions of *Macrochelys suwanniensis* (Thomas et al. 2014), *Mauremys sinensis* in 1971 (Jackson 2012), *Pseudemys rubriventris* in 2009 (Munscher and Weber 2012), *Dendropsophus marmoratus* in 2011 (Rochford et al. 2011), *Leiopeltis rubri-taeniata* in the 2000s (Krysko et al. 2013), *Crocodylus niloticus* from 2009–2011 (Rochford et al. 2016), *Anolis allisoni* in 2014 (Krysko et al. 2015), and *Acrantophis dumerili* in 2014 (Hanslowe et al. 2015).

We documented 38 newly confirmed intercepted ($n = 2$) and introduced ($n = 36$; Figs. 1–35) nonindigenous species through 2015, five of which were previously reported in the literature but were undocumented with an associated voucher (Table 1). We updated the invasion stage of seven previously introduced species, five of which were Stage 2 but are now established (Stages 3–5).

Corrections and revisions.—The species reported by Krysko et al. (2011a) as Cuvier’s Dwarf Caiman, *Paleosuchus palpebrosus*, is actually a Schneider’s Smooth-fronted Caiman, *Paleosuchus trigonatus* (Table 1). The specimen (EVER 40566, UF-Herpetology 153469) exhibits morphologically confusing characters likely caused by captive-induced growth abnormalities (F.W. King and K.A. Vliet, pers. comm. 2013; M. Hoogmoed, pers. comm. 2013). No current records document the presence of *P. palpebrosus* in Florida.

Table 1. Confirmed intercepted (n = 5) and introduced (n = 180) nonindigenous amphibians and reptiles in Florida from 1863 through 2015 using vouchers (i.e., specimens or photographs). Year Introduced = known or estimated year of first invasion pathway (additional years are provided for different invasion pathways); Year Established = known or estimated year of first established population for each invasion pathway; Source = first known reference for interception or introduction. Additional sources are provided for different invasion pathways, or as *This Study* if we provide the first known voucher, provide more details on a species we previously documented, or upgrade a species invasion stage (bold font) to established (stages 3–5); First voucher = first known voucher; Stage = current invasion stage (*see* Introduction); Pathway = invasion pathway: cargo (i.e., cargo/plants), biological control, zoo, or pet trade. All UF-Herpetology catalog numbers are abbreviated with the “UF” acronym. We have indicated (*) stage 2 species for which more than 12 vouchers exist. Thus, in order to illustrate the large propagule pressure of certain species, we find it noteworthy to state that there are currently 36 *Centrochelys sulcata* vouchers documented from 27 counties, 21 *Varanus exanthematicus* vouchers documented from 15 counties, and 106 *Python regius* vouchers documented from 30 counties.

Family/Species	Common Name	Year Introduced	Year Established	Source	First Voucher	Stage	Pathway
SALAMANDRIDAE							
<i>Hypselotriton orientalis</i> (David 1873)	Oriental Fire-bellied Newt	2009	N/A	Krysko et al. 2011a	UF 157033	2	Pet Trade
<i>Pachytriton labiatus</i> (Unterstein 1930)	Spotless Stout Newt	2010	N/A	Krysko et al. 2011a	UF 157219	2	Pet Trade
AMBYSTOMATIDAE							
<i>Ambystoma gracile</i> (Baird 1859)	Northwestern Salamander	2014	N/A	Rochford et al. 2015	UF 174498	2	Cargo
AMPHIUMIDAE							
<i>Amphiuma tridactylum</i> Cuvier 1827	Three-toed Amphiuma	2009	N/A	Krysko et al. 2011a	UF 157220, 157286	2	Pet Trade
BOMBINATORIDAE							
<i>Bombina orientalis</i> (Boulenger 1890)	Oriental Fire-bellied Toad	2007	N/A	Krysko et al. 2011a	UF 152327	2	Pet Trade
PIPIDAE							
<i>Xenopus laevis</i> (Daudin 1802)	African Clawed Frog	1970s?	1970s?	King & Krakauer 1966; Krysko et al. 2011a; This Study	UF 158477, 172054–55, 173050	3	Pet Trade
MICROHYLIDAE							
<i>Kaloula pulchra</i> Gray 1831	Malaysian Painted Frog	2008	N/A	Krysko et al. 2011a	UF 153704	2	Pet Trade
HYPEROLIIDAE							
<i>Afrixalus fornasini</i> (Bianconi 1849)	Fornasini’s Spiny Reed Frog	2010	N/A	Krysko et al. 2011a	UF 163085	2	Pet Trade

BUFONIDAE							
<i>Duttaphrynus melanostictus</i> (Schneider 1799)	Asian Black-spotted Toad	2010	N/A	Krysko et al. 2011a	UF 159699	1	Cargo
<i>Rhinella marina</i> (Linnaeus 1758) <i>sensu lato</i>	Cane Toad	1936	N/A	Lobdell 1936	UMMZ 113000	2	Biological Control
		1955	1950s	King & Krakauer 1966		5	Pet Trade
		2002	2000s	Himes 2007	UF 151348–51	3	Zoo
ELEUTHERODACTYLIDAE							
<i>Eleutherodactylus coqui</i> Thomas 1966	Coqui	1973	N/A	Austin & Schwartz 1975	MPM 24418	2	Cargo
<i>Eleutherodactylus planirostris</i> (Cope 1862)	Greenhouse Frog	1863	1860s	Cope 1863	USNM 30955	5	Cargo
HYLIDAE							
<i>Dendropsophis marmoratus</i> (Laurenti 1768)	Marbled Treefrog	2011	N/A	Rochford et al. 2011	UF 164381	2	Pet Trade
<i>Hyla savingyi</i> Audouin 1827	Savigny's Treefrog	2011	N/A	This Study	UF 166454	1	Cargo
<i>Litoria caerulea</i> (White 1790)	Great Green Treefrog	2003	N/A	Bartlett 1994; Krysko et al. 2011a	UF 146573	2	Pet Trade
<i>Osteopilus septentrionalis</i> (Duméril & Bibron 1841)	Cuban Treefrog	1920s	1920s	Barbour 1931	USNM 85392–97	5	Cargo
<i>Pseudacris sierra</i> (Jameson, Mackey & Richmond 1966)	Sierran Chorus Frog	1983	N/A	Krysko et al. 2011a	UF 116750–51	1	Cargo
CHELYDRIDAE							
<i>Chelydra serpentina</i> (Linnaeus 1758)	Snapping Turtle	2013	N/A	Cove & Maurer 2015	UF 174814	2	Pet Trade
<i>Macrochelys suwanniensis</i> Thomas et al. 2014	Suwannee Alligator Snapping Turtle	1916	N/A	Thomas et al. 2014	AMNH 8287	2	Pet Trade
EMYDIDAE							
<i>Chrysemys dorsalis</i> Agassiz 1857	Southern Painted Turtle	2008	2000s	Kail et al. 2011b; Krysko et al. 2011a	UF 153957	3	Pet Trade
<i>Chrysemys picta bellii</i> (Gray 1830)	Western Painted Turtle	1933	N/A	Carr 1940; Krysko et al. 2011a	UF 1898	2	Pet Trade
<i>Chrysemys picta picta</i> (Schneider 1783)	Eastern Painted Turtle	2007	N/A	Deckert 1918; Krysko et al. 2011a	UF 153764	2	Pet Trade
<i>Glyptemys insculpta</i> (Le Conte 1830)	Wood Turtle	2009	N/A	Krysko et al. 2011a	UF 159391	2	Pet Trade
<i>Graptemys ouachitensis</i> Cagle 1953	Ouachita Map Turtle	2006	N/A	Enge et al. 2007	UF 150157	2	Pet Trade

<i>Graptemys pseudogeographica kobnii</i> (Baur 1890)	Mississippi Map Turtle	2010	N/A	Kail et al. 2011a	UF 159338	2	Pet Trade
<i>Graptemys pseudogeographica pseudogeographica</i> (Gray 1831)	False Map Turtle	2000	2000s	Lau & Johnston 2008; Krysko et al. 2011a	UF 121459	3	Pet Trade
<i>Trachemys callirostris</i> (Gray 1855)	Colombian Slider	1972	N/A	Bartlett 1967b; Krysko et al. 2011a	UF 154026, 155125	2	Pet Trade
<i>Trachemys scripta elegans</i> (Wied-Neuwied 1839)	Red-eared Slider	1958	1960s	King & Krakauer 1966	CU 13034	5	Pet Trade
<i>Trachemys scripta scripta</i> (Thunberg in Schoepff 1792)	Yellow-bellied Slider	2002	2000s	Johnston & Johnston 2003; Krysko et al. 2011a	UF 134595	3	Pet Trade
<i>Trachemys venusta</i> (Gray 1855)	Huastecan Slider	2009	N/A	Kail et al. 2010	UF 157304	2	Pet Trade
TESTUDINIDAE							
<i>Aldabrachelys gigantea</i> (Schweigger 1812)	Aldabra Giant Tortoise	2012	N/A	This Study	UF 166523	2	Pet Trade
<i>Centrochelys sulcata</i> (Miller 1779)	African Spurred Tortoise	2002	N/A*	Krysko et al. 2011a	UF 151752	2	Pet Trade
<i>Chelonoidis carbonarius</i> (Spix 1824)	Red-footed Tortoise	2007	N/A	Meshaka et al. 2004; Krysko et al. 2011a	UF 153958	2	Pet Trade
<i>Chelonoidis denticulatus</i> (Linnaeus 1766)	Yellow-footed Tortoise	2012	N/A	Bartlett 1967b; This Study	UF 166994	2	Pet Trade
<i>Kinixys homeana</i> Bell 1827	Home's Hinge-backed Tortoise	2011	N/A	This Study	UF 165857	2	Pet Trade
<i>Manouria emys emys</i> (Schlegel & Müller 1840)	Asian Brown Giant Tortoise	2011	N/A	This Study	UF 166451	2	Pet Trade
<i>Stigmochelys pardalis</i> (Bell 1828)	Leopard Tortoise	2009	N/A	Krysko et al. 2011a	UF 155440	2	Pet Trade
<i>Testudo horsfieldii</i> (Gray 1844)	Horsfield's Tortoise	2008	N/A	Krysko et al. 2010a, 2011a	UF 152758, 159551	2	Pet Trade
PELOMEDUSIDAE							
<i>Pelusios sinuatus</i> (Smith 1838)	Serrated Hinged Terrapin	2012	N/A	This Study	UF 169961	2	Pet Trade
GEOEMYDIDAE							
<i>Mauremys sinensis</i> (Gray 1834)	Chinese Stripe-necked Turtle	1972	N/A	Jackson 2012	UF 166135	2	Pet Trade
<i>Rhinoclemmys pulcherrima</i> (Gray 1856)	Painted Wood Turtle	2006	N/A	Krysko et al. 2011a, 2012	UF 121604	2	Pet Trade
<i>Rhinoclemmys punctularia</i> (Daudin 1801)	Spot-legged Wood Turtle	2008	N/A	Bartlett & Bartlett 2006; Krysko et al. 2011a	UF 153697	2	Pet Trade

TRIONYCHIDAE							
<i>Apalone spinifera</i> (LeSueur 1827)	Spiny Softshell	2008	N/A	Krysko et al. 2011a	UF 153765	2	Pet Trade
KINOSTERNIDAE							
<i>Sternotherus carinatus</i> (Gray 1856)	Razor-backed Musk Turtle	2008	N/A	Krysko et al. 2011a	UF 154191	2	Pet Trade
STAUROTYPIDAE							
<i>Staurotypus salvinii</i> Gray 1864	Pacific Coast Giant Musk Turtle	2010	2010s	Smith et al. 2011; This Study	UF 160342	3	Pet Trade
CHELIDAE							
<i>Platemys platycephala</i> (Schneider 1792)	Twist-necked Turtle	1985	N/A	Krysko et al. 2011a	UF 154589	2	Pet Trade
CROCODYLIDAE							
<i>Crocodylus niloticus</i> Laurenti 1768	Nile Crocodile	1996-1997?	N/A	Quinn 1994; Rochford et al. 2016	UF 175632	2	Zoo
		2009	N/A	Quinn 1994; Friar & Plumb 2014; Rochford et al. 2016	UF 175743, 165995, 173082	2	Pet Trade
<i>Mecistops cataphractus</i> (Cuvier 1825)	West African Slender-snouted Crocodile	1983	N/A	Anonymous 1983; Krysko et al. 2011a	UF 163093	2	Zoo
ALLIGATORIDAE							
<i>Caiman crocodilus</i> (Linnaeus 1758)	Spectacled Caiman	1950s	1950s	King & Krakauer 1966	UF 75207	4b	Pet Trade
<i>Paleosuchus trigonatus</i> (Schneider 1801)	Schneider's Smooth-fronted Caiman	1999	N/A	Krysko et al. 2011a; This Study	UF 165484, UF 153469	2	Pet Trade
CORYTOPHANIDAE							
<i>Basiliscus plumifrons</i> Cope 1875	Green Basilisk	2015	N/A	Butterfield et al. 1997; This Study	UF 177256	2	Pet Trade
<i>Basiliscus vittatus</i> Wiegmann 1828	Brown Basilisk	1963	1960s	King & Krakauer 1966	UF 124584	5	Pet Trade
CROTAPHYTIDAE							
<i>Crotaphytus collaris</i> (Say in James 1822)	Eastern Collared Lizard	2015	N/A	This Study	UF 177209	2	Pet Trade

IGUANIDAE							
<i>Ctenosaura pectinata</i> (Wiegmann 1834)	Mexican Black Spiny-tailed Iguana	1960s	1960s	Eggert 1978	KU 206675	4b	Pet Trade
<i>Ctenosaura similis</i> (Gray 1831)	Gray's Spiny-tailed Iguana	1970s	1970s	Butterfield et al. 1997	UF 91662	5	Pet Trade
<i>Cyclura cornuta</i> (Bonnaterre 1789)	Rhinoceros Iguana	1960s	N/A	King & Krakauer 1966		2	Zoo
		2009	N/A	Krysko et al. 2011a	UF 155189	2	Pet Trade
<i>Cyclura nubila nubila</i> (Gray 1831)	Cuban Rock Iguana	2004	N/A	Krysko et al. 2011a	UF 164356	1	Cargo
		1999	N/A	This Study	UF 166567	2	Pet Trade
<i>Iguana iguana</i> (Linnaeus 1758)	Green Iguana	1964	1960s	King & Krakauer 1966	UF 22910	5	Pet Trade
PHRYNOSOMATIDAE							
<i>Phrynosoma cornutum</i> (Harlan 1825)	Texas Horned Lizard	1928	1930s	De Sola 1934	FMNH 11037	4a	Pet Trade
DACTYLOIDAE							
<i>Anolis allisoni</i> Barbour 1928	Cuban Blue Anole	2014	N/A	Krysko et al. 2015	UF 170513	2	Pet Trade
<i>Anolis chlorocyanus</i> Duméril & Bibron 1837	Hispaniolan Green Anole	1987	1980s	Moler 1988	KU 210033	4b	Pet Trade
<i>Anolis coelestinus</i> Cope 1862	Jeremie Anole	2009	N/A	Krysko et al. 2011a	UF 157133	2	Pet Trade
<i>Anolis cristatellus</i> Duméril & Bibron 1837	Puerto Rican Crested Anole	1975	1970s	Schwartz & Thomas 1975	MCZ R-146223–26	5	Pet Trade
<i>Anolis cybotes</i> Cope 1862	Large-headed Anole	1964	1967	King & Krakauer 1966	UF 91063	4b	Pet Trade
<i>Anolis distichus</i> Cope 1861	Bark Anole	1946	1940s	Smith & McCauley 1948	MCZ R-50001	5	Cargo
		1960s	1960s	King & Krakauer 1966		5	Pet Trade
<i>Anolis equestris</i> Merrem 1820	Knight Anole	1952	1950s	Neill 1957	LACM 61680	5	Pet Trade
<i>Anolis garmani</i> Stejneger 1899	Jamaican Giant Anole	1975	1970s	Roberts 1977	LSUMZ 35367	4b	Pet Trade
<i>Anolis porcatius</i> Gray 1840	Cuban Green Anole	1904	1900s	Barbour 1904	UF 91293	4 or 5	Cargo
<i>Anolis sagrei</i> Cocteau in Duméril & Bibron 1837	Brown Anole	1887	1880s	Garman 1887	USNM 85175–99	5	Cargo
		1941	1940s	Oliver 1950		5	Pet Trade
<i>Anolis trinitatis</i> Reinhardt & Lütkin 1862	St. Vincent Bush Anole	2004	2004	Krysko et al. 2011a	UF 144299, 151034	3	Pet Trade

TROPIDURIDAE							
<i>Tropidurus hispidus</i> (Spix 1825)	Peters's Lava Lizard	2003	N/A	Enge et al. 2004; Krysko et al. 2011a	UF 137411–13	2	Pet Trade
<i>Uranoscodon superciliosus</i> (Linnaeus 1758)	Mop-headed Iguana	2004	N/A	Krysko et al. 2010a, 2011a	UF 145734	2	Pet Trade
LEIOCEPHALIDAE							
<i>Leiocephalus carinatus</i> Gray 1827	Northern Curly-tailed Lizard	1935	1930s	Barbour 1936	UF 7893	5	Zoo
		1940s	1940s	Weigl et al. 1969		5	Biological Control
		1950s	1950s	Duellman & Schwartz 1958; King 1960		5	Pet Trade
<i>Leiocephalus personatus</i> Cope 1862	Haitian Curly-tailed Lizard	2004	N/A	Bartlett 1994; Krysko et al. 2010a, 2011a	UF 145733	2	Pet Trade
<i>Leiocephalus schreibersii</i> (Gravenhorst 1837)	Red-sided Curly-tailed Lizard	1978	1970s	Wilson & Porras 1983	UF 121397–99	4b	Pet Trade
AGAMIDAE							
<i>Agama picticauda</i> Peters 1877	Peters's Rock Agama	1976	1976	Wilson & Porras 1983; Nuñez 2016	UF 43490	5	Pet Trade
<i>Calotes cf. versicolor</i> (Daudin 1802)	Bloodsucker Lizard	1978	1970s	Enge & Krysko 2004	UF 137448	4b	Pet Trade
<i>Gonocephalus grandis</i> (Gray 1845)	Giant Forest Dragon	2011	N/A	This Study	UF 166447	2	Pet Trade
<i>Leiolepis belliana</i> (Gray 1827)	Beautiful Butterfly lizard	1992	1990s	Krysko & Enge 2005	UF 141589–91	3	Pet Trade
<i>Leiolepis rubritaeniata</i> Mertens 1961	Red-banded Butterfly Lizard	2010s	2010s	Krysko et al. 2013	UF 167804, 167182, 171120	3	Pet Trade
<i>Physignathus cocincinus</i> Cuvier 1829	Chinese Water Dragon	2010	N/A	Krysko et al. 2011a	UF 158809	2	Pet Trade
<i>Pogona vitticeps</i> (Ahl 1826)	Inland Bearded Dragon	2005	N/A	Krysko et al. 2011a	UF 152677	2	Pet Trade
<i>Stellagama stellio</i> (Linnaeus 1758)	Rough-tailed Rock Agama	1996	N/A	Meshaka et al. 2004	EVER 304176	2	Pet Trade
<i>Uromastyx dispar maliensis</i> Joger & Lambert 1996	Southern Saharan Spiny-tailed Lizard	2009	N/A	Krysko et al. 2011a	UF 159616	2	Pet Trade
CHAMAELEONIDAE							
<i>Chamaeleo calyptratus</i> Duméril & Bibron in Duméril & Duméril 1851	Veiled Chameleon	2000	2000s	Krysko et al. 2004	UF 133251, 133255–57, 133259–63	4a	Pet Trade

<i>Chamaeleo senegalensis</i> (Daudin 1802)	Senegal Chameleon	2009	N/A	Krysko et al. 2011a	UF 157301	2	Pet Trade
<i>Furcifer lateralis</i> (Gray 1831)	White-lined Chameleon	2011	N/A	This Study	UF 166453	2	Pet Trade
<i>Furcifer oustaleti</i> (Mocquard 1894)	Oustalet's Chameleon	2000	2000s	Gillette et al. 2010	UF 163066–084	4b	Pet Trade
<i>Furcifer pardalis</i> (Cuvier 1829)	Panther Chameleon	2008	2013	Krysko et al. 2011a; Rochford et al. 2013	UF 153489, 1707801–02	3	Pet Trade
<i>Trioceros jacksonii</i> (Boulenger 1896)	Jackson's Chameleon	2014	N/A	Bartlett & Bartlett 1995; This Study	UF 174349	2	Pet Trade
<i>Trioceros melleri</i> (Gray 1865)	Meller's Chameleon	2008	N/A	Krysko et al. 2011a	UF 153465	2	Pet Trade
EUBLEPHARIDAE							
<i>Eublepharis macularius</i> (Blyth 1854)	Leopard Gecko	2011	N/A	This Study	UF 166452	2	Pet Trade
SPHAERODACTYLIDAE							
<i>Sphaerodactylus argus</i> Gosse 1850	Ocellated Gecko	1944	1940s	Savage 1954	CAS-SU 10439– 40,10442	3	Cargo
<i>Sphaerodactylus elegans</i> MacLeay 1834	Ashy Gecko	1921	1920s	Stejneger 1922	MCZ 31636–43	5	Cargo
<i>Gonatodes albogularis</i> (Duméril & Bibron 1836)	Yellow-headed Gecko	1933	1930s	Carr 1939	YPM 01308	4a	Cargo
		1965	N/A	King & Krakauer 1966		2	Pet Trade
GEKKONIDAE							
<i>Chondrodactylus bibronii</i> (Smith 1846)	Bibron's Giant Thick-toed Gecko	2015	N/A	Bartlett & Bartlett 1999; This Study	UF 177320	2	Pet Trade
<i>Chondrodactylus turneri</i> (Gray 1864)	Turner's Giant Thick-toed Gecko	2010	N/A	Krysko et al. 2011a	UF 157971	2	Pet Trade
<i>Gehyra mutilata</i> (Wiegmann 1834)	Mutilating Gecko	1996	N/A	Meshaka et al. 2004	EVER 303436	2	Pet Trade
<i>Gekko badenii</i> Szczerbak & Nekrasova 1994	Golden Gecko	2008	2000s	Krysko et al. 2011a	UF 153894	3	Pet Trade
<i>Gekko gecko</i> (Linnaeus 1758)	Tokay Gecko	1964	1960s	King & Krakauer 1966	UF 99183	5	Pet Trade
<i>Gekko grossmanni</i> Günther 1994	Marbled Gecko	2008	N/A	Krysko et al. 2011a	UF 152730	2	Pet Trade
<i>Gekko vittatus</i> (Houttuyn 1782)	Lined Gecko	2009	N/A	Krysko et al. 2011a	UF 157035, 157327	2	Pet Trade

<i>Hemidactylus frenatus</i> Schlegel in Duméril & Bibron 1836	House Gecko	1993	1990s	Meshaka et al. 1994	USNM 504381–83, 504379–80	5	Pet Trade
<i>Hemidactylus garnotii</i> Duméril & Bibron 1836	Indo-Pacific Gecko	1963	1960s	King & Krakauer 1966	MCZ 77585	5	Cargo
<i>Hemidactylus mabouia</i> (Moreau de Jonnès 1818)	Wood Slave	1980s	1980s	Lawson et al. 1991	CAS 174849– 53	5	Cargo
<i>Hemidactylus platyurus</i> (Schneider 1792)	Asian Flat-tailed House Gecko	1984	1980s	Meshaka & Lewis 1994	KU 222278– 80, 223403	4b	Pet Trade
<i>Hemidactylus turcicus</i> (Linnaeus 1758)	Mediterranean House Gecko	1910	1910s	Fowler 1915	ANSP 18035	5	Cargo
		1960s	1960s	King & Krakauer 1966		5	Pet Trade
<i>Lepidodactylus lugubris</i> (Duméril & Bibron 1836) Clone C	Mourning Gecko	2005	2000s	Meshaka et al. 2004; Krysko et al. 2011a	UF 151603	3	Pet Trade
<i>Lygodactylus luteopicturatus</i> Pasteur 1964	Yellow-headed Dwarf Gecko	2011	N/A	This Study	UF 166455	2	Pet Trade
<i>Lygodactylus williamsi</i> Loveridge 1952	Turquoise Dwarf Gecko	2009	N/A	Krysko et al. 2011a	UF 161359	2	Pet Trade
<i>Phelsuma dubia</i> (Boettger 1881)	Dull Day Gecko	2009	N/A	Krysko et al. 2011a	UF 157201	2	Pet Trade
<i>Phelsuma grandis</i> Gray 1870	Madagascar Giant Day Gecko	1990s	1990s	Bartlett & Bartlett 1999	UF 130735– 37, 131553–54	5	Pet Trade
<i>Phelsuma laticauda</i> (Boettger 1880)	Gold Dust Day Gecko	2003	2010s	Bartlett & Bartlett 2006; Krysko et al. 2011a; Krysko & Borgia 2012	UF 137087, 168519–20	3	Pet Trade
<i>Phelsuma standingi</i> Methuen & Hewitt 1913	Standing's Day Gecko	1995	N/A	Krysko et al. 2011a	UF 163090	2	Pet Trade
<i>Ptychozoon kuhli</i> Stejneger 1902	Kuhl's Gliding Gecko	2011	N/A	This Study	UF 166458	2	Pet Trade
<i>Ptychozoon lionotum</i> Annandale 1905	Smooth-backed Gliding Gecko	2003	N/A	Enge et al. 2004; Krysko et al. 2011a	UF 137764	2	Pet Trade
PHYLLODACTYLIDAE							
<i>Tarentola annularis</i> (Geoffroy Saint-Hilaire 1827)	White-spotted Wall Gecko	1990	1990s	Bartlett 1997	EVER 302922, 303438–43	3	Pet Trade
<i>Tarentola mauritanica</i> (Linnaeus 1758)	Moorish Gecko	1996	1990s	Bartlett & Bartlett 1999; Krysko et al. 2011a	UF 157285	3	Pet Trade
TEIIDAE							
<i>Ameiva ameiva</i> (Linnaeus 1758)	Giant Ameiva	1953	1950s	Neill 1957; Duellman & Schwartz 1958	UMMZ 111408	5	Pet Trade

<i>Ameiva praesignis</i> (Baird & Girard 1852)	Borriguero Ameiva	1970s	1970s	Wilson & Porras 1983; Ugueto and Harvey 2012	KU 206536	4b	Zoo
<i>Aspidoscelis motaguae</i> (Sackett 1941)	Giant Whiptail	1994	1990s	Bartlett 1995	KU 222210–11	4b	Pet Trade
<i>Cnemidophorus lemniscatus</i> (Linnaeus 1758)	Rainbow Whiptail	1964	1960s	King & Krakauer 1966	KU 209859	4b	Pet Trade
<i>Dracaena guianensis</i> Daudin 1801	Guyana Caiman Lizard	2012	N/A	This Study	UF 168600	2	Pet Trade
<i>Salvator merianae</i> Duméril & Bibron 1839	Argentine Black & White Tegu	2002	2000s	Enge et al. 2006	UF 135044	5	Pet Trade
<i>Salvator rufescens</i> (Günther 1871)	Red Tegu	2007	N/A	Krysko et al. 2011a	UF 151510	2	Pet Trade
<i>Tupinambis teguixin</i> (Linnaeus 1758)	Gold Tegu	1990	2000s	Anonymous 1990; Krysko et al. 2011a	UF 153696	3	Pet Trade
LACERTIDAE							
<i>Takydromus sexlineatus ocellatus</i> (Guérin-Méneville 1829)	Ocellated Grass Lizard	2009	N/A	Krysko et al. 2011a, 2012	UF 157202	2	Pet Trade
SCINCIDAE							
<i>Chalcides ocellatus</i> (Forskål 1775)	Ocellated Skink	1999	2000s	Krysko et al. 2011a	UF 135284	3	Pet Trade
<i>Egernia cunninghami</i> (Gray 1832)	Cunningham's Skink	2008	N/A	Krysko et al. 2011a	UF 153760	2	Pet Trade
<i>Eutropis multifasciata</i> (Kuhl 1820)	Brown Mabuya	1990	1990s	Meshaka 1999	USNM 523790	4b	Cargo
<i>Tiliqua scincoides</i> (White 1790)	Eastern Blue-tongued Skink	2007	N/A	Krysko et al. 2011a	UF 152392	2	Pet Trade
<i>Trachylepis perrotetii</i> (Duméril & Bibron 1839)	Fire-sided Skink	2008	N/A	Krysko et al. 2011a, 2012	UF 153513	2	Pet Trade
<i>Trachylepis quinquetaeniata</i> (Lichtenstein 1823)	African Five-lined Skink	2010	2000s	Krysko et al. 2010b	UF 157446- 50	4b	Pet Trade
CORDYLIDAE							
<i>Smaug mossambicus</i> (FitzSimons 1958)	Gorongosa Girdled Lizard	2006	N/A	Krysko et al. 2010a, 2011a	UF 153698	2	Pet Trade
GERRHOSAURIDAE							
<i>Zonosaurus laticaudatus</i> (Grandidier 1869)	Western Girdled Lizard	2012	N/A	This Study	UF 174445	2	Pet Trade
VARANIDAE							
<i>Varanus albigularis albigularis</i> (Daudin 1802)	Southern White-throated Monitor	2008	N/A	Krysko et al. 2011a, 2012	UF 153409	2	Pet Trade

<i>Varanus albigularis microstictus</i> Boettger 1893	East African White-throated Monitor	2007	N/A	Krysko et al. 2011a, 2012	UF 152520	2	Pet Trade
<i>Varanus exanthematicus</i> (Bosc 1792)	Savannah Monitor	1992	N/A*	Prusak 1992	UF 135537	2	Pet Trade
<i>Varanus doreanus</i> (Meyer 1874)	Blue-tailed Monitor	2010	N/A	Krysko et al. 2011a, 2012	UF 160345	2	Pet Trade
<i>Varanus jobiensis</i> Ahl 1932	Peach-throated Monitor	2008	N/A	Krysko et al. 2011a	UF 154404	2	Pet Trade
<i>Varanus niloticus</i> (Linnaeus 1766) <i>sensu lato</i>	Nile Monitor	1981	1990s	Dalrymple 1994; Campbell 2003; This Study	UF 165874	5	Pet Trade
<i>Varanus panoptes</i> Storr 1980	Yellow-spotted Monitor	2015	N/A	This Study	UF 175626	2	Pet Trade
<i>Varanus salvadorii</i> (Peters & Doria 1878)	Crocodile Monitor	2009	N/A	Krysko et al. 2011a	UF 159511	2	Pet Trade
<i>Varanus salvator</i> Laurenti 1768	Water Monitor	1978	N/A	Beltz 1992; Krysko et al. 2011a	UF 65461	2	Pet Trade
ACROCHORDIDAE							
<i>Acrochordus javanicus</i> Hornstedt 1787	Javan File Snake	1970s	1970s	Krysko et al. 2011a	UF 151593–94	3	Pet Trade
BOIDAE							
<i>Boa constrictor constrictor</i> Linnaeus 1758	Common Boa	1960s	1970s	King & Krakauer 1966	UF 137070	3	Pet Trade
<i>Boa constrictor occidentalis</i> Philippi 1873	Argentine Boa	2009	N/A	Krysko et al. 2011a	UF 157190	2	Pet Trade
<i>Chilabothrus granti</i> (Stull 1933)	Virgin Islands Boa	2014	N/A	This Study	UF 173081 (FWC 46759)	2	Cargo
<i>Chilabothrus inornatus</i> (Reinhardt 1843)	Puerto Rican Boa	2014	N/A	This Study	UF 174740	2	Cargo
<i>Chilabothrus strigilatus</i> (Cope 1863)	Exuma Cays Boa	2014	N/A	This Study	UF 173412	2	Pet Trade
<i>Epicrates cenchria</i> (Linnaeus 1758)	Rainbow Boa	1997	N/A	Krysko et al. 2011a	UF 123128	2	Pet Trade
<i>Epicrates maurus</i> Gray 1849	Brown Rainbow Boa	2014	N/A	This Study	UF 173416, 177205	2	Pet Trade
<i>Eryx colubrina</i> (Linnaeus 1758)	Egyptian Sand Boa	2007	N/A	Krysko et al. 2011a	UF 151512	2	Pet Trade
<i>Eryx muelleri</i> Boulenger 1892	West African Sand Boa	2009	N/A	Krysko et al. 2011a	UF 155335	2	Pet Trade
<i>Eunectes murinus</i> (Linnaeus 1758)	Green Anaconda	2004	N/A	Dalrymple 1994; Snow et al. 2007b; Krysko et al. 2011a	UF 143935	2	Pet Trade
<i>Eunectes notaeus</i> Cope 1862	Yellow Anaconda	2007	N/A	Dalrymple 1994; Reed & Rodda 2009; Krysko et al. 2011a	UF 152688	2	Pet Trade

SANZINIIDAE							
<i>Acrantophis dumerili</i> Jan in Jan & Sordelli 1860	Dumeril's Madagascan Ground Boa	2014	N/A	Hanslowe et al. 2015	UF 175573	2	Pet Trade
CALABARIIDAE							
<i>Calabaria reinhardtii</i> (Schlegel 1848)	Calabar Burrowing Boa	2014	N/A	This Study	UF 174481	1	Pet trade
PYTHONIDAE							
<i>Leiopython fredparkeri</i> Schleip 2008	Parker's Python	2006	N/A	Krysko et al. 2011a	UF 159916	2	Pet Trade
<i>Malayopython reticulatus</i> (Schneider 1801)	Reticulated Python	1989	N/A	Neil & Smith Dampier 1989; Krysko et al. 2011a	UF 163091	2	Pet Trade
<i>Morelia spilota</i> (Lacepède 1804)	Carpet Python	2009	N/A	Krysko et al. 2011a	UF 157128	2	Pet Trade
<i>Python bivittatus</i> Kuhl 1820	Burmese Python	1979	1980s	Dalrymple 1994; Meshaka et al. 2000	EVER 301944, 305096	5	Pet Trade
<i>Python regius</i> (Shaw 1802)	Ball Python	1995	N/A*	Beltz 1995; Krysko et al. 2011a	UF 15256	2	Pet Trade
<i>Python sebae</i> (Gmelin 1789)	Northern African Rock Python	2002	2000s	Dalrymple 1994; Meshaka et al. 2004; Reed et al. 2010, 2011	UF 153699	4b	Pet Trade
COLUBRIDAE							
<i>Ahaetulla nasuta</i> (Lacepède 1789)	Common Vine Snake	2011	N/A	This Study	UF 166449	2	Pet Trade
<i>Ahaetulla prasina</i> (Boie 1827)	Short-nosed Vine Snake	2011	N/A	This Study	UF 166448	2	Pet Trade
<i>Chrysopelea ornata</i> Werner 1925	Golden Flying Snake	2011	N/A	This Study	UF 166451	2	Pet Trade
<i>Dendrelaphis pictus</i> (Gmelin 1789)	Painted Bronze-backed Treesnake	2011	N/A	This Study	UF 166444	2	Pet Trade
<i>Lampropeltis abnorma</i> (Bocourt 1886)	Guatemalan Milksnake	2009	N/A	Krysko et al. 2011a	UF 157203	2	Pet Trade
<i>Lampropeltis alterna</i> (Brown 1901)	Gray-banded Kingsnake	2010	N/A	Krysko et al. 2011a	UF 158776	2	Pet Trade
<i>Lampropeltis californiae</i> (Blainville 1835)	California Kingsnake	1992	N/A	Bartlett & Bartlett 2003; Krysko et al. 2011a	UF 135053	2	Pet Trade
<i>Lampropeltis polyzona</i> Cope 1861	Atlantic Central American Milksnake	2009	N/A	Krysko et al. 2011a	UF 155625	2	Pet Trade
<i>Lampropeltis gentilis</i> (Baird and Girard 1853)	Western Milksnake	2015	N/A	This Study	UF 177327	2	Pet Trade
<i>Orthriophis taeniurus</i> (Cope 1861)	Beauty Snake	2011	N/A	This Study	UF 175345	2	Pet Trade
<i>Pantherophis obsoletus</i> (Say in James 1822)	Western Ratsnake	2009	N/A	Krysko et al. 2011a	UF 155624	2	Pet Trade

<i>Pituophis catenifer</i> (Blainville 1835)	Gophersnake	2015	N/A	This Study	UF 175774	2	Pet Trade
<i>Pituophis ruthveni</i> Stull 1929	Louisiana Pinesnake	2010	N/A	Krysko et al. 2011a, 2014	UF 157954	2	Pet Trade
<i>Spilotes pullatus</i> (Linnaeus 1758)	Tiger Chicken Snake	1976	N/A	Bartlett 1967a; This Study	UF 117934	2	Pet Trade
DIPSADIDAE							
<i>Borikenophis portoricensis</i> (Reinhardt and Lütken 1862)	Puerto Rican Racer	2014	N/A	This Study	UF 174739, 174815	2	Cargo
HOMALOPSIDAE							
<i>Erpeton tentaculatum</i> Lacepède 1800	Tentacled Snake	2010	N/A	Holbrook & Krysko 2011	UF 163086	2	Pet Trade
LAMPROPHIIDAE (or PSEUDOXYPHIIDAE)							
<i>Langaha madagascariensis</i> Bonnaterre 1790	Madagascar Leaf-nosed Snake	2015	N/A	This Study	UF 175756	2	Pet Trade
ELAPIDAE							
<i>Naja kaouthia</i> Lesson 1831	Monocled Cobra	2015	N/A	Wilson & Porras 1983	UF 176955	2	Pet Trade
<i>Ophiophagus hannah</i> (Cantor 1836)	King Cobra	2001	N/A	Stutzman 2001; This Study	UF 176852, 176873	2	Pet Trade
TYPHLOPIDAE							
<i>Indotyphlops braminus</i> (Daudin 1803)	Brahminy Blind Snake	1979	1970s	Wilson & Porras 1983	AUM 32681	5	Cargo
<i>Typhlops lumbricalis</i> (Linnaeus 1758)	Earthworm Snake	1930	N/A	Myers 1958	UF 8995	2	Cargo

We verified the identity of the Western African Slender-snouted Crocodile, *Mecistops cataphractus* (Cuvier 1825) *sensu stricto* (Shirley et al. 2014), reported by Krysko et al. (2011a: photographic voucher UF-Herpetology 163093). The circumstances of this animal's release are more uncertain than originally reported. However, it clearly originated from a zoo in Miami-Dade County (JAW, pers. obs.; J. Groves, M. Shirley, K. Vliet, and B. Ziegler, pers. comm.).

The established species previously referred to as the African Rainbow Lizard, *Agama agama* (Linnaeus 1758), has been reidentified using molecular techniques as Peters's Rock Agama, *Agama picticauda* Peters 1877, by Nuñez (2016; Nuñez in Powell et al. 2016).

Ugueto and Harvey (2012) and Harvey et al. (2012) revised the *Ameiva ameiva* complex and recognized two species introduced in Florida. The long-known and established *A. ameiva* is widespread and known from Broward, Collier, Miami-Dade, and Monroe counties (Stage 5) (Powell et al. 2016), whereas the Borriquero Ameiva, *Ameiva praesignis*, occurs only on Key Biscayne, Miami-Dade County (Stage 4b) (Krysko et al. 2011a; Kraus 2012; Ugueto and Harvey 2012; Powell et al. 2016).

A revision of the *Lampropeltis triangulum* complex by Ruane et al. (2014) resulted in changes of species status of two previously recorded nonindigenous taxa: *Lampropeltis triangulum hondurensis* to the Guatemalan Milksnake, *Lampropeltis abnormalis* (Bocourt 1886) and *L. t. sinaloae* to the Atlantic Central American Milksnake, *Lampropeltis polyzona* Cope 1861.

Invasion stage updates.—The invasion status of the African Clawed Frog, *Xenopus laevis*, is upgraded from Stage 2 (Krysko et al. 2011a) to Stage 3, based on the discovery of a breeding population in abandoned aquaculture ponds in Riverview, Hillsborough County. A single *X. laevis* was found near Tampa, Hillsborough County, with no date of collection or voucher recorded (Tinsley and McCoid, 1996) and referenced by Krysko et al. (2011a), although S. Godley, M. McCoid, and R. McDiarmid (pers. comm. in Somma 2015) stated that the specimen was collected sometime during the mid-1970s and gave the locality as Riverview, which is in the Tampa area. This specimen has since been lost (R. McDiarmid and H. Mushinsky pers. comm. in Somma 2015). After rainfall on 9 December 2013 and 1 January 2014, two *X. laevis* were collected by Stacey Swilley in a garage on Cone Grove Road (27.8494°N, 82.33446°W), Riverview (photographic vouchers UF-Herpetology 172054–55). Swilley collected another *X. laevis* from the same location on 10 June 2014 (UF-Herpetology 173050) and a fourth specimen (UF-Herpetology 178169) from a separate Riverview locality on McMullen Loop (27.86339°N, 82.31917°W) on 23 June 2016. These frogs are from a known population inhabiting a complex of aquaculture (many abandoned) and retention ponds, and likely have been established (Stage 3) since the 1970s. We have been

unable to determine whether *X. laevis* has invaded the nearby Alafia River that drains into Hillsborough Bay or other nearby waterways. After rainfall on 9 August 2014, Zachary Fratto found an adult *X. laevis* (UF-Herpetology 173224 [FWC 47425]) on SW 318 Terrace, Homestead, Miami-Dade County (25.47131°N, 80.50322°W) (Stage 2); although this is a new county record, no current data suggest an established population there. These individuals and previous founders in Riverview likely were released or escaped from nearby enclosures and breeding ponds.

For the Pacific Coast Giant Musk Turtle (*Staurotypus salvi-nii*), further evidence (photographic voucher UF-Herpetology 166516, 5 January 2012, male, 127 mm CL, 85 mm CW, 315 g; and photographic voucher UF-Herpetology 168005, 23 July 2012, male, 122 mm CL, 88 mm CW, 271 g) collected at the same site (Zoo Miami) as previous specimens, including a gravid female (Smith et al. 2011), has changed its invasion status from Stage 2 to 3 in Florida.

Based on additional individuals and vouchers including juveniles and/or adults of both sexes, we have updated the invasion status from Stage 2 to 3 for the Panther Chameleon (*Furcifer pardalis*) (see Rochford et al. 2013), from Stage 3 to 4b for the Northern African Rock Python (*Python sebae*) (see Nuñez 2016; Mendyk et al. 2016), and from Stage 2 to 3 for the Gold Dust Day Gecko (*Phelsuma laticauda*) (see Krysko and Borgia 2012). We also updated the Gold Tegu (*Tupinambis teguixin*) from Stage 2 to 3, Oustalet's Chameleon (*Furcifer ousteleti*) from Stage 3 to 4b, and the Argentine Black and White Tegu (*Salvator merianae*) from Stage 4b to 5, based upon numerous vouchers catalogued since their first listing, indicating the presence of multiple individuals in a broad area.

Introduction pathway updates.—We added the Pet Trade introduction pathway for *Cyclura nubila*, based on an individual (photographic voucher UF-Herpetology 166567) collected in October 1999 on Long Beach Drive, Big Pine Key, Monroe County (24.63744°N, 81.34483°W). This individual was found on floating vegetation after Hurricane Irene and likely originated from a nearby *Cyclura* pet trader (Krysko et al. 2011a) on this island.

Earliest introduction updates.—We provide an earlier voucher (photographic voucher UF-Herpetology 165874) for the Nile Monitor, *Varanus niloticus sensu lato* Dowell et al. (2016), based on an individual collected by KME at Lake Kanapaha, Gainesville, Alachua County (29.62197°N, 82.40220°W), in 1981.

We found earlier literature records, unsupported by vouchers, for seven species: Colombian Slider (*Trachemys callirostris*) and the Yellow-footed Tortoise (*Chelonoidis denticulatus*) in Miami-Dade County (Bartlett 1967b); *Varanus niloticus*, Green Anaconda (*Eunectes murinus*), Yellow

Anaconda (*Eunectes notaeus*), Burmese Python (*Python bivittatus*), and *P. sebae* in southern Florida (Dalrymple 1994).

Species Accounts

Hylidae

Savigny's Treefrog, *Hyla savignyi* Audouin 1827, is indigenous to a large region of the Levant (Israel, Lebanon, western Syria, northwestern Jordan), Turkey, eastern Syria, Iran, Iraq, Georgia, Azerbaijan, Armenia, Nogorno-Karabakh, and Cyprus (Litvinchuk et al. 2006; Gvoždík et al. 2008, 2010; Arakelyan et al. 2011). On 7 October 2011, U.S. Customs and Border Protection intercepted (Stage 1) a *H. savignyi* (photographic voucher UF-Herpetology 166454; Fig. 1) from a cargo shipment of tiles originating from Syria at Port Everglades, Fort Lauderdale, Broward County (26.09677°N, 80.12647°W).



Fig. 1. Savigny's Treefrog, *Hyla savignyi* (photographic voucher UF-Herpetology 166454), intercepted on 7 October 2011, at Port Everglades, Fort Lauderdale, Broward County, Florida. Photograph by DC.

Testudinidae

The Yellow-footed Tortoise, *Chelonoidis denticulatus* (Linnaeus 1766), is indigenous to a large area of South America from southern Venezuela and Colombia, Trinidad, the Guianas, and into the northern and western Amazonian lowlands; disjunct populations occur on the Atlantic Coast in southeastern Brazil (Pritchard and Trebbau 1984; Bonin et al. 2006; Rueda-Almonacid et al. 2007; Cole et al. 2013; TTWG 2014). This species has been introduced to Guadeloupe, Lesser Antilles (Bonin et al. 2006; Kraus 2009; Henderson and Breuil 2012; TTWG 2014). On 12 April 2012 at 1630 h, DH collected a *C. denticulatus* (33 cm CL, 24 cm PL, 2 kg, photographic voucher UF-Herpetology 166994; Fig. 2) as it walked up to him on a sidewalk at 22200 SW 137 Avenue, Miami, Miami-Dade County (25.55896°N, 80.41449°W). This individual likely was released or escaped (Stage 2).



Fig. 2. Yellow-footed Tortoise, *Chelonoidis denticulatus* (photographic voucher UF-Herpetology 166994) collected by DH on 12 April 2012 at 22200 SW 137 Avenue, Miami, Miami-Dade County, Florida. Photograph by AW.

The Aldabra Giant Tortoise, *Aldabrachelys gigantea* (Schweigger 1812), is currently indigenous and reintroduced to several islands of the Aldabra Atoll, Granitic Islands, and others in the Seychelles; populations in Mauritius and Zanzibar are introduced (Stage 3 or 4) (Bonin et al. 2006; Balmer et al. 2010; Gerlach et al. 2013; TTWG 2014). For the contentious nomenclatural and taxonomic debate surrounding this species see Crumly (1986), Bour (2006), Bour and Pritchard (2009), Frazier (2009), Savage (2012, 2013), Gerlach et al. (2013), ICZN (2013), Roos (2013), and TTWG (2014). On 18 January 2012, Edward Wright collected an *A. gigantea* (photographic voucher UF-Herpetology 166523; Fig. 3) from a road at North Boulevard and W. Sligh Avenue, Tampa, Hillsborough County (28.01074°N, 82.46782°W). This individual likely was released or escaped (Stage 2).



Fig. 3. Aldabra Giant Tortoise, *Aldabrachelys gigantea* (photographic voucher UF-Herpetology 166523) collected by Edward Wright on 18 January 2012 at North Boulevard and W. Sligh Avenue, Tampa, Hillsborough County, Florida. Photograph by Dan Costell.

Home's Hinge-backed Tortoise, *Kinixys homeana* Bell 1827, is indigenous to a narrow region of western Africa along the Gulf of Guinea from Cameroon to Liberia; a disjunct population

occurs in the Republic of Congo (Bonin et al. 2006; Böhme et al. 2011; TTWG 2014). It was introduced and subsequently extirpated on Guadeloupe, Lesser Antilles (Henderson and Breuil 2012). On 7 September 2011, Suzanne Santos collected a *K. homeana* (photographic voucher UF-Herpetology 165857; Fig. 4) on SW 69th Avenue, Miami, Miami-Dade County (25.708108°N, 80.306246°W). This individual likely was released or escaped (Stage 2).

The Asian Brown Giant Tortoise, *Manouria emys emys* (Schlegel and Müller 1840), is indigenous to southern Thailand, Vietnam, Cambodia, Laos, Malaysia, Sumatra, and Borneo (Manthey and Grossmann 1997; Bonin et al. 2006; Das 2010; TTWG 2014). *Manouria emys* has been introduced (Stage 2) to Texas, USA, and Singapore (Ng et



Fig. 4. Home's Hinge-backed Tortoise, *Kinixys homeana* (photographic voucher UF-Herpetology 165857) collected by Suzanne Santos on 7 September 2011 on SW 69th Avenue, Miami, Miami-Dade County, Florida. Photograph by Suzanne Santos.

al. 1993; Dixon 2013). On 19 September 2011, an unidentified person collected a *M. e. emys* (photographic voucher UF-Herpetology 169960; Fig. 5) from an unnamed intersection in Broward County (26.14633°N, 80.48337°W). This individual likely was released or escaped (Stage 2).

Pelomedusidae

The Serrated Hinged Terrapin, *Pelusios sinuatus* (Smith 1838), is indigenous to northeastern South Africa, eastern Africa as far north as Somalia and southern Ethiopia, and westward to Rwanda and the Congo (Spawls et al. 2004; Bonin et al. 2006; Alexander and Marais 2007; Broadley and Boycott 2009; TTWG 2014). On 28 April 2012, a male *P. sinuatus* (photographic voucher UF-Herpetology 169961; Fig. 6) was collected at 1051 South Federal Highway, Fort Lauderdale, Broward County (26.10991°N, 80.13812°W). This turtle was found upside down in a parking lot with the number 2844 painted on its carapace. This individual likely was released or escaped (Stage 2). This represents the first known voucher for the Suborder Pleurodira and for this family in Florida.

Corytophanidae

The Green Basilisk, *Basiliscus plumifrons* Cope 1875, is indigenous to Costa Rica, Panama, and northward through the Atlantic versant into eastern Honduras (Savage 2002). Various authors have claimed *B. plumifrons* has been introduced (Stage 2 or 3) to Miami-Dade County without providing vouchered evidence (Butterfield et al. 1997; Bartlett and Bartlett 1999, 2006, 2011; Meshaka et al. 2004). On 23 September 2015, a juvenile *B. plumifrons* (UF-Herpetology 177256; Fig. 7) was collected by DC just outside the prop-



Fig. 5. Asian Brown Giant Tortoise, *Manouria emys emys* (photographic voucher UF-Herpetology 169960) collected on 19 September 2011 in Broward County, Florida. Photograph by DC.



Fig. 6. Serrated Hinged Terrapin, *Pelusios sinuatus* (photographic voucher UF-Herpetology 169961) collected on 28 April 2012 at 1051 South Federal Highway, Fort Lauderdale, Broward County, Florida. Photograph by DC.



Fig. 7. Green Basilisk, *Basiliscus plumifrons* (UF-Herpetology 177256) collected by DC on 23 September 2015 just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.

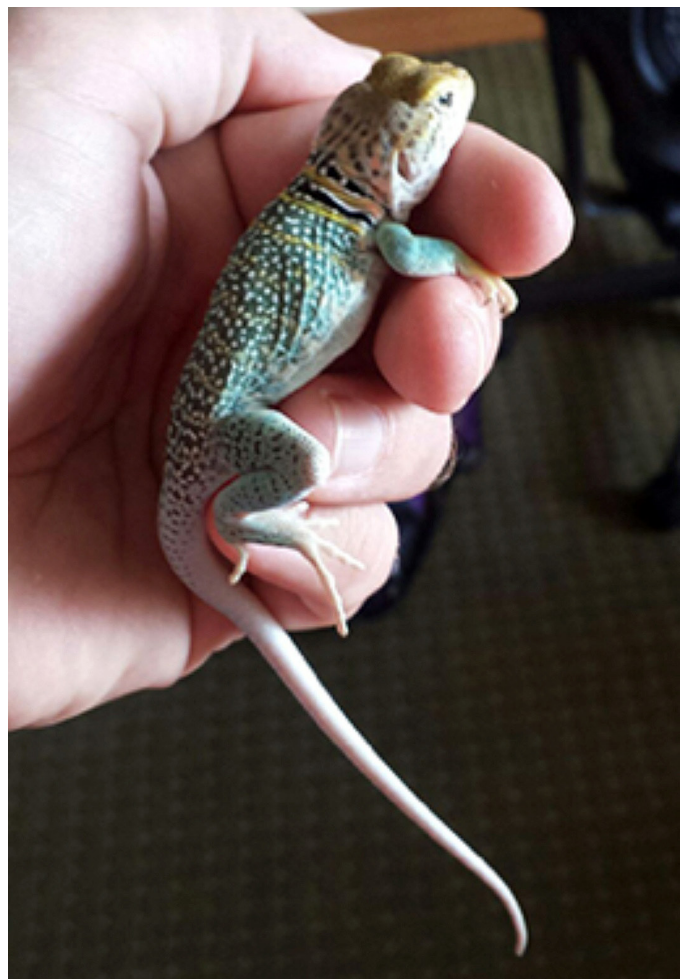


Fig. 8. Eastern Collared Lizard, *Crotaphytus collaris* (photographic voucher UF-Herpetology 177209) collected by Ryan Zach on 19 November 2015 on Ontario Circle East, Melbourne, Brevard County, Florida. Photograph by Ryan Zach.

erty of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

Crotaphytidae

The Eastern Collared Lizard, *Crotaphytus collaris* (Say in James 1822), is indigenous to the North American southern Great Basin from northern Mexico northward into Colorado and Kansas, westward to Arizona and Nevada, and eastward to northwestern Arkansas, southwestern and eastern-central Missouri, and southern Illinois (Brandon and Wilson 1994; McGuire 1996; Stebbins 2003; Powell et al. 2016). Eastern Collared Lizards found in Moffat County, Colorado, could be nonindigenous introductions (Stage 2 or 3; Roth in Livo et al. 1998). On 19 November 2015, a juvenile *C. collaris* (photographic voucher UF-Herpetology 177209; Fig. 8) was

collected by Ryan Zach on Ontario Circle East, Melbourne, Brevard County (28.156901°N, 80.651760°W). This individual likely was released or escaped (Stage 2). This represents the first known voucher for this family in Florida.

Agamidae

The Giant Forest Dragon, *Gonocephalus grandis* (Gray 1845), is indigenous to southern Thailand, western Malaysia, Borneo, Sumatra and nearby islands, and portions of Vietnam and Laos (Manthey and Grossmann 1997; Das 2010). On 7 November 2011, Daniel Rodriguez collected a *G. grandis* (photographic voucher UF-Herpetology 166447; Fig. 9) just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

Chamaeleonidae

The White-lined Chameleon, *Furcifer lateralis* (Gray 1831), is indigenous to Madagascar (Nečas 2004; Glaw and Vences

2007; Tilbury 2014; Glaw 2015) and is tolerant of anthropogenic habitats (Tolley and Menegan 2014). On 7 November 2011, Robert Freer collected a *F. lateralis* (photographic voucher UF-Herpetology 166453; Fig. 10) along State Road 9336, 0.17 km N SW 352 Street, Florida City, Miami-Dade County (25.4420555°N, 80.5014444°W). This individual likely was released or escaped (Stage 2).

Jackson’s Chameleon, *Trioceros jacksonii* (Boulenger 1896), is endemic to limited regions of Kenya and Tanzania, and it has been successfully introduced to Hawaii (Stage 4a) and California (Stage 3), USA (McKeown 1996, 1997; Stebbins



Fig. 9. Giant Forest Dragon, *Gonocephalus grandis* (photographic voucher UF-Herpetology 166447) collected by Daniel Rodriguez on 7 November 2011 just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.



Fig. 10. White-lined Chameleon, *Furcifer lateralis* (photographic voucher UF-Herpetology 166453) collected by Robert Freer on 7 November 2011 on State Road 9336, 0.17 km N SW 352 Street, Florida City, Miami-Dade County, Florida. Photograph by Robert Freer.



Fig. 11. Jackson’s Chameleon, *Trioceros jacksonii* (UF-Herpetology 174349) collected by Carolina Cabal-Speroterra on 16 November 2014 on NE 6th Court Circle, Miami, Miami-Dade County, Florida. Photograph by Carolina Cabal-Speroterra.

2003; Nečas 2004; Spawls et al. 2004; Kraus 2009, 2012; Tilbury and Tolley 2009; Glaw 2015). Bartlett and Bartlett (1995) noted the presence of a breeding population of *T. jacksonii* in the Tampa Bay area, Hillsborough County, from the mid-1960s to the early 1970s that was eventually extirpated (Bartlett and Bartlett 2001), but provided no vouchered evidence. Byers (2014) mentioned the existence of an established population of *T. jacksonii* around the Ft. Lauderdale area, Broward County, also without providing vouchered evidence. On 16 November 2014, a live male *T. jacksonii* (UF-Herpetology 174349; Fig. 11) was collected from a road by Carolina Cabal-Speroterra on NE 6th Court Circle, Miami, Miami-Dade County (25.960441°N, 80.190211°W). This individual was likely released or escaped (Stage 2).

Eublepharidae

The Leopard Gecko, *Eublepharis macularius* (Blyth 1854), is indigenous to northwestern India, Pakistan, eastern Afghanistan, and Baluchistan (Szczerbak and Golubev 1996; Daniel 2002). On 26 May 2011, Daniel Rodriguez collected a juvenile *E. macularius* (photographic voucher UF-Herpetology 166452; Fig. 12) just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This is a patternless morph (sometimes called leucistic, although not white; T. Gamble, pers. comm.). This individual likely was released or escaped (Stage 2). This represents the first known voucher for this family in Florida.

Gekkonidae

Bibron's Giant Thick-toed Gecko, *Chondrodactylus bibronii* (Smith 1846), is indigenous to western South Africa, extreme southern Namibia, and extreme southwestern Botswana (Branch 1998; Jacobsen 2005; Alexander and Marais 2007). Several authors claim *C. bibronii* was established (Stage 3) in Bradenton, Manatee County, since the 1970s, but these authors do not provide a specific locality or a voucher (Bartlett and Bartlett 1999, 2006, 2011; Meshaka et al. 2004; Meshaka 2011; Powell et al. 2016). On 23 September 2015, a *C. bibronii* (UF 177320; Fig. 13) was collected by DC just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

The Yellow-headed Dwarf Gecko, *Lygodactylus luteopicturatus* Pasteur 1964, is indigenous to southeastern Kenya, eastern Tanzania and offshore islands (including Zanzibar), and southward to coastal northern Mozambique (Spawls et al. 2004). On 6 November 2011, Daniel Rodriguez collected a *L. luteopicturatus* (photographic voucher UF-Herpetology 166455; Fig. 14) just outside the property of an animal



Fig. 12. Leopard Gecko, *Eublepharis macularius* (photographic voucher UF-Herpetology 166452) collected by Daniel Rodriguez on 26 May 2011 just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.



Fig. 13. Bibron's Giant Thick-toed Gecko, *Chondrodactylus bibronii* (UF-Herpetology 177320), collected by DC on 23 September 2015 just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.



Fig. 14. Yellow-headed Dwarf Gecko, *Lygodactylus luteopicturatus* (photographic voucher UF-Herpetology 166455) collected by Daniel Rodriguez on 6 November 2011 just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.

importer's facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

Kuhl's Gliding Gecko, *Ptychozoon kuhli* Stejneger 1902, is indigenous to southeastern Asia and much of Indonesia (Manthey and Grossmann 1997; Das 2010). On 3 November 2011, Daniel Rodriguez collected a *P. kuhli* (photographic voucher UF-Herpetology 166458; Fig. 15) just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

Gerrhosauridae

The Western Girdled Lizard, *Zonosaurus laticaudatus* (Grandidier 1869), is indigenous to much of Madagascar, especially coastal regions (Glaw and Vences 2007). On 24 August 2008, Brooke Williams photographed a *Z. laticaudatus* (photographic voucher UF-Herpetology 174445; Fig. 16) on W. San Rafael Street, Tampa, Hillsborough County (27.926275°N, 82.5306555°W). It was not captured despite



Fig. 15. Kuhl's Gliding Gecko, *Ptychozoon kuhli* (photographic voucher UF-Herpetology 166458) collected by Daniel Rodriguez on 3 November 2011 just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.

a subsequent search by TSC. This individual likely was released or escaped (Stage 2). This represents the first known voucher for this family in Florida.

Teiidae

The Guyana Caiman Lizard, *Dracaena guianensis* Daudin 1801, is indigenous to much of the Amazon Basin and Pantanal Region of South America as far north as French Guiana (de Massary et al. 2000; Harvey et al. 2012). On 7 April 2012 at 1437 h, Cathy Olson observed an adult *D. guianensis* (photographic voucher UF-Herpetology 168600; Fig. 17) at the Shell Creek observation platform, 35461 Washington Loop Road, Hathaway Park, Punta Gorda, Charlotte County (26.97506°N, 81.89095°W). This individual, which was never collected, likely was released or escaped (Stage 2).



Fig. 16. Western Girdled Lizard, *Zonosaurus laticaudatus* (photographic voucher UF-Herpetology 174445) found by Brooke Williams on 24 August 2008 on W. San Rafael Street, Tampa, Hillsborough County, Florida. Photograph by Brooke Williams.



Fig. 17. Guyana Caiman Lizard, *Dracaena guianensis* (photographic voucher UF-Herpetology 168600) found by Cathy Olson on 7 April 2012 at the Shell Creek observation platform, 35461 Washington Loop Road, Hathaway Park, Punta Gorda, Charlotte County, Florida. Photograph by Cathy Olson.

Varanidae

The Yellow-spotted Monitor, *Varanus panoptes* Storr 1980, is indigenous to southern New Guinea, Kimberley and west-



Fig. 18. Yellow-spotted Monitor, *Varanus panoptes* (photographic voucher UF-Herpetology 175626) found by Naomi and Robert Ally on 26 April 2015, on Flora Lane, Wellington, Palm Beach County, Florida. Photograph by Naomi and Robert Ally.

ern regions of Western Australia, and the northern portion of the Northern Territory to Cape York Peninsula and central Queensland, Australia (Christian 2004; Wilson and Swan 2010; Cogger 2014). On 26 April 2015, Naomi and Robert Ally observed an adult *V. panoptes* (photographic voucher UF-Herpetology 175626; Fig. 18) on Flora Lane, Wellington, Palm Beach County (26.661201°N, 80.273065°W). This individual, which was never collected, likely was released or escaped (Stage 2).

Boidae

The Virgin Islands Boa, *Chilabothrus granti* (Stull 1933), is indigenous to islands in the Puerto Rico Bank including Puerto Rico, Culebra, St. Thomas, Jost Van Dyk, Tortola, Great Camanoe, and perhaps Guana Island; it has been introduced to Steven Cay (Schwartz and Henderson 1991; Rivero 1998; Mayer 2012; Reynolds et al. 2013). On 28 March 2014, a *C. granti* (UF-Herpetology 173081; Fig. 19) was collected by Emily Rushton and Wanda Padilla from a shipment of electronic waste from Puerto Rico at a port at 5806 N 53rd Street, Tampa, Hillsborough County (28.00182°N, 82.39778°W). This snake was from unloaded cargo (Stage 2).



Fig. 19. Virgin Islands Boa, *Chilabothrus granti* (UF-Herpetology 173081) collected by Emily Rushton and Wanda Padilla from a shipment of electronic waste from Puerto Rico at a port at 5806 N 53rd Street, Tampa, Hillsborough County, Florida. Photograph by Emily Rushton and Wanda Padilla.

The Puerto Rican Boa, *Chilabothrus inornatus* (Reinhardt 1843), is endemic to Puerto Rico (Schwartz and Henderson 1991; Rivero 1998; Mayer 2012; Reynolds et al. 2013). On 17 July 2014, a *C. inornatus* (photographic voucher UF-Herpetology 174740; Fig. 20) was collected by officials from a shipment of electronic waste from Puerto Rico at the same port at 5806 N 53rd Street, Tampa, Hillsborough County, as the *C. granti* listed above (28.00182°N, 82.39778°W). This snake was from unloaded cargo (Stage 2).

The Exuma Cays Boa, *Chilabothrus strigilatus* (Cope 1863), is indigenous to several islands in the Exuma Group of the Bahamas, which includes Eleuthera (Schwartz and Henderson 1991; Buckner et al. 2012; Reynolds et al. 2013). On 27 March 2014, a *C. strigilatus* (photographic voucher UF-Herpetology 173412; Fig. 21) was collected by JLF from a parking lot of a rental car business, not involved in shipping,



Fig. 20. Puerto Rican Boa, *Chilabothrus inornatus* (photographic voucher UF-Herpetology 174740) collected by officials from a shipment of electronic waste from Puerto Rico at the same port at 5806 N 53rd Street, Tampa, Hillsborough County, as the *C. granti* listed above. Photograph by RT.

near the Miami International Airport, Miami, Miami-Dade County (25.8017°N, 80.2557°W), and its specific identity was verified by mtDNA analysis (R.G. Reynolds, pers. comm. 2014). This boa likely escaped or was released (Stage 2).

The Brown Rainbow Boa, *Epicrates maurus* Gray 1849, is indigenous to Costa Rica, Nicaragua, Panama, Colombia, northeastern Brazil, Suriname, Guyana, French Guyana, Trinidad and Tobago, and the island of Margarita (Passos and Fernandes 2009; Reynolds et al. 2013). In January 2014, a juvenile *E. maurus* (photographic voucher UF-Herpetology 173416) was collected by Tushar Mavani on SW 60th Street Road, Ocala, Marion County (29.12575°N, 82.20539°W). On 17 November 2015, CL collected an *E. maurus* (photographic voucher UF-Herpetology 177205; Fig. 22) on Willowcrest Way, Fort Myers, Lee County (26.4927916°N, 81.9067166°W). These snakes likely were released or escaped (Stage 2).

Calabariidae

The Calabar Burrowing Boa, *Calabaria reinhardtii* (Schlegel 1848), is indigenous to western-central Africa (Schmidt 1923; Böhme et al. 2011; Wallach et al. 2014). On 7 May 2014, a *C. reinhardtii* (photographic voucher UF-Herpetology 174481; Fig. 23) briefly escaped from a cargo container at a Korean Air cargo facility, Miami International Airport, Miami, Miami-Dade County (25.793052°N, 80.306164°W), was discovered and collected by airport staff, and returned to its crate (Stage 1) bound for an animal importer's facility in Hollywood, Broward County. This individual is the first known voucher for this family in Florida.

Colubridae

The Common Vine Snake, *Ahaetulla nasuta* (Lacépède 1789), is indigenous to a broad region of southeastern Asia, westward into India, Nepal, and Sri Lanka (Manthey and Grossmann 1997; Daniel 2002; David and Dubois 2005; Whitaker and Captain 2007; Das 2010). On 19 June 2011, Daniel Rodriguez collected an *A. nasuta* (photographic voucher UF-Herpetology 166449; Fig. 24) just outside the property of an animal importer's facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

The Short-nosed Vine Snake, *Ahaetulla prasina* (Boie 1827), is indigenous to a broad region of southeastern Asia, parts of Indonesia, China, and westward into eastern India and Bhutan (Manthey and Grossmann 1997; Whitaker and Captain 2007; Das; 2010; Miralles and David 2010). On 7 June 2011, Daniel Rodriguez collected an *A. prasina* (photographic voucher UF-Herpetology 166448) just outside the property of an animal importer's facility at 6450 Stirling Road,



Fig. 21. Exuma Boa, *Chilabothrus strigilatus* (photographic voucher UF-Herpetology 173412) collected by JLF on 27 March 2014 from a parking lot of a rental car business near the Miami International Airport, Miami, Miami-Dade County, Florida. Photograph by JLF.



Fig. 22. Brown Rainbow Boa, *Epicrates maurus* (photographic voucher UF-Herpetology 177205) was collected on 17 November 2015 by CJL on Willowcrest Way, Fort Myers, Lee County, Florida. Photograph by CJL.



Fig. 23. Calabar Burrowing Boa, *Calabaria reinhardtii* (photographic voucher UF-Herpetology 174481) intercepted by airport staff on 7 May 2014 at a Korean Air cargo facility, Miami International Airport, Miami, Miami-Dade County, Florida. Photograph by JLF.

Hollywood, Broward County (26.04591°N, 80.21976°W). On 18 December 2011, CRG, Kevin Messenger, Mike Martin, and Nathan Shepard collected another *A. prasina* (photographic voucher UF-Herpetology 166450; Fig. 25) at this same locality. These individuals likely were released or escaped (Stage 2).



Fig. 24. Common Vine Snake, *Ahaetulla nasuta* (photographic voucher UF-Herpetology 166449) collected by Daniel Rodriguez on 19 June 2011 just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.



Fig. 25. Short-nosed Vine Snake, *Ahaetulla prasina* (photographic voucher UF-Herpetology 166450) collected by CRG, Kevin Messenger, Mike Martin, and Nathan Shepard on 18 December 2011 just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by CRG.

The Golden Flying Snake, *Chrysopelea ornata* Werner 1925, is indigenous to a broad region of southeastern Asia and portions of China, Nepal, India and Sri Lanka (Manthey and Grossmann 1997; Whitaker and Captain 2007; Das 2010). On 15 July 2011, Daniel Rodriguez collected a *C. ornata* (photographic voucher UF-Herpetology 166451; Fig. 26) just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

The Painted Bronze-backed Treesnake, *Dendrelaphis pictus* (Gmelin 1789), is indigenous to southeastern Asia and Sunda, portions of southern China, and more speculatively westward into northeastern India (Manthey and Grossmann 1997; Whitaker and Captain 2007; Vogel and van Rooijen 2008, 2011; Das 2010). On 3 August 2011, CRG, Daniel Rodriguez, and Ashley Lawrence collected a *D. pictus* (UF-Herpetology 166444; Fig. 27) just outside the prop-



Fig. 26. Golden Flying Snake, *Chrysopelea ornata* (photographic voucher UF-Herpetology 166451) collected by Daniel Rodriguez on 15 July 2011 just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by CRG.



Fig. 27. Painted Bronze-backed Treesnake, *Dendrelaphis pictus* (UF-Herpetology 166444) collected by CRG, Daniel Rodriguez, and Ashley Lawrence on 3 August 2011 just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by CRG.

erty of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

erty of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County (26.04591°N, 80.21976°W). This individual likely was released or escaped (Stage 2).

The Western Milksnake, *Lampropeltis gentilis* (Baird and Girard 1853), is indigenous to a broad region of the United States west of eastern Louisiana, eastern Arkansas and the Missouri River, and into the Great Basin through Texas, Oklahoma, Kansas, Nebraska, and varying sections of New Mexico, Arizona, Colorado, Wyoming, Nevada, and Montana (Ruane et al. 2014; Ruane 2015; Powell et al. 2016). On 16 November 2015, DC collected a *L. gentilis* (UF-Herpetology 177327; Fig. 28) just outside the prop-

The Beauty Snake, *Orthriophis taeniurus* (Cope 1861), is currently defined as a polytypic species indigenous to most of southeastern Asia, including the Ryukyu Archipelago of Japan; its range extends northward to southern and eastern China and southeastern Russia, and westward into Bhutan and northeastern India (Manthey and Grossmann 1997; Daniel 2002; Whitaker and Captain 2007; Das 2010; Schulz 2010, 2013; Schulz et al. 2015). It has been introduced to New Zealand (Stage 2) and the Taiwanese subspecies of *O.*



Fig. 28. Western Milksnake, *Lampropeltis gentilis* (UF-Herpetology 177327) collected by DC on 16 November 2015 just outside the property of an animal importer’s facility at 6450 Stirling Road, Hollywood, Broward County, Florida. Photograph by DC.

taeniurus is an established (Stage 4b), nonindigenous, invasive snake in Okinawa, Japan (Ota 1999; Gill et al. 2001; Ota et al. 2004; Kraus, 2009; You et al. 2013). On 8 April 2011, 1932 h, an adult *O. taeniurus* was collected by SM on SW 37th Street, Miami, Miami-Dade County (25.73573°N, 80.35012°W) (photographic voucher UF-Herpetology 175345; Fig. 29). This individual likely was released or escaped (Stage 2).

The Gopher snake, *Pituophis catenifer* (Blainville 1835), is currently considered a polytypic species indigenous to a broad region of North America from Indiana and eastern-central Texas westward to the Pacific coast; northward to southern Saskatchewan, Alberta and British Columbia, Canada; and southward to mainland and northern Baja California, Mexico (Sweet and Parker 1990; Rodríguez-Robles and de Jesús-Escobar 2000; Ernst and Ernst 2003; Powell et al. 2016). This species has been introduced to (Stage 2) and intercepted (Stage 1) in Hawaii, and it perhaps has been introduced (Stage 2) to Cook County, Illinois, USA (Anton 1999; Kraus and Cravalho 2001; Kraus 2009). On 10 July 2015, a *P.*

catenifer (TL 122 cm) was photographed, but not collected, by Joshua Smith in a bromeliad garden on SW Crawfish Drive, Port Saint Lucie, Saint Lucie County (27.207955°N, 80.363070°W) (photographic voucher UF-Herpetology 175774; Fig. 30). This individual likely was released or escaped (Stage 2).

The Tiger Chicken Snake, *Spilotes pullatus* (Linnaeus 1758), is indigenous to a broad region of Latin America extending from central Mexico, southward through Central America, and more putatively, into northern South America (Jadin et al. 2014; Cole et al. 2013; Wallach et al. 2014). It has been introduced (Stage 2) to Indiana, USA (Minton 1972). Bartlett (1967a) reported a *S. pullatus* collected in Miami-Dade County, with no indication of a voucher deposited. On 24 July 1976, a *S. pullatus* (UF-Herpetology 117934; Fig. 31) was collected by Jim Stevenson on Route 84 old Alligator Alley (currently replaced by I-75 Alligator Alley) 1.61 km eastward of the western toll bridge, Collier County (approximately 26.15°N, 81.5°W). This individual likely was released or escaped (Stage 2).



Fig. 29. Beauty Snake, *Orthriophis taeniurus* (photographic voucher UF-Herpetology 175345) collected by SM on 8 April 2011 on SW 37th Street, Miami, Miami-Dade County, Florida. Photograph by SM.



Fig. 30. Gophersnake, *Pituophis catenifer* (photographic voucher UF-Herpetology 175774) photographed by Joshua Smith on 10 July 2015 on SW Crawfish Drive, Port Saint Lucie, Saint Lucie County, Florida.



Fig. 31. Tiger Chicken Snake, *Spilotes pullatus* (UF-Herpetology 117934) collected by Jim Stevenson on 24 July 1976 on old Alligator Alley, Collier County, Florida. Photograph by KLK.



Fig. 32. Puerto Rican Racer, *Borikenophis portoricensis* (photographic voucher UF-Herpetology 174739) collected by officials on 17 July 2014 from a shipment of electronic waste from Puerto Rico at a port at 5806 N 53rd Street, Tampa, Hillsborough County, Florida. Photograph by RT.

Dipsadidae

The Puerto Rican Racer, *Borikenophis portoricensis* (Reinhardt and Lütken 1862), is a medically important, venomous dipsadid indigenous to the Puerto Rican Bank, including Isla Desecheo, and it has been introduced (Stage 2) to St. Croix (Rivero 1998; Hedges et al. 2009; García-Gubern et al. 2010; Mayer 2012). On 17 July 2014, two *B. portoricensis* (photographic voucher UF-Herpetology 174739, UF-Herpetology 174815; Fig. 32) were collected by officials from a shipment of electronic waste from Puerto Rico at the same port in which the *C. granti* and *C. inornatus* listed above were collected at 5806 N 53rd Street, Tampa, Hillsborough County (28.00182°N, 82.39778°W). These snakes were from unloaded cargo (Stage 2) and represent the first known vouchers for this family in Florida.

Lamprophiidae (or Pseudoxyrhopiidae)

The Madagascar Leaf-nosed Snake, *Langaha madagascariensis* Bonnaterre 1790, is endemic to Madagascar (Glaw and Vences 2007; Tingle 2012) and can potentially spread the endoparasitic nematode *Hexametra angusticaecoides* to the endemic herpetofauna of Florida (Morton and Krysko 2012). On 31 May 2015, an adult male *L. madagascariensis* was collected on a residential patio by JLF on SW 120 Street, Miami, Miami-Dade County (25.6567°N, 80.3736°W) (photographic voucher UF-Herpetology 175756; Fig. 33). This individual likely was released or escaped (Stage 2). This represents the first known voucher for this family in Florida.

Elapidae

The Monocled Cobra, *Naja kaouthia* Lessson 1831, is a medically important venomous species indigenous to northern and eastern India, Nepal, Bhutan, and eastward into southwestern China and continental southeastern Asia into Cambodia and southern Vietnam (Wüster and Thorpe 1989, 1992; Manthey and Grossmann 1997; Whitaker and Captain 2007;

Das 2010). It has been introduced to the Ryukyu Islands, Japan (Stage 2 or 3), and Texas, USA (Stage 2) (Ota 1999; Kraus 2009; Jankowski 2015). Wilson and Porras (1983) indicated that a *N. kaouthia* was released by a religious sect in Miami-Dade County in the 1970s and later collected as a roadkill, but they provided no vouchered evidence. On 7 November 2015, a *N. kaouthia* was collected and confiscated at Kitty Hawk Drive and Stratton Road, Fort Myers, Lee

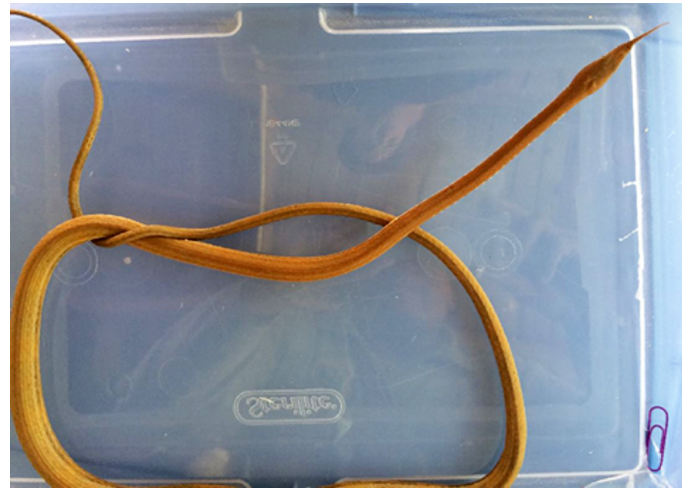


Fig. 33. Madagascar Leaf-nosed Snake, *Langaha madagascariensis* (photographic voucher UF-Herpetology 175756) collected by JLF on 31 May 2015 on SW 120 Street, Miami, Miami-Dade County, Florida. Photograph by JLF.



Fig. 34. Monocled Cobra, *Naja kaouthia* (photographic voucher UF-Herpetology 176955) confiscated by David Barrett on 7 November 2015 at intersection of Stratton Road and Kitty Hawk Drive, Fort Myers, Lee County, Florida. Photograph by David Barrett.

County (26.678902°N, 81.696186°W), by David Barrett (photographic voucher UF-Herpetology 176955; Fig. 34). This snake was a pet that escaped (D. Barrett and L. Gregory, pers. comm. 2016; Virata 2015).

The King Cobra, *Ophiophagus hannah* (Cantor 1836), is currently defined as a polytypic species — likely a species complex — indigenous to a broad region of southeastern Asia and the East Indies westward to northern Pakistan, eastward to the Philippines, and northward to Nepal and eastern and southern China (Manthey and Grossmann 1997; Whitaker and Captain 2004; Das 2010; Wallach et al. 2014). Although bites from *O. hannah* are rare, its venom is medically significant (Lim 1990; Toriba 1990; Whitaker and Captain 2004). On 6 October 2001, Rick Eslinger, Chris Edson, and Brian Edson shot an *O. hannah* (TL = 411.48 cm; photographic voucher UF-Herpetology 176852; Fig. 35) in Eslinger’s residential garage southwest of 3206 Harrison Avenue, Orlando, Orange County (28.580588°N, 81.384080°W) (Stutzman 2001). On 7 October 2015, animal control officers Jenifer Porter, Kirsten Smith, and Billy Ledford collected an *O. hannah* (TL = ~243.4 cm; photographic voucher UF-Herpetology 176873) that escaped from captivity one

month prior from beneath a clothes dryer in a residential garage at the 5000 block of Sawdust Circle, Ocoee, Orange County (28.602116°N, 81.502362°W) (Allen and Harris 2015). This snake was returned to its owner. Both of these snakes, each christened “Elvis,” were pets that escaped from the same individual’s enclosures over a period of 15 years (Stutzman 2001; Allen and Harris 2015). These represent the first known vouchers for this family from Florida.

Discussion

A total of 180 introduced herpetofaunal taxa are known in Florida (not including the now five known interceptions); these are derived from at least 191 total independent introductions (Table 1, Figs. 36–38). Of these, two (1.04%) are related to the Biological Control pathway, six (3.14%) to the Zoo pathway, 19 (9.94%) to the Cargo pathway, and 164 (85.86%) to the Pet Trade pathway. Evidence of establishment now exists for 63 taxa, including four frogs, five turtles, one crocodylian, 48 lizards, and five snakes (Figs. 37–38). Our data suggest that one of every three introduced herpetofaunal species becomes established in Florida. This is greater than the one of every four for most introduced vertebrates worldwide (Wilson 2016). Furthermore, we see no evidence that the increase in numbers of herpetofaunal introductions is slowing down.

The number of established taxa increased from 23 in the 1960s to 63 in 2015 (Fig. 37). Currently, the numbers of native and nonindigenous taxa, respectively, for each group are: salamanders 27 and 0, frogs 28 and 4, turtles 28 and 5, crocodylians 2 and 1, amphisbaenians 1 and 0, lizards 16 and 48, and snakes 48 and 5 (Fig. 38). An astonishing 75% of the extant lizard species in Florida are nonindigenous. We



Fig. 35. King Cobra, *Ophiophagus hannah* (photographic voucher UF-Herpetology 176852) shot by Rick Eslinger, Chris Edson and Brian Edson 6 October, 2001, southwest of 3206 Harrison Avenue, Orlando, Orange County, Florida. Photograph by Chris Edson.

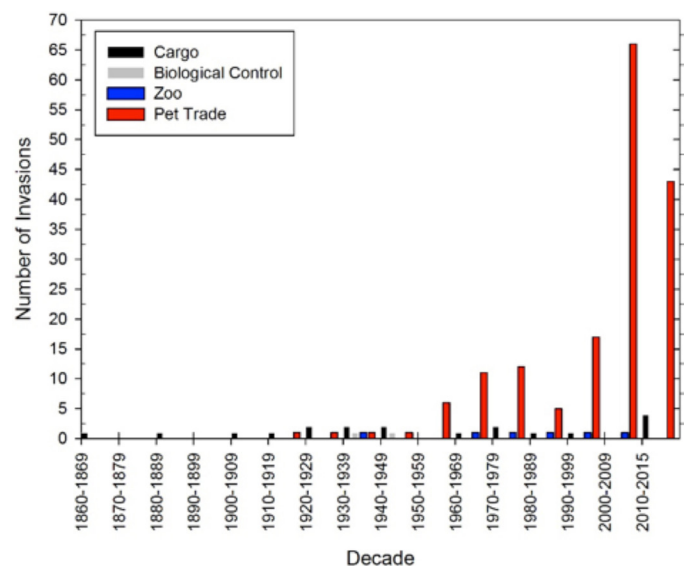


Fig. 36. Number of independent introduction pathways (n = 191) of amphibian and reptile taxa (n = 180) in Florida for each decade from 1860 through 2015. Note that intercepted taxa (n = 5) and numbers for the second half of the last decade are not included.

found a significant difference between numbers of indigenous and established nonindigenous taxa among taxonomic groups (Fig. 38; $\chi^2 = 107.65$, $df = 6$, $p < 0.0001$). Differences in the distribution of these nonindigenous taxa among invasion pathways were significant ($\chi^2 = 380.66$, $df = 3$, $p < 0.0001$), with the pet trade being by far the largest contributing pathway. From 1995 through 2015, a single animal importer in Hollywood, Broward County (see Krysko et al. 2011a), is the most likely source for the introduction of at least 46 (25.5%) of the 180 confirmed herpetofaunal taxa introduced in Florida and is an obvious cause for concern. These taxa

either have not been found elsewhere in Florida or previously were not known to have established populations in areas adjacent to the importer’s facility, and many have been included on their inventory lists. The impact of large numbers of particular species released or escaped from this facility is unstudied, as is that of most other introduced taxa discussed here. Additionally, a single port in Tampa, Hillsborough County, receiving electronic waste from Puerto Rico, is responsible for the introduction of four nonindigenous snakes, representing three species, and requires further diligent monitoring.

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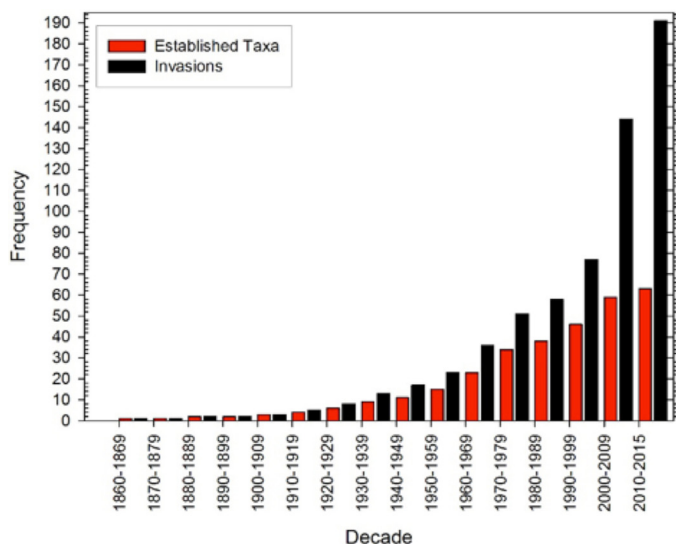


Fig. 37. Accumulation curves for the total number of independent introduction pathways (n = 191) of amphibian and reptile taxa and established taxa (n = 63) for each decade from 1860 through 2015. Note that establishment is calculated only once for each taxon using the first year it became established, and intercepted taxa (n = 5) are not included.

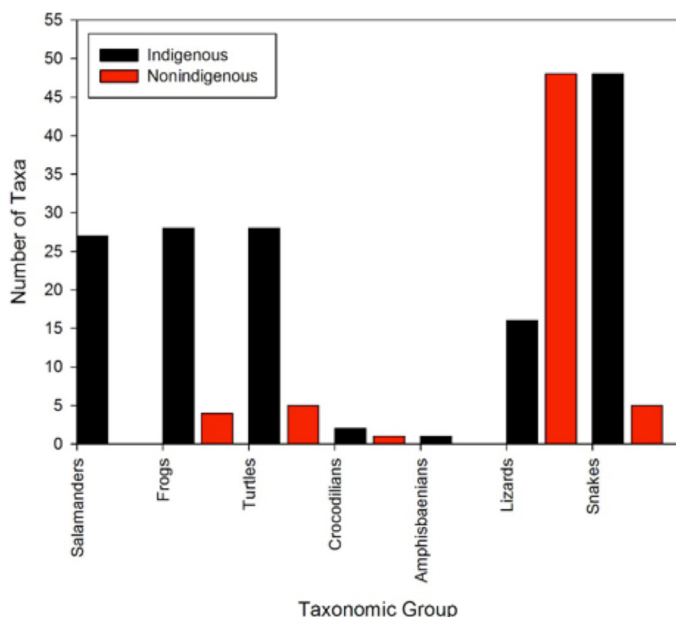


Fig. 38. Numbers of indigenous and established nonindigenous taxa among taxonomic groups.

Pam L. Fuller, Susan B. Halbert (Florida State Collection of Arthropods, DPI), Fred Kraus, James R. McCranie, Claudia MacKenzie-Krysko, Hidetoshi Ota, Beverly Pope (Librarian, DPI), Robert Powell, Klaus-Dieter Schulz, Sal and Nancy Somma, CRC Press, New Holland Publishers Ltd. (UK), Grantham Book Services, the Library of Congress, and library support of DPI (Florida Department of Agriculture and Consumer Services) for important literature.

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