



Public Comments Processing: ATTN: RIN-1018-AV68
Division of Policy and Directives Management
U.S. Fish and Wildlife Service
Attn: Erin Williams
4401 North Fairfax Drive, Suite 222
Arlington, VA 22203

30 April 2008

Dear Ms. Williams:

The Pet Industry Joint Advisory Council (PIJAC) is writing in response to the Notice of Inquiry entitled, "Injurious Wildlife Species: Review of Information Concerning Constrictor Snakes From Python, Boa, and Eunectes genera," dated 31 January 2008. We appreciate this opportunity to provide public comment.

As you know, PIJAC is a 38 year-old, nonprofit trade association comprised of members who represent the live animal segment of the pet industry.¹ Our mission is to promote animal welfare, foster environmental stewardship, and ensure the availability of pets. For well over two decades (?), we have enjoyed a close working relationship with Federal and State agencies on invasive species issues through the Aquatic Nuisance Species Task Force (ANSTF) and associated regional panels, the National Invasive Species Council (NISC), and the Invasive Species Advisory Committee (ISAC). We take the impacts of invasive species seriously and are committed to providing industry-wide leadership in efforts to prevent the introduction of non-native animals via pet ownership.

With this in mind, we have given careful consideration to the U.S. Fish and Wildlife Service's Notice of Inquiry (NOI) on Python, Boa, and Eunectes genera. Over the last four months, we have conducted a thorough literature assessment of the biology of Python, Boa, and Eunectes species and subspecies; interviewed scientists, resource managers, and snake keepers with expertise on the subject; completed a survey of the economic benefits associated with the US trade in these snakes; and co-coordinated a listening session on the NOI for large constrictor importers/distributors, retailers, and hobbyists.

Our findings are summarized as follows:

- There is no scientific-basis for listing any species or subspecies of Python, Boa, or Eunectes as injurious wildlife under the Lacey Act. These species do not pose a national-level threat to wildlife or wildlife habitat.
- Despite the fact that many of these species have been in the US pet trade for more than 40 years, only two subspecies of large constrictors (*Python molurus bivittatus* and *Boa constrictor constrictor*) have established feral populations (one each) in the United States, both in southern Florida.

¹ PIJAC represents all segments of the pet industry: companion animal importers/exporters/breeders, retail outlets, product manufacturers, wholesale distributors, hobbyists, affiliated hobby clubs, aquarium societies, and other industry trade associations.

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- With the exception of one account of predation by a *P. m. bivittatus* on two Endangered Key Largo woodrats (*Neotoma floridana smalli*), there is no evidence of significant adverse environmental, human health, or economic impacts by these feral populations. Research is needed to assess the potential ecological and economic benefits of their presence.
- Relevant State and Federal agencies have been aware of these feral populations for nearly three decades. Florida has *not* perceived the need to ban any species of large constrictor. Neither the State nor the Federal government has invested in strategic programs for the eradication or control of *P. m. bivittatus* or *B. c. constrictor* on the lands they manage. Clearly, the agencies have higher priorities.
- Florida has, however, adopted the most compressive state-level regulatory mechanism (e.g., permit system, record-keeping, micro-chip identification) for large constrictors. This program could serve as a model for other states to follow.
- There is no evidence for the potential range expansion of the established *P. m. bivittatus* population beyond southern Florida and little potential for *B. c. constrictor* to extend its population beyond its specific locality.
- Listing Python, Boa, or Eunectes species or subspecies under the Lacey Act will not help to reduce or eliminate the extant feral populations of large constrictors. Depending on the species and scale of a listing, it could, however, cause significant economic losses to reptile- and reptile product-related businesses, losses which might result in the closing of many, if not most, of these companies.
- Finally, if commercial enterprises and individual hobbyists are no longer economically viable and/or able to move Pythons, Boas, or Eunectes across state lines, **we anticipate that a Lacey Act listing could actually promote the release of a substantial number of large constrictors of various species in Florida and elsewhere.** In short, a Lacey Act listing could become the impetus for establishment of additional feral populations of Pythons, Boas, or Eunectes in the US.

The remainder of this submission addresses the questions posed by the USFWS in the NOI, as well as provides information on PIJAC initiatives to reduce the potential of the release or escape of large constrictors.

NOI QUESTIONS/RESPONSE

- **Question 1:** What regulations does your State have pertaining to use, transport, or production of Python, Boa and Eunectes genera?

See Table 1 for a directory of state laws pertaining to the regulation of Python, Boa, and Eunectes genera.

- **Question 2:** How many species in the Python, Boa and Eunectes genera are currently in production for wholesale or retail sale, and in how many and which States?

See Tables 2A, 2B, and 2C for economic information on species and subspecies of Python, Boa, and Eunectes in trade in the United States. Note that many of these

species/subspecies have been in the pet trade without environmental consequence for four decades or more (and some considerably longer in the zoo trade). Some species are no longer imported due to regulations under the Convention for the International Trade in Wild Species of Fauna and Flora (CITES) and there is an overall trend toward US-based breeding of large constrictors, particularly of color morphs and locality-specific varieties (e.g., from particular islands) that can demand prices in the \$1,000s (some upwards of \$25,000) per snake. The financial investment that snake keepers make in these animals acts as a substantial deterrent to their release or potential for escape.

Question 3: How many businesses sell Python, Boa and Eunectes species?

The following numbers are approximations for sales of Python, Boa, and Eunectes in the US: 10 importers, 50 distributors, 5,100 retailers, 25 hobbyist show promoters hosting between 350-400 reptile shows in the US annually, and 2,000-5,000 individual hobbyists.

See submission by OnlineHobbyist.com for information on internet-based sales.

Note: The question as posed by USFWS is too general to enable more detail. PIJAC is willing to collaborate with the US Fish and Wildlife Service on a more detailed analysis in the future.

Question 4: How many businesses breed Python, Boa and Eunectes species?

PIJAC estimates that there are several thousand (2,000-5,000) companies and individual hobbyists breeding species/subspecies of Python, Boa, and Eunectes in the US.

See submission by OnlineHobbyist.com for information on internet-based sales of US bred snakes.

Note: The question as posed by USFWS is too general to enable more detail. PIJAC is willing to collaborate with the US Fish and Wildlife Service on a more detailed analysis in the future.

Question 5: What are the annual sales for Python, Boa and Eunectes species?

See Tables 2A, 2B, and 2C for approximate prices of species and subspecies of Python, Boa, and Eunectes in trade in the United States, as well as the approximate numbers of these animals imported and bred in the US annually. Note that particular color morphs and locality-specific varieties (e.g., from particular islands) can demand prices in the \$1,000s (some upwards of \$25,000) per snake. The financial investment that snake keepers make in these animals acts as a substantial deterrent to their release or potential for escape.

Gross revenue per company for the sale of species and subspecies of Python, Boa, and Eunectes is highly variable – depending on whether or not the company focuses on wholesale or retail, the size of the operation, what species/subspecies are involved, and if the focus is on a) imported or US bred animals and b) normal (“wild type”) specimens or color morph/locality-specific varieties. In addition to commercial operations, thousands of reptile hobbyists sell and trade large constrictors for supplemental income and conservation purposes.

See Table 5 for examples of annual revenue (gross sales) of some species of Python, Boa, and Eunectes in the US.

Note: The question as posed by USFWS is too general to enable more detail. PIJAC is willing to collaborate with the US Fish and Wildlife Service on a more detailed analysis in the future.

Question 6: Please provide the number of Python, Boa and Eunectes species, if any, permitted within each State.

See Table 1 for information on state-level regulations.

Question 7: What would it cost to eradicate Python, Boa and Eunectes individuals or populations, or similar species, if found?

Only two populations of large constrictors are established in the US, both in southern Florida: *Python molurus bivittatus* in the Everglades and *Boa constrictor constrictor* in Deering Estate (bordering Biscayne Bay). According to State officials, eradication of these feral populations is infeasible due to difficulty in surveying the landscape and ensuring that every individual has been killed or otherwise removed. See Tables 3A and 3B for further details.

The pet industry (PIJAC and individuals in the trade) has repeatedly offered to assist State and Federal agencies with programs to control the feral populations of constrictors in Florida. However, thus far, these agencies have not designed or enacted a strategic population management program.

The cost of eradicating other populations of large constrictors, if found, would be situation-specific. Factors that would need to be considered include: species/subspecies, number of individual animals, climate, terrain, and extent of the population.

PIJAC has joined with Federal and State agencies and other stakeholders to prevent the release of unwanted Pythons, Boas, or Eunectes by promoting a component of the Habitattitude™ campaign that is focused on reptiles and amphibians (www.pijac.org). We believe that support of this program is one of the best investments the US government can make in preventing the establishment of additional populations of large constrictors.

Question 8: What are the costs of implementing propagation, recovery, and restoration programs for native species that are affected by Python, Boa and Eunectes species, or similar snake species?

Unknown. To date, there is no need for the development of such programs. There is already a species recovery plan in place for Key Largo woodrats (*Neotoma floridana smalli*), an endemic rodent that is Endangered due to loss of habitat (See: <http://www.fws.gov/southeast/vbpdfs/species/mammals/klwr.pdf>). Otherwise, there is no evidence that native species have been adversely affected by the feral populations of *P. m. bivittatus* or *B. c. constrictor*. For further information, see the response to Question 10. If an additional native species is adversely impacted in the future, the cost of

implementing propagation, recovery, and restoration programs would need to be assessed on a situation-specific basis.

Question 9: What State-listed species would be impacted by the introduction of Python, Boa and Eunectes species?

Unknown. If warranted, such as assessment would need to be undertaken on a situation-specific basis. Factors to consider would include: locality of the introduction, extent of the introduction, potential for establishment of the species, biology (including diet) of the species, biology of relevant state-listed species, and potential mitigation opportunities.

Question 10: What species have been impacted, and how, by Python, Boa and Eunectes species?

No native wildlife species have been adversely impacted by feral populations of *B. constrictor constrictor* (K. Enge, Florida Fish and Wildlife Commission personal communication; Table 3A).

Gut content analysis of *P. m. bivitattus* (Table 4) conducted by Skip Snow (Everglades National Park) and colleagues includes three state-listed species of special concern (*Aramus guarauna*, *Eudocimus albus*, *Alligator mississippiensis*), each represented by a single prey item. All of these species were listed due to historical overhunting, as well as habitat loss/modification. Their populations have rebounded considerably and all are commonly observed in the Everglades during the period in which the study occurred. All of the other species identified in the gut content analysis are common in the Everglades and most are common state-wide. Two species (*Felis sylvestrus catus* and *Rattus sp.*) are non-native species that are generally considered invasive where they have become established. At least three of the rodent species (*Sigmodon hispidus*, *Oryzomys palustris*, and *Rattus sp.*) found in *P. m. bivitattus* guts are reservoirs for human-disease and are known to have negative impacts on wildlife and/or crops. On 13 April 2007, a single male *P. m. bivitattus* was found to have ingested two Key Largo woodrats (*Neotoma floridana smalli*), a species that is Federally- and State-listed as Endangered. This represents the first record of Burmese pythons in the Keys and the only record of predation on a US Threatened or Endangered species by a large constrictor. Patrols have been established to prevent further incursions of the pythons into the Keys.

Although a thorough analysis of the ecological role of *P. m. bivitattatus* is not available at this time, it is possible that they are making an overall positive contribution to the Everglades system as a prey base for native species and a predator of invasive species, as well as native “pest” species. For more information, see Table 3B.

No established populations of Eunectes species have been documented in the US. See Table 3C.

PIJAC INITIATIVES

In order to prevent the introduction of any species or subspecies of the general Python, Boa, or Eunectes in the US, PIJAC has been engaged with State and Federal agencies, as well as other stakeholders, in the following initiatives. It is our contention that these programs, as well as State-level permitting systems, offer the most effective strategy for preventing any additional populations of large constrictors from establishing in the US. PIJAC wishes to continue working

with the US Fish and Wildlife Service, Florida Fish and Wildlife Commission, and others on these important programs. For more information see: www.pijac.org.

- **Habitattitude™**: Designed to educate pet owners on the need to make smart pet choices, care for their pets properly, and find alternatives to the release of unwanted pets. Includes a component focused on reptiles and amphibians.
- **National Reptile Improvement Plan (NRIP)**: Accreditation program for reptile importers, distributors, and retailers to ensure the animals are free of parasites and pathogens.
- **Non-Native Pet Amnesty Day**: Sponsored by the State of Florida and partners for the purposes of taking in unwanted, non-native species of pets (mostly reptiles and amphibians) without consequence to the former pet owner.
- **Retailer Capacity Building**: PIJAC guidebooks and a certification program for increasing the capacity of pet retailers to help customers make wise choices about pet selection, as well as to care for their pets properly.

FUTURE OPPORTUNITES

We respectfully request that the US Fish and Wildlife Service continue to use PIJAC and its Members as a resource for the evaluation of the genera Python, Boa, and Euneptes under the NOI. We currently have two relevant peer-reviewed publications in progress and will make these available to the US Fish and Wildlife Service once they have been accepted by a scientific journal.

Should the US Fish and Wildlife Service contract economic or biological studies as part of its assessment, PIJAC is willing contribute additional data (to the best of our ability) for these purposes.

We look forward to future collaboration on invasive species issues and trust that the US Fish and Wildlife Service will continue to proceed in a science-based, transparent, and stakeholder-inclusive manner.

Sincerely,



N. Marshall Meyers
Executive Vice President &
General Counsel

&



Jamie K. Reaser, PhD
Senior Science and Policy Advisor

Table 1. State Regulations for Pythons, Boas, and Eunectes (as well as other large constrictors)

State	Code/Regulation	Species	Summary
Florida	68A-6.007	<i>Python molurus</i> <i>Python reticulatus</i> <i>Python sebae</i> <i>Morelia amethystinus</i> <i>Eunectes murinus</i>	<p>Possession, Transportation, Exhibition and Caging Venomous reptiles and Reptiles of Concern</p> <p>Any person who possesses, keeps, exhibits or sells a reptile of concern must obtain an annual permit and comply with</p> <p>Person must be at least 18 years of age, no prior violations of captive wildlife regulations, illegal commercialization of wildlife, animal cruelty, or violation of importation rules</p> <p>To qualify for a permit, must demonstrate knowledge of husbandry, nutritional, and behavioral characteristic of species</p> <p>Comply with facility standards to ensure “safe, secure and proper housing”</p> <p>Document Disaster and Critical Incident Plans (Form FWCDLE_619(02-06))</p>
	68A-6.004		<p>Standard Caging Requirements for Constrictors – subpart (q) covers constrictors up to 5 feet, specimens 5 feet to 12 feet, specimens greater than 12 feet</p>
	68A-6.0071		<p>Record Keeping and reporting Requirements</p> <p>Inventory changes including births, deaths, acquisitions, sales and transfers on FormFWCDLE_620IV-R (12-06)</p>

	68A-6.0072		<p>Acquisition records include species, date, quantity, PIT tag data for each specimen and license identification number of recipient</p> <p>Identification; Escape Permanently identified with unique passive integrated transponder (PIT tag). Records (including species, specimen name, gender, age, ID number) must be maintained as long as specimen maintained For snakes with greater than 2 inch diameter, PIT tag implanted back 1/3 of same forward of anal plate. Notification of escape required</p>
Hawaii	HRS 150A-6.5 HI ADC Sec. 4-7-6, 4-7-10	All Squamata (snakes)	Importation/possession prohibited
Illinois	720 ILCS 585/1 8 ILAC 8:25.110	<i>Python spp.</i> <i>Boa spp.</i> <i>Eunectes spp.</i>	Permit required for “any constrictor snake six feet or over in length, such as boa, python, and anaconda.”
Iowa	Iowa Admin. Code 21-77.1 22-77.7	<i>Python reticulatus</i> <i>Eunectes spp.</i> <i>Python sebae</i>	Classified as “dangerous wild animal” and possession prohibited. Permits (\$100) allowed for specimens possessed prior to July 1, 2007 subject to detailed criteria, including an “electronic identification device, record-keeping, and disposition.
Louisiana	76 La. Admin. Code	<i>Apodora papuana</i>	Importation and/or private possession of constrictors in excess

	Pt. XV. Sec 101.K	<i>Liasis olivacea</i> (= <i>olivaceus</i>) <i>Morelia spilota</i> <i>Morelia kinghorni</i> <i>Morelia amethystinus</i> <i>Python natalensis</i> <i>Python sebae</i> <i>Python molurus</i> <i>Python reticulatus</i> <i>Boa spp.</i> <i>Eunectes spp.</i>	of 12 feet by a permit issued by the Department of Wildlife and Fisheries.
Massachusetts	321 CMR 9.01	<i>Python sebae</i> <i>Python reticulatus</i> <i>Eunectes spp.</i>	Permit required.
Missouri	Title 38, Crimes and Punishment Chapter 578.023		Keeper of dangerous wild animals must register animals with the local law enforcement agency in the county in which the animal is kept. Specifically refers to “dangerous reptile over eight feet long.”
Montana	MT ADC 12.6.2215 Mont.Admin.R. 12.6.2215	<i>Eunectes</i>	Permit required
New Jersey	NJ ADC 7:25-4.3	Family <i>Pythonidae</i> Family <i>Boaidae</i> (other than <i>Boa constrictors</i>)	Possession by permit provided applicant satisfies criteria within N.J.A.C. 7:25-4.7 (animal welfare, husbandry)
New York	Chapter 43-B Article 11-0103	<i>Python molurus bivittatus</i> <i>Python reticulatus</i>	Possession prohibited

		<i>Python sebae</i> <i>Eunectes murinus</i> <i>Eunectes notaeus</i> <i>Morelia amethystinus</i>	
Rhode Island	RI Code R12 020 030 Section 8.00	<i>Python reticulatus</i>	Import/Possession permit required. Permit criteria and conditions set forth in Section 3.00 – Section 5.00.
Texas	V.T.C.A. Parks & Wildlife Code Sec. 43.851 Texas Administrative Code Title 31 Part 2 Chapter 55.651 et seq	<i>Python sebae</i> <i>Python molurus</i> <i>Python reticulatus</i> <i>Python natalensis</i> <i>Eunectes murinus</i>	<p>A person may not possess, sell or transport through Texas a covered species without a permit (Note: a bill of lading functions as a temporary permit)</p> <ul style="list-style-type: none"> • Annual permit (permits provided for both possession (\$20) and commercial activities (\$60)) • Seller must notify purchaser at time of sale that <ul style="list-style-type: none"> ○ Sales receipt is temporary permit valid for 21 days ○ A controlled exotic snake permit must be obtained within 21 day timeframe ○ If convicted of violating requirements result in 5 year ban from obtaining a permit • Permit must be obtained for each permanent place where controlled species are sold or held for commercial purposes • Commercial permit holder must maintain daily records of all activities involving acceptance, possession or transfer of a controlled species

TABLE 2A: BOA TRADE STATUS & ECONOMIC VALUE^a

Genus ^b	Species	Subspecies	Common name(s)	@Vol. US trade/yr Import; US Bred	@Time in trade (yrs)	@Retail value (US\$) Import; US Bred	Morph- & locality-related price variation
<i>Boa</i>	<i>constrictor</i>	<i>amarali</i>	Amaral's boa	0; <1,000	20-30	NA; \$200-\$400	NA
<i>Boa</i>	<i>constrictor</i>	<i>constrictor</i>	Red-tailed boa	3,000; 1,000	40-50	\$100-\$200; \$200-\$500	Up to \$1,000
<i>Boa</i>	<i>constrictor</i>	<i>imperator</i>	Common northern boa	25,000; 5,000-10,000	40-50	\$100-\$200; \$150-\$200	Up to \$12,000
<i>Boa</i>	<i>constrictor</i>	<i>longicauda</i>	Tumbes Peru boa	0; <500	20 (1988, 1992 only importations)	NA; \$250-\$350	Up to \$500
<i>Boa</i>	<i>constrictor</i>	<i>nebulosa</i>	Dominican clouded boa	0;0	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>occidentalis</i>	Argentine boa	0; 1,000-2,000	40-50	NA; \$175-\$225	Up to \$3,500
<i>Boa</i>	<i>constrictor</i>	<i>orophias</i>	St. Lucia boa	0; 0	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>ortonii</i>	Orton's boa	0; 0	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>sabogae</i>	Pearl Island boa	<25; 50	3 (2005 first importation)	\$1,000-\$2,000; \$1,000-\$2,000	NA

^aPet Industry Joint Advisory Council (PIJAC), unpublished data.

^bTaxonomy based on: ITIS 2008; Russo 2007; McDiarmid 1999.

References

ITIS (Integrated Taxonomic Information System). Pythonidae. Accessed 4 February 2008. <http://www.itis.gov>

McDiarmid, R. W., J. A. Campbell, and T. Touré. 1999. Snake Species of the World: A Taxonomic and Geographic Reference, vol. 1. Herpetologists' League. 511 pp. ISBN 1-893777-00-6 (series). ISBN 1-893777-01-4 (volume).

Russo, V. 2007. The Complete Boa Constrictor: A Comprehensive Guide to the Care, Breeding, and Geographic Races. ECO Herpetological Publishing and Distribution. Lansing, MI.

TABLE 2B: PYTHON TRADE STATUS & ECONOMIC VALUE^a

Genus ^b	Species	Subspecies	Common name(s)	@Vol. US trade/yr Import; US Bred	@Time in trade (yrs)	@Retail Value (US\$) Import; US Bred	Morph-related price variations
<i>Python</i>	<i>anchietae</i>		Angolan python, Anchieta's dwarf python, Southwestern desert python	0; 300-400	25	\$1,500	NA
<i>Python</i>	<i>brongersmai</i>		Blood python	3,000; 1,000-2,000	10	\$100-\$200; \$150-\$250	Up to \$10,000
<i>Python</i>	<i>breitensteini</i>		Borneo python	<100; 1,000-1,500	19 (1989 first entry)	\$120; \$125-\$250	\$1,000
<i>Python</i>	<i>curtus</i>		Sumatran python, short python, blood python, short-tailed python	<100; 700-1,000	10-20	\$120;\$250	NA
<i>Python</i>	<i>molurus</i>	<i>molurus</i>	Asian rock python, Indian rock python, Indian python, black-tailed python, tiger python	0; <1,000	40-50	NA; \$50-\$250	NA
<i>Python</i>	<i>molurus</i>	<i>bivitattus</i>	Burmese python	1,000; 7,000-10,000	40-50 (1972 sig. increase)	\$100;\$100	Up to \$450

<i>Python</i>	<i>natalensis</i>		Natal rock python, southern Africa python	0; <100	20-30	NA; \$200-\$250	NA
<i>Python</i>	<i>regius</i>		Ball python, royal python	50,000-70,000; 15,000-20,000	40-50 (1980s in large numbers)	\$50-\$150; \$50-\$150	Up to \$10,000
<i>Python</i>	<i>reticulatus</i>		Reticulated python, Asiatic reticulated python, regal python	1,000; 5,000+	40-50	\$100; \$100-\$150	Up to \$10,000
<i>Python</i>	<i>sebae</i>	<i>sebae</i>	African rock python	<1,000; <100	40-50	\$80-\$100; \$80-\$100	Up to \$250
<i>Python</i>	<i>timoriensis</i>		Lessor Sundas python, Timor python	0; <20	30-40	NA; \$500-\$700	NA

^aPet Industry Joint Advisory Council (PIJAC), unpublished data.

^bTaxonomy based on: ITIS 2008; McDiarmid 1999; Reptile-database.org

References

ITIS (Integrated Taxonomic Information System). Pythonidae. Accessed 4 February 2008. <http://www.itis.gov>

McDiarmid, R. W., J. A. Campbell, and T. Touré. 1999. Snake Species of the World: A Taxonomic and Geographic Reference, vol. 1. Herpetologists' League. 511 pp. ISBN 1-893777-00-6 (series). ISBN 1-893777-01-4 (volume).

TABLE 2C: EUNECTES TRADE STATUS & ECONOMIC VALUE^a

Genus^b	Species	Subspecies	Common name(s)	@Vol. US trade/yr Import; US Bred	@Time in trade (yrs)	@Retail value (US\$) Import; US Bred	Morph- & locality-related price variation
<i>Eunectes</i>	<i>murinus</i>	<i>murinus</i>	Green anaconda	1,000; <200	45+ (since early 1960s)	\$100-\$200; \$100-\$200	NA
<i>Eunectes</i>	<i>murinus</i>	<i>gigas</i>	Green anaconda	Not distinguished in trade from above	See above	See above	NA
<i>Eunectes</i>	<i>deschauenseei</i>		Marajo anaconda, Dark-spotted anaconda	0; 0	NA	NA	NA
<i>Eunectes</i>	<i>notaeus</i>		Yellow anaconda	0; <100	45+	NA; \$100-\$300	Up to \$2,000

^aPet Industry Joint Advisory Council (PIJAC), unpublished data.

^bTaxonomy based on: ITIS 2008; McDiarmid 1999.

References

ITIS (Integrated Taxonomic Information System). Pythonidae. Accessed 4 February 2008. <http://www.itis.gov>

McDiarmid, R. W., J. A. Campbell, and T. Touré. 1999. Snake Species of the World: A Taxonomic and Geographic Reference, vol. 1. Herpetologists' League. 511 pp. ISBN 1-893777-00-6 (series). ISBN 1-893777-01-4 (volume).

TABLE 3A: BOA GENUS INJURIOUSNESS ASSESSMENT

(Impacts are not applicable (NA) for species that have not established populations in the US)

Genus ^a	Species	Subspecies	Common name(s)	Established US; Spreading	Impact Wildlife	Impact Human Health or Safety	Impact Economy
<i>Boa</i>	<i>constrictor</i>	<i>amarali</i>	Amaral's boa	No	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>constrictor</i>	Red-tailed boa	Yes, 1 pop. ^b ; no evidence, limited potential ^c	Not problematic ^c ; also serves as prey base ^d	No ^e	Benefit ^c
<i>Boa</i>	<i>constrictor</i>	<i>imperator</i>	Common northern boa	No	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>longicauda</i>	Tumbes Peru boa	No	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>nebulosa</i>	Dominican clouded boa	No	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>occidentalis</i>	Argentine boa	No	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>orophias</i>	St. Lucia boa	No	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>ortonii</i>	Orton's boa	No	NA	NA	NA
<i>Boa</i>	<i>constrictor</i>	<i>sabogae</i>	Pearl Island boa	No	NA	NA	NA

^aTaxonomy based on: ITIS 2008; McDiarmid 1999.^bSnow et al. (2007) report the removal of a small number of *B. constrictors* (< 5/year from 1989-2006, with the exception of 69 removed in 1996) from the vicinity of Charles Deering Estate at Cutler (Deering), Miami, Miami-Dade County. Most of these animals were young of the year (69% overall and 84% of the 69 captured in '96). Although molecular studies are needed to determine the exact taxonomic identity of these snakes, they are reported to most closely resemble *B.c. constrictor*. The first report that the snakes were possibly breeding was anonymously made in 1992 (1992a,b). In 1994, Dalrymple (1994) reported snakes breeding in the natural and suburban areas of Deering.^cKevin Enge of the Florida Fish and Wildlife Conservation Commission (FFWCC) reports (*pers. comm.*; 17 April 2008) that *B.c. constrictor* is still present in the Deering Estate area and that snake dealers collect and sell specimens for profit (@\$150 for a

juvenile). There are no native prey species in the area of special concern and there are very limited opportunities for the population to spread as it is bordered by ocean and urban sprawl. According to Scott Hardin (*pers. comm.*; FFWCC; 17 April 2008), the South Florida Water Management District (my.sfwmd.gov) has expressed an interest in eradicating the population.

^dSnow et al. (2007) reports that potential predators of *B. c. constrictor* include American alligator (*A. mississippiensis*), American crocodiles (*Crocodylus acutus*), Eastern indigo snakes (*Drymarchon couperi*), large turtles, birds-of-prey, feral hogs, and medium- to large-sized carnivorous mammals.

^eFeral *B. c. constrictors* pose no threats to humans if unmolested (Snow et al. 2007). If improperly handled, they can cause bit wounds and bruises.

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TABLE 3B: PYTHON GENUS INJURIOUSNESS ASSESSMENT

(Impacts are not applicable (NA) for species that have not established populations in the US)

Genus^a	Species	Subspecies	Common name(s)	Established US; Spreading	Impact Wildlife	Impact Human Health or Safety	Impact Economy
<i>Python</i>	<i>anchietae</i>		Angolan python, Anchieta's dwarf python, Southwestern desert python	No; NA	NA	NA	NA
<i>Python</i>	<i>brongersmai</i>		Blood python	No; NA	NA	NA	NA
<i>Python</i>	<i>breitensteini</i>		Borneo python	No; NA	NA	NA	NA
<i>Python</i>	<i>curtus</i>		Sumatran python, short python, blood python, short-tailed python	No; NA	NA	NA	NA
<i>Python</i>	<i>molurus</i>	<i>molurus</i>	Asian rock python, Indian rock python, Indian python, black-tailed python, tiger python	No; NA	NA	NA	NA

<i>Python</i>	<i>molurus</i>	<i>bivitattus</i>	Burmese python	Yes, ^b one pop.; No evidence, limited potential ^c	Diet consists of native and non-native species ^d ; serves as prey base for native species ^e	Consistent with native wildlife (alligators) in the area ^f	No data ^g
<i>Python</i>	<i>natalensis</i>		Natal rock python, southern Africa python	No; NA	NA	NA	NA
<i>Python</i>	<i>regius</i>		Ball python, royal python	No; NA	NA	NA	NA
<i>Python</i>	<i>reticulatus</i>		Reticulated python, Asiatic reticulated python, regal python	No; NA	NA	NA	NA
<i>Python</i>	<i>sebae</i>	<i>sebae</i>	African rock python	No; NA	NA	NA	NA
<i>Python</i>	<i>timoriensis</i>		Lessor Sundas python, Timor python	No; NA	NA	NA	NA

^aTaxonomy based on: ITIS 2008; McDiarmid 1999; Reptile-database.org

^bSnow et al. (2007a) report that a road-killed *P. m. molurus* was first encountered on U.S. 41 in the vicinity of Everglades National Park (ENP), Florida, in 1979 and that the number and spatial distribution of *P. m. molurus* reported in and around ENP markedly increased in 2002. Meshaka et al. (2000) speculated that the species was breeding in ENP. Snow et al. (2007a) reports finding juvenile snakes as follows: 1 in 1995, 5 (including four neonates) in 2002, 11 in 2003, and 9 in 2004. Krysko et al. (2008) report the collection and necropsy of four gravid females *P. m. molurus* collected between 5 March and 26 April 2004 and a female found coiled

around 46 eggs on 17 May 2006 (see also Snow 2007b). Bien et al. (2008) report that the average clutch size for *P. m. bivittatus* in the Everglades is 35.8 (N = 8, range 19-46).

^cThere is no evidence at this time that the Everglades population is expanding beyond southern Florida, and the vicinity of Everglades National Park in particular. The extent of the current population has not been delineated and a large-scale radio tracking and/or mark-release-recapture program would be necessary to monitor the activity of individual snakes at the range periphery. Rodda et al. (2008) claimed that the climate of the Burmese python in its native range matched the climate of approximately 1/3 of the US (up the coasts and across the south from Delaware to Oregon, including California, Texas, Oklahoma, Arkansas, Louisiana, Mississippi, Alabama, Florida, Georgia, and South and North Carolina) and concluded that “a substantial portion of the mainland US is potentially vulnerable to this ostensibly tropical invader.” However, Rodda et al. (2008) actually matched the climatic range of the Indian python (*P. m. molurus*), not the Burmese python (*P. m. bivittatus*), the latter being the subspecies established in southern Florida (Barker and Barker 2008a). Due to CITES regulations, the Indian python is no longer imported in the US, fewer than 1000 are produced in the US trade each year (Table 2A), and feral populations are not established in the US (Table 2B). The Burmese python is derived from a much smaller and generally more tropical range than the Indian python (Barker and Barker 2008b). Furthermore, the specimens imported into the US have been drawn from a subset of the Burmese python’s entire range (<http://www.unep-wcmc.org/citestrade/trade.cfm>), show very little genetic variation (Collins et al. 2008), and may thus have significantly reduced ecological plasticity (i.e. an inability to tolerate a wide range of environmental conditions). According to Barker (2008), these animals are not able to behaviorally protect themselves (seek shelter) from lethal cold (near or below freezing temperatures). Furthermore, as a species, it appears their geographic distribution may more limited via critical minimum temperatures for the proper development of their eggs than body temperature (Vinegar *et al.*, 1970). At ambient temperatures below 24.8 C (76.64 F), *P. m. bivittatus* was not able to behaviorally offset the heat lost to the environment resulting in cooling of the eggs (Hutchison et al. 1966). Finally, it is clear that a wide range of factors besides climate influence the potential for *P. m. bivittatus* range expansion. Non-climatic factors that are likely to place considerable limits its spread include: mechanized agriculture, road traffic, human persecution, and predation by wildlife and domestic animals. In short, the Rodd et al. (2008) provides no scientific basis for projecting *P. m. bivittatus* range expansion in the US.

^dSnow et al. (2007c) reports analysis of stomach and lower intestines of 56 sub-adult and adult *P. m. bivittatus* from within or adjacent to Everglades between January 2003 and March 2006, but does not provide a comprehensive analysis of the wildlife status of these species. Instead, he remarks that the range of the python overlaps with the range of four threatened and endangered mammals (2) and birds (2) (*none of which were found in the gut content analysis*). We provide an analysis of the actual prey items in Table 4. According to our assessment, all of the species ingested by Burmese pythons are common within the Everglades, particularly during the time period of sampling. Two species (*Felis sylvestris catus* and *Rattus sp.*) are non-native species that are generally considered invasive where they have become established. At least three of the rodent species (*Sigmodon hispidus*, *Oryzomys palustris*, and *Rattus sp.*) are

reservoirs for human-disease and are known to have negative impacts on wildlife and/or crops. Three of the species (each representing one prey item) are state-listed as species of special concern (*Aramus guarauna*, *Eudocimus albus*, *Alligator mississippiensis*) due to historical overhunting and habitat loss, but populations have rebounded considerably. On 13 April 2007, a single male *P. m. bivitattus* was found to have ingested two Key Largo woodrats (*Neotoma floridana smalli*), a species that is Federally- and State-listed as endangered. This represents the first record of Burmese pythons in the Keys and the only record of predation on a Threatened or Endangered species (Greene et al. 2007). Patrols have been established to prevent further incursions of the pythons into Key Largo. ^eSnow et al. (2007a) reports that potential predators of *P. m. bivitattus* include American alligator (*A. mississippiensis*), American crocodiles (*Crocodylus acutus*), Eastern indigo snakes (*Drymarchon couperi*), large turtles, birds-of-prey, feral hogs, and medium- to large-sized carnivorous mammals. They are also susceptible to road traffic and mechanized agriculture (Snow et al. 2007a). However, no studies are available that report the diversity of species feeding on Burmese pythons in the Everglades, nor what level of benefit this food source provides for these species. Such data are necessary for conducting ecological cost-benefit analyses, as well as determining the levels of “natural” *P. m. bivitattus* population control through predation and anthropogenic factors. ^fSnow et al. (2007a) report that, unmolested, feral Burmese pythons probably pose little danger to adult humans. He speculates that children could be at risk in “certain situations” and that they should be kept away from water edges and dense vegetation, which is already recommended due to the much higher likelihood of alligator attacks. Furthermore, like alligators, large constrictors crossing roads could cause traffic accidents. ^gNo data are currently available to assess the economic costs or benefits of *P. m. bivitattus* presence in the Everglades. Tourist visitation could benefit from visitors hoping to see the large constrictors. Those who fear snakes are not likely to be Everglades visitors in the first place. If a harvest program is developed, the snakes could be marketed for skins and meat both within the US and abroad.

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TABLE 3C: EUNECTES GENUS INJURIOUSNESS ASSESSMENT

(Impacts are not applicable (NA) for species that have not established populations in the US)

Genus^a	Species	Subspecies	Common name(s)	Established US; Spreading	Impact Wildlife	Impact Human Health or Safety	Impact Economy
<i>Eunectes</i>	<i>murinus</i>	<i>murinus</i>	Green anaconda	No	NA	NA	NA
<i>Eunectes</i>	<i>murinus</i>	<i>gigas</i>	Green anaconda	No	NA	NA	NA
<i>Eunectes</i>	<i>deschauenseei</i>		Marajo anaconda, Dark-spotted anaconda	No	NA	NA	NA
<i>Eunectes</i>	<i>notaeus</i>		Yellow anaconda	No	NA	NA	NA

^aTaxonomy based on: ITIS 2008; McDiarmid 1999.**References**ITIS (Integrated Taxonomic Information System). Pythonidae. Accessed 4 February 2008. <http://www.itis.gov>

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Table 4. Status of Species Found in Burmese Python (*Python molurus bivittatus*) Gut Content Analysis (Based on Snow et al. 2007c)

Prey Species	#	Status	Reference(s)
Mammals			
<i>Sylvilagus floridanus</i> (Cottontail rabbit)	9	<ul style="list-style-type: none"> Common statewide except Keys 	Brown 1997; Website A
Rodentia (species uncertain)	6	NA	NA
<i>Sigmodon hispidus</i> (Hispid cotton rat)	5	<ul style="list-style-type: none"> Common statewide Economic pest causing damage to sweet potato, corn, peanut, tomato, sugar cane, squash, carrot, and cotton crops Reservoir for rabies, Chagas' disease, Venezuelan equine encephalitis, <i>Borrelia burgdorferi</i> (Lyme's Disease), and hantavirus (etc.) Can reduce productivity of ground nesting birds 	Brown 1997; Websites A,B, I, J; Coffey et al. 2004
<i>Peromyscus gossypinus</i> (Cotton mouse)	3	<ul style="list-style-type: none"> Common statewide 	Brown 1997; Website A
<i>Sciurus sp.</i> (Tree squirrel); Species not stated, likely <i>Sciurus carolinensis</i> (Eastern grey squirrel) given collection locality	3	<ul style="list-style-type: none"> Common statewide except lower Keys 	Brown 1997; Website A
<i>Felis sylvestris catus</i> (Feral domestic cat)	2	<ul style="list-style-type: none"> Abundant Introduced non-native Listed as an invasive species in the Global Invasive Species Database Predator of native wildlife; expected to have negative impacts on a wide range of native faunal species 	Brown 1997; Website A & H
<i>Procyon lotor</i> (Raccoon)	2	<ul style="list-style-type: none"> Abundant statewide 	Brown 1997; Website A
<i>Rattus sp.</i> (Old World rat); species not stated, possibly <i>Rattus rattus</i>	2	<ul style="list-style-type: none"> Common statewide Introduced non-native Listed as an invasive species in 	Brown 1997; Website A & H

and/or <i>Rattus norvegicus</i>		<p>the Global Invasive Species Database</p> <ul style="list-style-type: none"> • Predator of native wildlife • Reservoir for numerous diseases, including plague (<i>Yersinia pestis</i>) 	
Unidentifiable remains	2	NA	NA
<i>Didelphis virginia</i> (American opossum)	1	<ul style="list-style-type: none"> • Common statewide 	Brown 1997; Website A
<i>Felis rufus</i> (Bobcat)	1	<ul style="list-style-type: none"> • Common statewide 	Brown 1997; Website A
<i>Neofiber alleni</i> (Round tailed muskrat)	1	<ul style="list-style-type: none"> • Locally common, peninsula and isolated populations in Apalachicola and Okefenokee areas 	Brown 1997; Website A
<i>Oryzomys sp.</i> (Rice rat), species non stated, likely <i>Oryzomys palustris</i> (Marsh rice rat) given collection locality	1	<ul style="list-style-type: none"> • Locally common statewide in salt marsh and associated habitats • Reservoir for <i>Borrelia burgdorferi</i> (Lyme's Disease) and hantavirus (etc.) 	Brown 1997; Website A, I, J
Birds			
Aves (uncertain)	9	NA	NA
<i>Podilymbus podiceps</i> (Pied-billed grebe)	2	<ul style="list-style-type: none"> • Common and widespread winter resident in Florida • Common in Everglades in spring, fall, and winter and uncommon in summer • Commonly breeds in the Everglades 	Website C & E
<i>Aramus gaurauna</i> (Limpkin)	1	<ul style="list-style-type: none"> • Commonly observed in Everglades National Park all seasons • Breeds in Everglades • Large winter congregations in the Everglades suspected to include migrants • Initially listed as a species of special concern in Florida due to over hunting and habitat loss. It has made a significant comeback but remains listed due to its dependence on golden apple snails. 	Website C, F, G
<i>Eudocimus albus</i> (White ibis)	1	<ul style="list-style-type: none"> • Common in Florida • Everglades is center of breeding 	Websites C, D, G

		<p>abundance</p> <ul style="list-style-type: none"> Listed as species of special concern in Florida in 1970s due to habitat loss, but the National Audubon Society reports no current conservation concerns 	
<i>Fulica americana</i> (American Coot)	1	<ul style="list-style-type: none"> Probably the most widespread and abundant waterfowl in Florida in the winter Common in Everglades in spring, fall, and winter Breeds in the Everglades 	Website C & E
<i>Troglodytes aedon</i> (House wren)	1	<ul style="list-style-type: none"> Common in Everglades National Park in spring, fall, and winter 	Website E
Reptiles			
<i>Alligator mississippiensis</i> (American alligator)	1	<ul style="list-style-type: none"> Common in Everglades National Park Hunted almost to extinction before a ban was enacted in the 1960s. Although populations have rebounded, it remains a State-listed species of special concern. 	Website G

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Website D: <http://web1.audubon.org/waterbirds/species.php?speciesCode=whiibi>

Website E:

<http://www.nps.gov/ever/planyourvisit/upload/Bird%20Checklist%202006.pdf>

Website F: <http://www.nsis.org/bird/sp/wb-limp.html>

Website G: <http://myfwc.com/imperiledspecies/pdf/threatened-and-endangered-species-2006.pdf>

Website H: <http://www.issg.org/database/>

Website I: <http://entomology.uark.edu/museum/deertick.html>

Website J: <http://www.hantavirus.net/info1.html>

Table 5. Examples of Annual Revenue (Gross Sales) from the Sale of Select Pythons, Boas, and Eunectes

Species/Subspecies	Company 1	Company 2	Company 3	Company 4	Company 5	Company 6	Company 7
<i>Boa constrictor imperator</i>	\$4,000		\$10,000	\$77,000	\$20,000	\$50,000	\$10,000
<i>Boa constrictor ortonii</i>	\$22,500						
<i>Eunectes murinus</i>	\$16,250						
<i>Eunectes notaeus</i>	\$10,000						
<i>Python brongersmai</i>			\$8,000				
<i>Python curtus</i>			\$8,000				
<i>Python molurus bivittatus</i>	\$35,000	\$2,750					
<i>Python regius</i>	\$210,000	\$112,000		\$260,000	\$30,000	\$50,000	\$75,000
<i>Python reticulatus</i>		\$1,700					
<i>Python sebae</i>	\$4,000						

Note: Figures are approximations. All companies are independent retailers. Individual hobbyists often specialize in a small number of species/subspecies and may gross sales in the \$10,000s for specific color morphs or locality-based varieties (particularly of *P. regius*).