Testimony of Elliott R. Jacobson, DVM, PhD, DACZM, Professor of Zoological Medicine, College of Veterinary Medicine
University of Florida

Committee on the Judiciary, Subcommittee on Crime, Terrorism, and Homeland Security

H.R. 2811, a bill to amend title 18 of the U.S. Code, to include constrictor snakes of the species Python genera as an injurious animal.

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Mr. Chairman, members of the Subcommittee, I want to thank you for the opportunity to be before you and present testimony today on HR. 2811, a bill to amend title 18 of the U.S. Code, to include constrictor snakes of the species Python genera as an injurious animal.

My name is Elliott R. Jacobson and I am currently a Professor of Zoological Medicine, Department of Small Animal Clinical Sciences in the College of Veterinary Medicine at the University of Florida. My testimony will include personal experiences with a range of domestic and non-domestic species and concerns I have with a recently published USGS Open-File Report 2009-1202, "Giant Constrictors: Biological and Management Profiles and an Establishment Risk Assessment for Nine Large Species of Pythons, Anaconda, and the Boa Constrictor" (Reed and Rodda, 2009).

First let me provide some pertinent educational and experiential background relevant to this hearing.

I was born in Brooklyn, NY in 1945 and attended Brooklyn College of the City University of New York, where I earned my BS degree in Biology in 1967. I went on to earn a Master of Science Degree at New Mexico State University in 1969 where I worked on physiological ecology of snakes. Next, I attended graduate school at the University of Missouri where I earned my PhD in Zoology. Illness and disease in my research animals opened my eyes to a career in veterinary medicine. He dually enrolled in graduate school and veterinary school and earned his DVM and PhD in Zoology in 1975. From 1975 to 1977 he was a faculty member in the Veterinary Science Department at the University of Maryland and wildlife veterinarian for the state of Maryland where he worked on various epizootics of waterfowl in the Chesapeake Bay. Elliott R Jacobson arrived at the University of Florida in 1977 and is currently a Professor of Zoological Medicine, Department of Small Animal Clinical Sciences in the College of Veterinary Medicine. He is also a member of the Zoological Medicine Service, Veterinary Medical Center at the University of Florida where he serves as a clinician and teaches veterinary students and graduate veterinarians in a zoological medicine residency-training program. Since 1979, Dr. Jacobson has advised 30 residents and has advised or served on the committee of 18 graduate students. Almost all of former residents are employed in major zoological institutions and aquariums scattered across the United States. In 1986 he became a Diplomate of the American College of Zoological Medicine. Over the last 32 years he has worked on health problems of a wide variety of amphibians, reptiles, birds, and mammals. His laboratory focuses on infectious diseases of wildlife and zoo animals, with an emphasis on reptiles including the development of serologic assays and molecular diagnostic assays used to determine exposure to and infection with certain pathogens. He has authored or coauthored 250 refereed scientific papers, 37 chapters in texts, edited and co-edited four books, and has been either the principal or co-principal investigator on 83 funded projects since 1978. Many of his papers are the first description of certain infectious agents in nondomestic species. Several of these descriptive reports have evolved into long-term research projects. I also have been a reptile hobbyist since childhood, keeping and breeding a wide range of reptiles over the years. Currently I have about 120 snakes.

With that as background material to judge my expertise, my testimony will include personal experiences with a range of domestic and non-domestic species and concerns I have with a recently published USGS Open-File Report 2009-1202, "Giant Constrictors: Biological and Management

Profiles and an Establishment Risk Assessment for Nine Large Species of Pythons, Anaconda, and the Boa Constrictor (Reed and Rodda, 2009). It is my understanding that this report is being used as the "best" source of information in determining the ultimate outcome on the bill to amend title 18. While this report presents much factual information gleaned from the literature, it also is replete with interpretations and categorizations of various "Organism Risk Potential" (Table 10.6) that (as far as I can tell) are based on a subjective scoring system that lacks scientific credibility. I will go though this document, pointing to those issues/topics/factors that lack substantive data to support their conclusions. In some cases, important information has been left out. Given that much of this is not my area of research expertise, since it covers such a diverse range of topics, that no one person could be an ultimate source of expertise for all that is covered in this over the last 34 years I have reviewed a wide range of papers/reports on different topics for journals and governmental organizations that I feel comfortable reviewing this document. This report contains areas that are well documented and others that are very poorly described (such as colonized animals serving as a pathogen vector). In the following paragraphs I will point to those statements or interpretations that merit further evaluation/discussion.

The authors start off with the following statement in Chapter 1: "in this report we compile summaries of the biology of nine very large constrictor species and consider what effects these species might have on the ecology, economy, and domestic tranquility of the United States were such snakes to become established". One snake, the Burmese Python is already established and thus there should be some information compiled for these potential effects. None is provided. Given that the US is engaged in two wars in the middle-east and an unemployment rate of over 10%, it is hard to imagine that such snakes would have a more than insignificant impact on domestic tranquility.

In the 2nd paragraph of Chapter 1, the authors state that "the boa" is very large…" However many island forms of this snake are relatively small and overall, this snake is relatively small compared to the other constrictors listed in this report.

Pages 2-3. The authors state that that "This document addresses primarily the biological impacts associated with potential colonization of the United States by any of the nine giant constrictors…." But the authors go on to state: "Risk assessment, by its very nature, entails uncertainty". "A risk assessment model cannot absolutely determine whether or not an introduced exotic species will establish and if it does what impact it will have" The (ANSTF, 1996). The ANSTF (1996) pointed out "…….it is the biological uncertainty more than anything else that initiated the need for developing a nonindigenous risk process. Common sense dictates that the caliber of a risk assessment is related to the quality of data available about the organism and the ecosystem that will be invaded". The authors of the report state, **"The basic natural history of the giant constrictors is largely unknown; our risk assessment reflects this uncertainty."** If their risk assessment reflects this uncertainty, then why in Table 10.4 is the probability of the 9 constrictors becoming established in the US given as either high (5) or medium (4). Probabilities are not expressed as statistical probabilities and because of this, they have less value to the reviewer.

Under "Synopsis of Conclusions" the authors state: "At present, the only probable pathway by which these species would become established in the United States is h pet trade". This is not totally correct. The boa constrictor, *Boa constrictor imperator*, ranges just north of Hermosillo, Mexico, an area very close to the US. For whatever reason, this subspecies of the boa constrictor has never made it into the US. Why is that? Probably a combination of ecological and climactic factors are involved. This needs to be studied in order to determine limitations to the spread of this species. Thus, Figure 7.5, a map of areas of the US matching the climate envelope expressed by *Boa constrictor* in its native range does

not explain why this species has never invaded the US given that its northern range is so close to the Arizona border. Also the fact that boa constrictors became established on Deering Estate in the 1970s in southern Florida, and has been breeding for 10 consecutive years, there is no indication that it has spread beyond this introduced locality. Why is this?

Page 6. The author states, “The list of differences among the species is less striking than are the ecological commonalities among them”. However, ecological details are not provided. A table would have been helpful that lists similarities and differences.

Pathogens that these snakes can harbor, diseases described for these animals, and ectoparasites that infest these snakes along with pathogen these ectoparasites may serve as vectors is very superficially addressed. While most of the literature is based on captive constrictor snakes, this literature still provides important information. Studies are needed on pathogens and diseases of these large constrictors.

While all these snakes grow quickly (page 6), most of the available information is for captive snakes that are maximally fed. It is doubtful they would grow as rapidly in the wild.

Page 6. The authors state “All the giant constrictors would have few predators on themselves in the US because they are so large.” all start out small and probably many (if not most) would be eaten by a variety of predators. The effects of fire ants on the ability of Burmese pythons to brood their eggs needs to be studied. This could be a limiting bio-ecological factor. There are anecdotal reports of declines of certain native egg laying snakes in Florida due to fire any predation.

Page 9. The authors state, “Knowledge of the biology of these giant constrictors may be scanty, but knowledge of appropriate management tools for these species is almost nonexistent. Thus for the management profiles we relied to varying degrees on inference from the management of other snake species, primarily the Brown Tree snake in Guam and the Habu in the Ryukyu Islands (Rodda and others, 1999d). But such inferences are full of uncertainty given how different these animals are regarding their natural history and biology.

Climate Matching on page 15, acknowledges “one controversial component of species-specific management is projection of the areas of the US that are climatically suitable for each giant constrictor. “. This only provides an indication of the “relative size and location of the geographic area at risk, but should be used only with great circumspection to identify localities at risk.” The reviewer believes the maps over-predict the geographic area at risk. There are probably many areas within these areas that the large constrictor snakes could not exist.

Page 16, Reasons for preferring our Method to the use of Environmental Niche Models. The authors fail to convince the reviewer that their method is a better predictor of areas at risk for invasions vs. Environmental Niche Models. Given all the uncertainty previously expressed by the authors, it is hard to have confidence in their model.

Page 22. Dogs may serve very well in locating nesting (incubating) Burmese pythons, even though these animals are in a semi-aquatic habitat. It appears they have not been utilized as well as they could.

Page 23. Use of a pathogen to directly control constrictor snake populations should be avoided. Extensive studies would need to be done on native reptiles and that would be cost prohibitive.

Page 33. The diet of indigo snakes is primarily amphibians and reptiles, with a smaller percentage of mammals. Their diet is probably quite different than the constrictors in this report.

Page 37. “Many proponents of pathogen-based control have advocated the use of advanced genomic science to enhance the virulence of a pathogen-based agent (Interdisciplinary Center for Biotechnology Research 1992).” Actually, what was recommended was to identify a non-pathogenic blood parasite that could be gene spliced with a sequence coding for an anti-gonadotropin or inhibitor of some aspect of the reproductive system including egg development.

Page 52. Burmese Python. Section 3.5. Introduced Ranges. Very little information is provided. A map should have been included showing specific sites where Burmese pythons have been encountered in Florida and where females with eggs have been found. History of the invasion of this snake should have been included along with current methods of control and demographic findings.

Page 59. 7.2. Human Health Risks. “A remarkable exception occurred during production of this report (1 July 2009), in which an unattended 2-year-old in Florida was sought out and fatally constricted by the family’s 2.5 m (5.5 kg) pet amelanistic Burmese python (Miller, 2009).” The reviewer takes issue with use of “sought out”. This was a horrific event, but certainly should have been prevented if the animal was caged properly. The reviewer doubts the snake purposefully “sought out” this child. This is highly anthropomorphic.

Page 61. 9.0. Entry Potential. The reviewer would like to see that data that shows survival of imported constrictors approaching 100%.

Page 62. 10.2. Climate Match – Areas of the United States at Greatest Risk.
Why are these areas of greatest risk since climate suitability is just one factor in the establishment of an invasive species, a necessary but not sufficient condition?

Page 64. 10.4. The following two sentences do not make sense to the reviewer and appear to be contradictory? The circumstantial evidence from southern Florida is that the combination of panthers and alligators has not noticeably constrained establishment or spread. It is possible, however, that spread will accelerate if and when Burmese pythons spread beyond the area densely inhabited by panthers and alligators.”

Page 64. 10.6. Hibernation Requirements. Gopher tortoise burrows will not be suitable for those large constrictor snakes that hibernate. There is a size limit. The following is information provided by Ray Ashton, a noted gopher tortoise biologist: “The average adult tortoise is cm long CL 20-32 cm (add 5-8 cm to this to figure width of burrow). The average height of a tortoise is (12-16 cm). (add 2 cm for the height of the burrow).
Note that burrows have an end chamber, which is an average of 5 cm in circumference larger than the width of the burrow. Note that coastal strand burrows in shell sands and in very wet flatwoods (where the pythons are found) are usually very shallow (above 1 m) in depth and the shell sands cause easy collapse of the burrows. However on some islands many burrows are less than 3 m. long. Where there are deep sands like the edges of the dunes, they may be up to 8 m. The burrows would not be a good refuge for a python exceeding 2 m. maximum. This is using the indigo and diamondback size range. We photographed a tortoise kicking a large diamondback, probably just less than 2 m. until the snake left. This indicates that tortoises may well be aggressively kicking out larger snakes”.

Page 65. 11.1 Dispersal Ability. What has limited the Burmese python from dispersing further north

than it has? There is no mention anywhere is this report on the effect of highways and interstates, and urbanization of Florida, on the ability of this snake to disperse any further north than it has.

Peg 68. 13.1. Species of Special Concern as Prey or Competitors. The authors state, "A very large number of imperiled species are at risk from giant constrictors in the state of Florida." See Table 4.2. There is no mention or comparison made about the impact of feral cats on these species. Which is of greater concern? The millions of feral cats already throughout the state of Florida and elsewhere in the US or invading constrictor snakes?

Page 245. In Chapter 10, "The Risk Assessment", no quantitative data are presented to determine consequences of establishment (Table 10.5) for the nine giant constrictor species and how the authors arrived at the organism risk potential algorithm in Table 10.6. The authors state that this was adopted by the Aquatic Nuisance Species Task Force (ANSTF, 1996), but the specifics of how their categories of "High, Medium, and Low" were determined. In Pyron et al (2008), the authors' ecological niche models, which include 19 climactic variables representing climatic extremes as well as averages, indicate that the only suitable habitat in the U.S. for Burmese pythons presently occurs in southern Florida and in extreme southern Texas. Models based on the current distribution of the snake predict suitable habitat in essentially the only region in which the snakes are found in the U.S. The authors conclude that the Burmese python is strongly limited to the small area of suitable environmental conditions in the United States it currently inhabits due to the ecological niche preferences of the snake. The ability of the Burmese python to expand further into the U.S. is severely limited by ecological constraints. This is in conflict with the assessment by Reed and Rodda (2009). Thus further ecological studies are needed to determine the most accurate model that should be used.

CONCLUSION: Although this report provides much valuable biological information for nine large species of pythons, anacondas, and the boa constrictor, the risk assessment component of this report does not make an compelling argument for these snakes spreading throughout the climatic map areas in the US depicted for each species. As previously stated by the authors: "Risk assessment, by its very nature, entails uncertainty". "A risk assessment model cannot absolutely determine whether or not an introduced exotic species will establish and if it does what impact it will have" The (ANSTF, 1996). **"The basic natural history of the giant constrictors is largely unknown; our risk assessment reflects this uncertainty."** This comment alone makes the reviewer question whether the nine constrictor snakes can become established in the areas represented by the climate maps provided for each snake. The climate maps oversimplify an extremely complicated issue since climate alone will not dictate where or when these snakes will become established. Other ecological factors need to be considered. Urbanization and the system of roads north of extreme southern Florida will probably be a factors that will affect the spread of these snakes. A composite map is needed that represents an overlay of all the potential ecological factors that would affect the ability of these snakes to become established beyond southern Florida and possibly southern Texas. Finally, the fact that the boa constrictor, *Boa constrictor imperator*, ranges into northern Mexico, but has never entered the US, suggests there are ecological factors that have limited its spread into the US. The report does not address this issue. The authors of this report are correct in stating that much uncertainty exists.