Review: *Giant Constrictors: Biological and Management Profiles and an Establishment Risk Assessment for Nine Large Species of Pythons, Anacondas, and the Boa Constrictor* by Robert N. Reed and Gordon H. Rodda 2009. U.S. Geological Survey Open-File Report 2009-1202, xviii + 302 pp.

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Summary

Burmese Pythons may eat Ivory-billed Woodpeckers. As surprising as that statement may seem, it's listed as a genuine possibility in Table 4.2 on page 69 of this report. There is no better illustration of the extraordinary degree of bias and unfounded speculation that comprises the bulk of this report. We make the following observations to summarize this report:

• A search of the manuscript for 11 grammatical qualifiers, including *may*, *might*, *maybe*, *could*, *appears to*, and others, found a total of 1369 uses. More than one in every hundred words is a qualifier. On average there are 5.3 qualifiers per page.

• The maps indicating areas in the USA favorable to the establishment of each taxon are based on climate and, in some cases, precipitation. They do not consider the habitat, plant communities, niches, human density, mechanized agriculture, predators, prey, road density and traffic, suitable shelter, surface water, soil, or any other of many factors that have strong effect on the potential and realistic "suitability" of these areas for the actual establishment of any of these species. It is our opinion that most of the areas indicated in the report as having favorable climates, in fact, have little or no actual possibility to realistically or actually support populations of any of these large constrictors. The authors stop short of stating that Anacondas could survive in South Texas, or that Burmese Pythons could live in Oklahoma or Utah, but they strongly suggest these are "possibilities." In fact, because of their excessive use of qualifying terms, the authors make few definitive statements about anything.

• This is a state issue, not a national issue. The presence of Burmese Pythons in Florida and the possibility of the establishment of the other species covered in this report is a Florida issue. The state of Florida has excellent progressive and proactive regulations and programs in place.

• The establishment risk assessments performed by the authors for each of the nine taxa in this report conclude that in all categories the nine taxa have either a "medium" or "high" risk that they will become established. In other words, they conclude that a 100-pound, 15-foot-long snake has the same likelihood to become established as, say, a small generalist sparrow species or a rat. This begs disbelief.

• It would be improper to base legislation of any sort on this report. This report is not impartial, nor are the authors and the department that employs them, the Invasive Species Program of United States Geological Survey. If such a report is deemed necessary, it should be compiled by an impartial panel of scientists.

Quotes with Annotated Comments

Below we list a series of quotes taken from the manuscript, each annotated with our comments in brackets. This seemed to us the best way to illustrate the extraordinary number of presumptions and speculations that liberally riddle this manuscript. We do recognize the unfairness of isolating citations out of context; therefore we list the exact location in the manuscript of each of our excerpts so that a reader can go to the page to better understand the context. We start with this citation from the beginning paragraph of the manuscript:

> "The occurrence of these three large constrictors [referring to Burmese Pythons, Northern African Pythons, and Boa Constrictors] in the wild in the same area of Florida may be a coincidence, but southern Florida has a climate that may be suitable for all of the giant constrictors and much of the commercial trade in giant constrictors passes through southern Florida." (Page 1; paragraph 1)

[Coincidence? Isn't it more likely that South Florida has the only suitable conditions in the United States for any of the nine species considered in this report? The climate of South Florida is not truly tropical, but it is the closest thing to it in the continental USA. Perhaps more important, the 1.5-million acres of the Everglades National Park provide a unique swampy refugium that is unpeopled and protected. There is no other place in the United States even remotely similar. However, climate is only one of many factors necessary for any of these species to become established. The problem of established exotic constrictors is a Florida issue, and there is no evidence that in the future this will ever be anything more than a Florida problem. HSUS, USGS invasive-snake biologists, and a few other environmental biologists and animal-rights organizations are trying to convince the public that this is a national issue—coincidentally, they all stand to benefit if their efforts result in a national law.]

> "This document addresses primarily the biological impacts associated with potential colonization of the United States by any of the nine giant constrictors. . . ." (Page 2; paragraph 4)

[This sounds a lot like the entirety of the United States is in danger of colonization by giant constrictors. In fact, it goes on to mention that the purpose of this paper is to "tabulate biological information germane to potential social and economic impacts."(?) They go on to say that this paper does not "consider or assess the diverse regulatory actions that might be taken to mitigate or prevent colonization by these animals." They then go on for another 258 pages implying, suggesting, and predicting that giant constrictors would do just fine in selected areas of the United States, and that in those areas, life as we know it will

be drastically altered if nothing is done to stop this impending invasion.]

> "Risk assessment, by its very nature, entails uncertainty. . . . We have tried to draw attention to the greatest sources of uncertainty, but all elements of a risk assessment embody some uncertainty." (Page 3; paragraph 2)

[This citation could be also be written to say "The very uncertainty of risk assessment allows it to be manipulated to make any statement that is desired." This is particularly true when there is 1) uncertainty of the process (methodology), 2) uncertainty of the assessor (human error), 3) uncertainty about the organism (biological and environmental unknowns)." Those three factors are identified in Chapter 1 as the three primary factors leading to "uncertainty". Perhaps coincidentally, all three factors are either uncertain or unknown for every species covered by this paper. We wonder why, in the absence of sufficient quantifiable data, these risk analyses were even attempted.]

> "A word on terminology—a variety of terms has been used to describe an organism that is not native to the place in which it is found: exotic, introduced, invasive, nonindigenous, non-native, colonists. In this report we make no distinction among these terms." (Page 4; paragraph 2)

[We find this curious, since most ecology and invasion biology texts draw a clear distinction between the term "invasive" and the others listed. In fact, an "invasive species" is legally defined in the National Invasive Species Act as "an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. With this qualifying statement, the authors give themselves free rein to identify these nine species as "invasive," arbitrarily granting them a more damaging and dangerous status.]

> "All of the species under consideration can probably move large distances over short periods when so inclined. These two factors combine to make it hard to limit the spread of their colonies." (Page 6; paragraph 2)

[This is biased speculation and a misleading statement. A "large" distance compared to what—the migration of the dog flea? A "short" time compared to what—the lifespan of a mayfly? We would request that the authors here provide even one citation regarding the mobility or migration of the Beni Anaconda or the South African Python—or any one of the others. Radio tracking in the Everglades has shown that several displaced Burmese Pythons returned several miles to their original location, but that falls somewhat short of them packing up and crawling to Georgia. Take note of the qualifier "probably" used in the first sentence—more on that later. The only fact in the matter of migration is that in the 30 or so years that boas and Burmese Pythons have resided in South Florida, there has not been any "spread of their colonies."]

> "The core of this work—the biological profiles—are a work of traditional library scholarship, . . . " (Page 9; paragraph 1)

[The biological profiles in this paper are based on an assorted compilation of references of varying value, relevance, and importance. The 37 pages of References Cited at the end of the paper will be a valuable resource for future writers and researchers. However, the core of the paper is better described as a carefully crafted thesis of speculation and presumption that takes every opportunity to propose all possible terrible *possibilities* that *might* happen *if* any of these species did someday survive in an isolated population somewhere in the United States.]

> "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 Treesnake in Guam and the Habu in the Ryukyu Islands. . . . " (Page 9; paragraph 3)

[Sure, that's science for you—since there is absolutely no applicable knowledge, then turn to the unsuccessful managements attempts of two snake species that are only distantly related to pythons, snake species that are completely different physically, physiologically, ecologically and geographically. Again, why was any of this even set to paper?]

> "We obtained CITES records of imports to the United States from 1977 through 2007 for the species of interest; results are presented in the Appendix and include records of over 1,100,000 individuals of these species imported to the United States during this period." (Page 14; paragraph 4)

[Table A-1, page 302 in the Appendix, indicates that in that 30-year period, 618, 872 Boa Constrictors were imported, followed by Burmese Pythons (297,443), Reticulated Pythons (147,485), North African Pythons (32,728), Green Anacondas (13,262), with Yellow Anacondas trailing at 1,968. There is no record of South African Pythons, Beni Anacondas or DeShaunsee's Anacondas being imported and we are not aware of living specimens in the United States at this time. We would emphasize that these animals all were legally imported into the United States, legally purchased by Americans, and many of these animals and their descendants are currently living in the United States as the private property of American citizens. The numbers of Boa Constrictors, Burmese Pythons, and Reticulated Pythons total 1,063,800 animals or 95.7% of the total imports. Because of the emphasis placed on captive breeding, it is likely that the number of these animals currently living in the USA exceed the original imports.]

> "In 14.4 radiotelemetered python-years, we are aware of only four detections [of Burmese Pythons] unaided by use of the radio signal (S. Snow, pers commun., 2008). During the radiotracking period, there were visitors and searchers in a position to see pythons in the area every day. Despite this human presence, the average python was detected by searchers or the public about once per three years (4/5,270 days or 1/1,318 days). This implies that on any given day the probability of anyone finding an arbitrary python without the assistance of radiotelemetry is only one out of 1,318 days or 0.001 or 0.1 percent." (Page 26; paragraph 1)

[Four snakes were seen in 5,270 man-days of searching—this is definitely going to be a problem for the tourists who come to the Everglades specifically to see a python. Not to nitpick, but the actual probability of seeing a python is even less than .1%, closer to 0.076%.]

> "Whereas some of the pythons were undetected because no one was searching for them, and a few others were near a searcher but undetected due to obscuring vegetation, the vast majority of non-detections occurred simply because pythons rarely visit levees, roads or road berms, trails, or other locations frequented by humans (Mazzotti and others, unpub. data, 2009). In most cases a python went undetected simply because it was too far from any dry land or open water to be seen by an observer walking, driving, or boating." (Page 26; paragraph 1)

[What? Some pythons were undetected because no one was

searching for them? And how would anyone know if "the vast majority of nondetections" occurred because they were too far from dry land or open water? Maybe there aren't very many.]

> "The relative difficulty of detecting giant pythons has vital implications for controlling the population using either trained searchers or volunteers." (Page 28; paragraph 1)

[So "giant" pythons are harder to find that just regular pythons? Based on the data presented here, it seems there is no point to attempt searching.]

> " . . . searching for dangerous snakes in a swamp at night has fewer steadfast devotees." (Page 30; paragraph 1)

[Just how many volunteers have been harmed while searching for pythons and boas by those pythons and boas to warrant that these snakes are here designated as "dangerous"? This is baseless slander directed purposely at pythons and boas. In fact, we suspect it is the alligators, crocodiles, cottonmouths, diamondback rattlesnakes, feral hogs, and skunks that present most of any nocturnal dangers.]

> " . . . giant constrictors are potentially dangerous to hunters, and misidentification of snake species in the southern United States can lead to fatalities." (Page 30; paragraph 3)

[What? Does "misidentification" mean that volunteers searching for giant snakes might be confused by venomous cottonmouths and grab them? Or does this mean that volunteers might be fatally grabbed by the giant snakes that they are searching for? Or does it mean that hunters might misidentify native snakes as being pythons or boas and fatally shoot them?]

> "However the low detectability of giant constrictor snakes in heavily vegetated environments (especially in the southeastern United States) probably precludes use of this tool [searching] for eradication." (Page 30; paragraph 4)

[We start to notice a pattern of always referring to "giant constrictors" and "giant snakes" instead of pythons and boas. This is using a loaded term for effect. We prefer to think of them as the "great constrictors," in the same manner to which the great cats, and great apes are identified. The fact is that most boas and pythons that are encountered in nature are not of "giant" proportions—they are just regular small to medium-sized snakes. In the example of Burmese Pythons, first there is only a 0.076% chance of seeing one at all, and then the chances that it is a large specimen are also small.]

> "A key consideration for traps is that giant constrictors appear to be primarily sit-and-wait or ambush foragers. . . . " (Page 31; paragraph 2)

[It goes on to explain that traps don't work and it is pointless to use them. Nevertheless, money has been spent to place traps in numerous locations in the Everglades and in the Crocodile Lake Wildlife Refuge on Key Largo.]

> "A likely drawback to sniffer dog detection of giant constrictors is that the dogs, which are remarkably expensive to train and maintain, could be killed by their targets." (Page 32; paragraph 2)

[Is this different than the dangers faced by bear dogs, hog dogs, lion dogs, drug dogs, or police dogs? Sniffer dogs have even been used in the efforts to control the venomous habu (Shiroma and Ukuta, 1999). Considering that Python Pete, the well-trained python sniffer beagle with his own website has yet to find a python after three or four years, apparently the danger to a sniffer dog is probably not all that great.]

> "Given the various restrictions on access inherent in the complex wetlands of southern Florida, it is difficult to see how a bounty could be raised to a high enough level to stimulate hunting of rare giant constrictor snakes in all suitable habitat." (Page 38; paragraph 2)
>
> " . . . one risks creating a perverse incentive for hunters to both distribute the pest to new areas. . . . " (Page 38; paragraph 3)

[Not only will most hunters not be motivated by bounties, but the hunters that are motivated may also be motivated to release pythons and boas in new areas. It's a pretty low opinion of the hunters and volunteers who are working with the program.]

> "We are not aware of any documented power line problems from the large population of Burmese Pythons in south Florida, and thus this problem may be no more severe than that already associated with power line movements by rat snakes." (Page 66; paragraph 4)

[When volunteers and researchers are searching, a python is spotted every 1,318 man-days of effort, but it's a "large" population.]

> " . . . hunting is an economically important activity further north, one that is potentially adversely impacted by a stealthy predator that competes with hunters by eating desired species such as quail, turkey, feral hogs, and deer." (Page 67; paragraph 5)

[Would hunting not be affected by a loud noisy predator? Pythons are stealthy, no doubt, but can't this be said of panthers, bobcats, foxes, coyotes, mink, feral cats and just about all vertebrate predators? Isn't it a good thing if Burmese Pythons happen to eat feral hogs, the animal determined by many to be the most destructive invasive species in the United States?]

> "Regulatory measures to restrict trade or ownership could have negative ecological effects in terms of dealers freeing stock (the release of multiple animals at the same time and same place enormously increases the risk over single releases such as those typically done by pet owners), owners releasing animals for which they don't have or cannot acquire appropriate licenses, and ecovandals determined to release animals as a imprecisely directed assault on the government." (Page 74; paragraph 1)

[It appears to us that there is a strong possibility that "ecovandals" are already at work releasing Northern African Pythons in South Florida in order to support their inclusion on H.R. 2811 and S. 373. We find it beyond coincidence that the day after the first House committee hearing for H.R. 2811 in August 2009, in which it was decided to add *Python sebae* to that bill, there was a news release that two specimens of *Python sebae* were found in South Florida. In the months that followed, there have been numerous specimens and reports of specimens in South Florida, yet prior to that Congressional hearing, not a peep was heard about Northern African Pythons invading Florida. Now the talk is that the species has long been established in South Florida. Yet Snow et al. (2007) made only passing reference to the species being reported. There is even speculation in that paper that Green Anacondas and Reticulated Pythons might become feral in South Florida, but no mention of that possibility for *Python sebae*. Is it possible that in 30 years of monitoring the "Burmese Python problem" that no one noticed an even bigger species out there prowling in the Everglades? We cannot help but suspect that foul dealings have been orchestrated to lend credence to this unnecessary and ill-advised bill.]

> "Within this vast distribution, Northern African Pythons . . . range from the coasts of Kenya and Tanzania across much of central Africa to Mali and Mauritania, as well as north to Ethiopia and Eritrea; . . . " (Page 109; paragraph 3)

[The range of the Northern African Python is centered on the equator. It is a truly equatorial tropical species that ranges from about 17 degrees north latitude to about 12 degrees south latitude. So far as we are able to determine, all imported specimens since the 1990s have come from West Africa at 7–10 degrees north latitude—most or all exported from Ghana, Togo and Benin. There is no climate and no ecosystem in the United States that is even remotely similar to the environment in the natural range of the particular *Python sebae* that have been imported into the United States. The fact that Reed and Rodda are able to perform a "risk analysis" that would indicate otherwise should be taken as evidence of the flexible nature of the outcome of any such analyses.]

> "The fertility and long-term viability of such hybrids [between Burmese Pythons and Northern African Pythons] is unexplored. It is conceivable that introduction of African genes to the Indian Python population could result in increased genetic variability that could allow exploitation of new ecological or physiological niches and/or result in some other type of hybrid vigor. Such a scenario has become more likely in the face of recent evidence for a population of Northern African Pythons along the western edge of Miami, an area within the introduced range of Indian (Burmese) Pythons." (Page 137; paragraph 2)

[We are astounded that any scientist would publish such wild speculation. It's like a movie script—what if the Alien bred with the Predator—then with all the fury its hybrid vigor could muster, the Predlien preyed on the human population with doubled vengeance. Do the authors really think this is this a conceivable scenario for pythons? Still, press releases about the dangers of hybrid pythons have been rampant in the media in the past month—nothing like stirring up a little public hysteria, all in the name of getting this bill passed. We are aware of at least 20 different hybrid crosses of python species that have been made in captivity. The fact is that most hybrid pythons that have been observed show low viability, low fecundity, and, in some cases, sterility. The problems of some hybrids become more pronounced in successive generations.]

> "The presence of a novel predator on rare birds is likely to be detrimental to bird watching tourism if pythons reduce populations and thus reduce sighting rates." (Page 139; paragraph 3)

[The failure of USGS invasive-snake biologists to protect the birds of Guam has no doubt left them with the impression that the bird population will suffer with the introduction of any exotic snake species. However, unlike in Guam, there are no bird species in the Everglades that are naïve to snake predation. From what we can sift from this manuscript, it's equally possible that by increasing predation on raccoons and especially on feral cats, pythons may improve hatching successes and increase the bird population.]

> "Presence of such species in natural landscapes might also induce employers to institute measures such as are used in bear country, including special training, requirements for safety equipment, and/or requirements to travel in pairs in predator-occupied habitat." (Page 139; paragraph 4)

[We were on the floor laughing with this one. It's OK if employers in South Florida send their employees out to face 1000-pound alligators, crocodiles, cottonmouths, diamondback rattlesnakes, bears, feral hogs, and rabid skunks, but they better be careful and institute special safety procedures in case an employee should bump into a harmless snake that is commonly kept as a pet by teenage kids. We recommend that when walking around, all nervous USGS biologists and Park Service employees wear bells on their shoes, blow continuously on snake charmer flutes, and carry stun guns.]

> "It is possible that pythons would suppress populations of rats or other crop pests in agricultural settings." (Page 139; paragraph 4)

[How did this slip in here? A feral python might actually have a beneficial affect on agriculture? Burmese Pythons are known to eat feral cats and they might eat feral hogs, too. However, this statement follows the musings of Reed and Rodda that Northern African Pythons might negatively impact hunting because they are known to eat ungulates that are considered trophy game species in their native habitat; if they become established in Florida they might eat deer and exotic trophy ungulates. In other words, to import and establish exotic ungulates in Florida is apparently a good practice that is encouraged and supported by game biologists, but those good feelings and that support are not extended to reptiles, especially if those exotic reptiles might eat the exotic ungulates.]

> "As with most giant constrictors, the maximum size of the Boa Constrictor has been subject to exaggeration, especially in the older literature. Unfortunately, many of these claims of gigantic boas have been perpetuated by more recent authors. . . . Part of the confusion stems from misapplication of the name Boa Constrictor to other giant snakes, including anacondas and even some Old World pythons." (Page 148; paragraph 3)

[That is correct. The Boa Constrictor with the scientific name of *Boa constrictor* is not considered a "giant" snake species. In fact, most are on the small end of the snakes that are considered to be medium-sized.]

> "The Boa Constrictor has established more introduced populations than any other boa or python species of which we are aware, with at least three known populations." (Page 158: paragraph 5)

[Three? Why that's nearly world domination. Let's see, they have become established on Aruba (a narrow tropical island about 21 miles long, located at 12 degrees, 30 minutes, north latitude, situated about 20 miles offshore from the South American mainland and the natural range of boas). Boa Constrictors also have become established in Cozumel (a tropical island, 30 miles by about 10 miles, located at 20 degrees, 30 minutes, north latitude, situated about 12 miles east of the Yucatan Peninsula of Mexico and the natural range of boas. Really, the only surprise about these two populations of Boa Constrictors is that they weren't there already. Of course, there is the small beachhead population located in South Miami in the Deering Estate, a Miami park. This population is located at about 25 degrees, 30 minutes, north latitude, a long ways away from any natural populations of Boa Constrictors. The Deering Estate is 444 acres in size, but Boa Constrictors are usually observed in a small area within the park. In the nearly 40 years that the population has been observed, it has not significantly expanded its numbers or territory. It is not reported to have committed any sort of havoc in the native ecosystems. Of course, the environ-

ment of Miami and of South Florida in general cannot in any sense be considered to be a natural ecosystem.]

> ". . . at least seven *B. constrictor* specimens currently held in museums in the United States were found among bananas shipped from Central America or Mexico. . . . " (Page 158; paragraph 5)

[Are these records from the 1950s and before? We have read that modern banana shipping methods have eliminated hitchhiking tarantulas, pitvipers, and Boa Constrictors. If that is not so, then perhaps it would be prudent to ban imports of bananas.]

> "Ninety-six individuals [Boa Constrictors] were captured between 1989 and 2005. . . . However, most (around 70 percent) of the Deering snakes were found in 1996, when at least two females must have given birth in the park. (Page 159; paragraph 1)

> "Snow and others . . . suggested that the invasive population at the Deering Estate at Cutler may be limited by climate, and that reproduction may be successful only during years with especially warm winters, such as occurred in 1996; they support this idea by saying that the boas appear to be of northern South American stock and thus unlikely to be adapted to cooler temperatures." (Page 160; paragraph 6)

[We agree. The boas at the Deering Estate are a struggling population. Ignoring the babies of 1996, an average of less than two boas a year were observed. Boa Constrictors will not thrive in feral populations in the United States outside of South Florida for a variety of reasons; even this population in what seems like prime real estate is not doing well.]

> ". . . we are unaware of any verified fatal attacks of a Boa Constrictor on a human being." (Page 173; paragraph 4)

[To repeat—there are no verifiable accounts of a fatal attack by a Boa Constrictor on a person of any size or age. For that matter, there are no published reports of serious injury, either.]

> "United States importation records for the period 1989-2000 totaled 115,131 individuals, a sum that was second only to Ball Pythons (*Python regius*: 366,808 individuals) among 24 species of boid/pythonid snakes imported. . . . " (Page 174; paragraph 3)

[These figures are from Reed (2005) and they are from the LEMIS data base, not the CITES data. Unfortunately, Reed (2005) got the math wrong. See Barker and Barker (2008b) for a thorough review of Reed (2005). Now Reed and Rodda have the math wrong. According to the data presented in this paper in Table A-1 in the Appendix, from 1989 to 2000 a total of 288,833 boas were imported, more than double the figure reported here.]

> "In the public mind, Boa Constrictors are considered a giant snake, but they are not particularly large in comparison to some of the true giants." (Page 176; paragraph 5)

[Regardless of what is in the "public mind," the Boa Constrictor is not by any measure a "giant snake" and it does not belong in this paper. The Boa Constrictor is one of the most common snake captives in the world, and because it is a highly desired pet with many unusual color and pattern variations, it is the most valuable snake species in the world. There are at least a half million Boa Constrictors in captivity in the USA, and that number may be closer to one million.]

> "When localities of Argentine boas are removed, however, the suitable area is much smaller and includes peninsular Florida south of about Orlando and extreme south Texas, as well as parts of Hawaii and Puerto Rico." (Page 177; paragraph 2)

[The darkly pigmented Argentine Boa is listed as a CITES I Endangered species. However, captive-bred animals are classified as CITES II and can be imported, exported and entered into commercial transactions. The range of Argentine boas extend south in north-central Argentina to about 29 degrees south latitude. In the southern reaches of the range this taxon is seasonally active, taking shelter in the coldest parts of the winter. They are unlike any of the other geographic races of Boa Constrictors, and including them in the risk analyses for the generic Boa Constrictor certainly does expand the potential suitable climate for the species. Argentine Boas constitute a small percentage of the US captive population of Boa Constrictors. While they are undoubtedly better adapted to more climatic regions in this country, it seems doubtful that they would establish anywhere beyond the hypothesized range of other races of Boa Constrictors, if at all, because of other environmental and human factors. The bottom line is that there are no established extralimital colonies of Argentine boas anywhere in the world.]

> "The introduced population [of Boa Constrictors] in south Florida has not dispersed widely over the past three decades, but it is unknown whether this is due to unsuitable surrounding habitat, whether we are currently observing the preexpansion lag phase typical of many invasive species . . . , or for some other reason." (Page 181; paragraph 1)

[After nearly 40 years of observing them not leaving their little park, it seems most parsimonious to assume that surrounding habitat is not suitable, and that the population is small and only marginally successful.]

> "Captive production is spread across far more breeders than is the case for anacondas or the giant African pythons, and regulations on trade in Boa Constrictor would probably cause economic hardship for a greater number of breeders, but quantification of producer impacts would be better handled in a formal economic analysis." (Page 186; paragraph 1)

[This species should never have been included with the other eight species in the first place. However, if economic impact is a consideration, this species should be removed from this list of nine. If perceived danger (imaginary or not) to the populace is a consideration, this species should be removed from this list. If damage to the ecosystem is a consideration, realize that in 40 years in a small park, the species has done no quantifiable damage to the area where it occurs or the wildlife with which it exists. There are hundreds of thousands of keepers with Boa Constrictors valued in the many millions of dollars.]

> "If hybrids are fertile and exhibit characteristics of both species (for example, cold tolerance of Yellow Anacondas but increased size from Green Anaconda genetic contributions), the resulting hybrid might represent higher risk as an introduced species. However, we judge such a scenario to be fairly unlikely." (Page 211; paragraph 2)

["Fairly unlikely" is an understatement, but still it goes to the authors' credit that they mention the improbability of the scenario. However, this story was released to the media along with the equally unlikely hybrid python fairy tale. We are astounded that in a paper representing itself as unbiased and serious, there is even mention of such far-flung imaginations.]

> "Imports [of anacondas] spiked in 1997 as compared to levels in preceding or ensuing years. It is likely that this spike was related to

the 1997 release of the horror movie *Anaconda*, in which larger-than-life anthropophagous anacondas consumed a variety of B-list movie stars. If the apparent relationship between the movie and import rates is more than a remarkable coincidence, such a spike implies that demand, not availability, drives the import rate of anacondas, and that suppliers can obtain more snakes from wild populations even within a short time period." (Page 236; paragraph 3)

[This statement is incorrect, contradicted by data supplied in the report itself. On page 234, the authors state that from 1989 through 2000 about 1400 Green Anacondas were imported into the USA, averaging about 125 a year. However, CITES records cited in Table A.1 on page 302 indicate 5226 Green Anacondas imported during that period, with the spike occurring in 1996, the year before the release of the movie. In addition, if their speculation was valid, then one would expect to see another spike in 2004 with the release of the movie "*Anacondas, The Hunt for the Blood Orchid*," but no such spike occurred. The authors most likely failed to consider trends and strategies used by importers and exporters to work around quotas and seasons to get the maximum financial advantages. In fact, the similarities between the movie *Anaconda* and some of the claims and possibilities proposed in this manuscript are hard to ignore.]

"Of the eleven hypotheses related to survival, ten apply with roughly equal force to all of the giant constrictors. Of these ten, two suggest that giant constrictors are not likely to establish: (1) Establishment is facilitated for insectivores (none of the giant constrictors are insectivorous), and (2) establishment is promoted for species that actively modify their environment in their favor (for example, digging tortoises). As far as is known, the giant constrictors' requirement for burrows is dependent on other species digging them." (Page 247; paragraph 1)

[The 11 hypotheses are not some important and accepted tenet of invasion biology. They are hypotheses gleaned from a variety of sources and assembled in a table in a recently published paper of one of the authors (see Rodda and Tyrrell, 2008). To synthesize, of the 11, three don't apply to the great constrictors. Four cannot be applied because not enough is known about any of the great constrictors with regard to these hypotheses. Only four of the 11 can be applied. This is invasion biology risk analysis at its finest—if you don't have all the data, then just use what you can and make your best guess.]

"The one survival attribute that varies greatly among the giant constrictors is that of climate match. Some species (for example, Indian Python, Yellow Anaconda, Southern African Python, Boa Constrictor) would find suitable habitat over a broad swath of the American landscape, whereas others (Northern African Python, Reticulated Python, Green Anaconda) would likely be limited to the warmer fringes of the continent." (Page 247; paragraph 4)

[Of course this entire citation and the rest of the paragraph that follows is based entirely upon speculation and unproven hypotheses. We can only imagine that the authors made an accidental misstatement when they state that Indian Pythons, Yellow Anacondas, Southern African Pythons, and Boa Constrictors would likely find "*suitable habitat*" over a broad swath of the American landscape—the issue is suitable climate. It's highly *unlikely* that any of these species will find suitable "habitat" in the continental United States ouside of South Florida.

"Hypothesized attributes affecting reproduction of potential invaders during establishment . . . as applied to giant constrictors." (Page 250; Table 10.2)

[This table outlines what the authors know about the reproduction of the nine species of great constrictors—not much. Of course nothing is known about the Beni Anaconda or the DeSchaunsee's Anaconda, as they have not been in captivity in the past few decades. We can state that none of the others have shown a capacity for extended sperm storage. Interclutch interval is a year or longer in all the seven species that have been bred in captivity. We also point out that none of them can be considered parthenogenic. There is one report of a captive female Burmese Python that underwent an apparently unusual form of parthenogenesis to produce fertile eggs and all female offspring (Groot et al., 2003). This is the only report of which we are aware for any of these species and is an extraordinarily rare occurrence.]

"Eleven traits . . . hypothesized to influence spread success in reptiles and amphibians." (Page 252; Table 10.3)

[Another table based on hypothetically important factors identified in Rodda and Tyrell (2008).]

"Probability of organism establishment for nine giant constrictor species, . . . " (Page 253; Table 10.4)

[This table and the three that follow on pages 259 and 260 illustrate the results of all the risk analyses. It's here to which one turns to see the authors' estimates of the hypothetical level of risk for each of the species to become established. Here all 300 pages of this report are distilled into three categories of likelihood of establishment of the great constrictors, those being High, Medium, or Low. Incredibly, no species has a risk rated as "Low"—about half are high and half are low in each of the tables. To say that a Green Anaconda has roughly the same high probability to establish as, say, an small anoline lizard is clear evidence of the bias of the authors and of the overall unrealistic assumptions and conclusions made by this manuscript.]

"We defer to any potential economic evaluation to quantify the potential costs associated with giant constrictor colonization." (Page 254; paragraph 1)

[By "economic evaluation," they are not referring to the costs to the reptile trade and captive breeding industry if they great constrictors should be placed on the Injurious Wildlife List of the Lacey Act. Instead, for example, they are talking about estimates of the economic losses to city and state economies if tourism drops in South Florida because of fear of loose pythons. Never mind that fear has been purposely implanted in the mind of the public by carefully crafted publicity released by USGS (see Barker and Barker, 2008a) and media campaigns stoked by animal-rights organizations, Florida legislators, and academic invasion biologists acting in their own interests.]

"A *potentially* devastating impact to the nation's agriculture could occur *if* the deadly cattle disease heartwater *or some other* tick-borne disease were to become established in the United States and be transmissible through reptile ticks. . . . " [italics ours] (Page 254; paragraph 5)

[Even if this speculation came to pass, it's difficult to believe that the nation's agriculture would be endangered by ticks that are stuck to pythons found only in extreme South Florida. Even the exaggerated climate matches made for each species don't project that the great constrictors will be wandering through the cattle ranches of this country.]

"Direct predation on livestock will occur if any of the giant constric-

tors become established in the United States. . . . This prediction is very certain because livestock losses have been widely documented in Florida (by Burmese Pythons, North African Pythons, and Reticulated Pythons). However, the extent of the damage is much less certain." (Page 255; paragraph 1)

[Just exactly how have "livestock losses" been widely documented? The authors fail to provide any reference on which they base this charge. To read this, it sounds like prized bulls are being attacked and eaten out in the pastures. The authors fail to provide information as to just exactly what they are referring but we are pretty sure that it must be POULTRY. Native snakes, hawks, owls, feral cats, raccoons, the neighbor's dog, mink, skunks, foxes, and just about anything else with sharp teeth will eat chickens every chance they get—but if the great constrictors do it, it is called "direct predation on livestock." The authors note that the Asian pythons may eat pigs, and, considering that the environment and ecology of South Florida is devastated by feral hogs, isn't that a good thing?]

"Predation on pets is likely to be of limited economic importance, but acutely felt by the bereaved pet owner." (Page 255; paragraph 2)

[We note the irony that this report will be considered as strong evidence (by those who haven't read it closely) that the great constrictors should be placed on the Injurious Wildlife List. This will damage the commercial value of these snakes, destroy American family business, cause bankruptcies and foreclosures in the times of great economic hardship, yet we are to empathize with some imaginary "bereaved pet owner"?]

"All of the giant constrictors could further endanger watchable wildlife species that presently constitute a significant draw for ecotourists. Colonial bird rookeries (for example, Wood Storks) are a particular tourist draw, and are potentially vulnerable to depredation by a new nocturnal and opportunistically arboreal predator. Where their ranges overlap, all of the giant constrictors could significantly reduce stocks of economically-important fur-bearers such as beaver and muskrats." (Page 255; paragraph 4)

[Bhatt (1991) notes that his *Python molurus* study site in Keoladeo National Park, Bharatpur, in central India is the wintering grounds of the western flock of the endangered Siberian Crane. This must at least allow for the possibility that Wood Storks will also be able to co-exist with Burmese Pythons in the Everglades. Regarding the "economically-important-furbearer" industry, we certainly do not want the great constrictors to compete with the steel-traps. Never mind that beavers and muskrats are considered to be pest species in many parts of their ranges. Are beaver and muskrat pelts economically important in Florida? We note that the Florida Trappers and Fur Hunters Association boasts that its 2008 membership was approaching 150 members. Of course, most members are "nuisance animal removers, varmint chasers, turtle catchers, USDA trappers, hog trappers and ferral (sic) animal removers" and not beaver trappers (www.floridatrappers.org).]

"A most difficult aspect of this threat is its irreversibility. Once an introduced giant constrictor becomes well-established, there is no known method for removing the threat, . . . and thus recovery of endangered species in an infested area is a prospect likely to be diminished or even eliminated permanently. In this respect, invasive species constitute a more enduring threat than pollution, overexploitation, or habitat degradation." (Page 256; paragraph 4)

[Let's get this straight—first, aren't the generic "endangered species" mentioned in this plea already endangered when great constrictors come onto the scene. It's NOT the great constrictors that have made them endangered. In the 30 to 40 years that Burmese Pythons and Boa Constrictors have lived in South Florida, there is not a single native species that has had its status reclassified to threatened or endangered due to the presence or actions of these introduced snakes. Second, don't most endangered species have that status because of "pollution, overexploitation, or habitat degradation"? What about overpopulation, overdevelopment, and traffic? Third, here the claim is made that the danger from great constrictors is more "enduring" than the factors that already threatened these generic endangered species? Does this mean the authors have solutions for overpopulation, pollution, overexploitation, habitat degradation and other destructive forces that plague nature and ecosystems throughout the world?]

"Although it is difficult, or perhaps impossible, to fully quantify perceived impacts that have no overt economic or ecological impacts, it is notable that colonization by giant constrictors would affect human relations to the rural landscape significantly, and not in a good way. Perhaps a mother would no longer allow her children to explore the woods unescorted, or to swim in a creek. Perhaps a child would have fewer opportunities to experience the full range of native wildlife. Loss of these pivotal developmental opportunities comes at a cost that we can appreciate even if we cannot readily measure it." (Page 257; paragraph 2)

[This is truly heart-wrenching. However, few mothers would encourage their kids to swim in creeks and canals in South Florida as most are well aware of the dangers, even if the authors are not. There are huge predatory reptiles called alligators already living in essentially all the waterways of Florida, with a concentration in south Florida. An average alligator weighs more than double what a large great constrictor weighs, and big alligators weigh more than 1000 pounds. Alligators are known to kill and eat pythons and humans. The largest venomous pitviper in North America, the eastern diamondback rattlesnake, lives along the pathways through the woods of Florida. Cottonmouths abound in the swamps. South Florida is a wonderful place because it is not a tame place. It has always been a place to keep the dog on a leash and the children close and in sight. The presence of great constrictors will not affect what have always been considered prudent and safe actions and activities in South Florida.]

Qualifiers

Throughout the paper we noticed the poor quality of the statements being made and the preponderance of qualifying terms that allowed unsupported statements to be made. A vocabulary search found the uses of these qualifying terms: "may" (318 uses in the text); "likely" (306); "potential" (160); "could" (138); "maybe" (137); "might" (103); "probably" (80); "potentially" (44); "appears to" (40); "uncertainty" (26); "possibly" (17). By our count, these 11 qualifying terms appear in the manuscript 1369 times. The manuscript searched was the 260 pages of the body of the text, not including the introductory pages and References Cited pages. These qualifying words appear on average 5.3 times per page. More than one out of every hundred words in the manuscript is a word that qualifies and weakens any statements that are being made.

The Great Constrictors Come to Texas

We note that the climate-matches that have been performed for each of the nine species in their biological profiles all predict that South Florida is the closest thing to nirvana that we have to offer to all of them. However, extreme South Texas is also predicted to be suitable climate and habitat. We are Texans living in South Texas, and we here state that while this might seem possible in theory, it is so highly unlikely as to be close to impossible. Absolutely no one arrives in South Texas, looks around and thinks, "Wow, this is exactly like South Florida."

There are major differences between South Florida and the Rio Grande Valley, the southmost tip of Texas. First, there is no Everglades National Park to serve as 1.5- million acre, swampy refugium, as is the case in South Florida; we cannot overemphasize the importance of that fact. South Texas is colder in winter than South Florida because of what is called the "continental effect—it is not a peninsula surrounded by temperature-mediating warm seas like Florida. What little surface water does exist in South Texas, mostly ox-bow lakes locally called *resacas*, is both heavily populated with human habitations, and used for irrigation. Even the Rio Grande is bone-dry most of the time. More than 95% of the original Tamaulipan thorn scrub habitat is gone, replaced with fields of onions, carrots and other produce. Sugar cane fields would undoubtedly lure pythons and thirsty anacondas wandering around the huge, empty, hot, flat fields, but sugar cane is surrounded and burned from all sides simultaneously annually or biannually, killing all wildlife hidden in the thick vegetation. There is heavy traffic on most roads day and night, and mechanized agriculture rules the fields. There is vegetation along a few stretches of the Rio Grande, but the nocturnal human traffic through those areas is heavy. Consider that Boa Constrictors naturally occur in Tamaulipas, Mexico, 120 miles from the southern tip of Texas, but show no evidence of extending their range northward. We here state that it is our strong opinion that there is no prospect of any of these nine snake species becoming established in South Texas.

Conclusion

Throughout the American South and Southeast, professional pest exterminators are often called upon to exterminate snakes. Often, out on a call, an exterminator will volunteer, at a small additional charge, to put down some chemicals that they claim will deter any snakes that are thinking of passing through, and exterminate any already present. Regardless of whether or not any snake has actually ever been spotted, the exterminator will recommend that you go ahead and let him take care of the "problem." If ever you ask any exterminator "Should I exterminate for snakes?" that exterminator will always answer in the affirmative.

Robert Reed and Gordon Rodda are USGS invasive-snake biologists. As such, they are the government pest exterminators in charge of snakes. That has defined their careers. Whenever they are asked "Should we be worried about being invaded by snakes?" you can bet they will say "Yes, absolutely, and you better start worrying now," just like any good exterminator.

A serious flaw in this report is that it was not composed by impartial authors. Both authors and their employer, the USGS Invasive Species Program, stand to benefit if great constrictors can be made to look like serious threats to the environment of this country. This document is not science, it is opinion and surmise laced with citations that make it seem far more authoritative than careful reading will reveal.

This document appears to us to be a sales pitch designed for one purpose—to persuade legislators and regulators that it is now time to start worrying about exterminating the great constrictors. All analyses in this paper are based on hypothesis and estimation. This is crystal ball fortune-telling disguised as science.

Literature Cited

Barker, D. G., and T. M. Barker. 2008a. Comments on a flawed herpetological paper and an improper and damaging news release from a government agency. Bull. Chicago Herp. Soc. 43(3):45-47.

Barker, D. G., and T. M. Barker. 2008b. Review: *An Ecological Risk Assessment of Nonnative Boas and Pythons as Potentially Invasive Species in the United States* by Robert N. Reed. Bull. Chicago Herp. Soc. 43(4):63-67.

Bhatt, K. 1991. The diel activity pattern of Indian python (*Python molurus molurus* Linn) at Keoladeo National Park and some factors influencing it. Dissertation presented to the Saurashtra University, Rajkot: 1-65.

Groot, T. V. M., E. Bruins and J. A. J. Breeuwer. 2003. Molecular genetic evidence for parthenogenesis in the Burmese python, *Python molurus bivittatus*. Heredity 90:130-135.

Reed, R. N. 2005. An ecological risk assessment of nonnative boas and pythons as potentially invasive species in the United States. Risk Analysis 25(3):753-766.

Rodda, G. H., and C. L. Tyrrell. 2008. Introduced species that invade and species that thrive in town: Are these two groups cut from the same cloth? Pp. 327-341. *In*: J. C. Mitchell, R. E. Jung Brown and B. Bartholomew, editors, Urban herpetology. Salt Lake City, Utah: SSAR Herpetological Conservation, Number 3.

Shiroma, H., and H. Ukuta. 1999. Training a dog to detect Habu (*Trimeresurus flavoviridis*). Pp. 348-352. *In*: G. H. Rodda, Y. Sawai, D. Chiszar and H. Tanaka, eds., Problem snake management: The Habu and the Brown Treesnake. Ithaca, New York: Cornell Univ. Press.

Snow, R. W., K. L. Krysko, K. M. Enge, L. Oberhofer, A. Warren-Bradley and L. Wilkins. 2007. Introduced populations of *Boa constrictor* (Boidae) and *Python molurus bivittatus* (Pythonidae) in southern Florida. Pp. 416-438. *In*: R. W. Henderson and R. Powell, editors, Biology of the boas and pythons. Eagle Mountain, Utah: Eagle Mountain Publishing.