Bull. Chicago Herp. Soc. 46(4):41-43, 2011

A Review of: Willson, J. D., M. E. Dorcas and R. W. Snow. 2010. *Identifying Plausible Scenarios for the Establishment of Invasive Burmese Pythons (*Python molurus*) in Southern Florida*. Biological Invasions. Online doi 10.1007/s10530-010-9908-3

David G. Barker and Tracy M. Barker
vpi@beecreek.net

First impressions are important. This particular paper is an excellent example of just that. We call attention to the word "plausible" in the title. According to *Webster's New Universal Unabridged Dictionary* (1996), the chief synonym of "plausible" is "specious" and these words "describe that which has the appearance of truth but might be deceptive." It goes on to define a plausible argument as "one that cannot be verified or believed in entirely." The *American Heritage Dictionary* (1982) defines plausible as "Giving a deceptive impression of truth, acceptability or reliability." It also provides "specious" as both a definition and a synonym.

Okay, the point is only semantic and more humorous than critical. However, to further color the first impression of the paper, the taxon that is the focus of this paper is incorrectly identified in the title. Yes, this is yet another paper published by *Biological Invasions* where the authors and the editor fail to use the correct scientific name for the animal they purport to study. Invasive snake biologists studying Burmese pythons apparently feel it important to embrace the dated and incorrect taxonomy that has plagued and continues to plague their papers. This is a fairly common problem of environmental papers, and one with potentially serious consequences (Bortolus, 2008). It's pretty pitiful when the researchers can't correctly identify the species they study.

However, they have a problem, because to correctly identify *Python bivittatus* would be a tacit admission of a fundamental error made by Rodda et al. (2008) and Reed and Rodda (2008/2009), an error that invalidates all of the climate match analyses that have been published for the Burmese python (Barker and Barker, 2008a). That, in turn, collapses the house of cards that has been constructed with research, grants, publications, and, importantly, media attention, all based on the fallacious original studies. Incorrect taxonomy is only one of many fundamental errors in Reed and Rodda (2008/2009) that invalidate the analyses and conclusions for all the species in that report (see Barker and Barker, 2010a, b, c).

We did not hold much hope for this paper just based on its title and, unfortunately, reading the paper did little to change our first impression. However, the paper is important in that it is yet one more attempt to make keepers responsible for the presence of Burmese pythons in the Everglades National Park [ENP]. This paper appears to be another part of a game plan that the invasive biologists are closely following in order to reap millions of taxpayer dollars from Burmese python studies.

We offer the following summary to readers not familiar with this paper: in the Introduction the authors yet again cite the overused and unproven statement of Pimental et al. (2000) that invasive species are the bane of all ecosystems, the greatest threat to global biodiversity. They then move on to the example of the insidious little brown treesnake in Guam, and point out how much vital information has been learned from that fiasco that can now be applied to the Burmese python problem. [In fact, we contend that what government biologists learned from the brown treesnake boondoggle was how to get more than $100 million from taxpayers for a completely unsuccessful program that failed in every aspect except that, so far, the treesnakes haven't made it to Hawaii.] The authors then go on to state that is it critical to understand just how the Burmese pythons got loose in the first place [more on that later] and so this study is necessary.

In the Methods section they use a simple mathematical formula to estimate the growth of the python populations in order to then extrapolate backwards and identify the time of the original introduction of the founder pythons, and the characteristics of the founders (was it many young snakes, a few young snakes, many adult snakes, or a few adult snakes?) They then plug in various values for the variables in their model, generate some very scientific-looking graphs, and come up with six plausible scenarios for the introduction and establishment of the reproducing Burmese python population in south Florida.

In the Discussion section, the authors carefully evaluate each of their plausible explanations, until finally they state " . . . we consider the most plausible scenario for establishment of pythons in the region to have been a one-time release of a relatively small number of adult or juvenile *pet pythons* in the mangrove regions of ENP near Flamingo prior to 1985." [italics ours]. We wonder, would it make a difference if they were *research pythons* from a laboratory, *rescue pythons* from Animal Control, or *education pythons* from the Living Materials Center of a school system? Can the authors prove these animals were "pets"? If not, why have they so unsubtly and specifically identified the pythons as pets? There are many reasons why people keep animals other than as "pets."

The paper goes on to state that " . . . proactive measures that prevent initial introductions *may* be more effective than reactive control or eradication measures once successful establishment (reproduction) is detected." [italics ours].

It's carefully worded, but the unwritten conclusion, and in our opinion, the authors' primary intent for the article, is to endorse the proposed action of the U.S. Fish and Wildlife Service to list the nine constricting snakes on the Injurious Wildlife List of the Lacey Act. That is the only ongoing "proactive measure" that has been proposed or is underway to being enacted at the federal level.

We do not consider this to be some spectacular revelation. This paper amounts to no more than simplistic reasoning that if there were no pythons in captivity, then they couldn't escape into the ENP. This line of thought, extended into modern society is the same as stating that if we had no motorcycles, there would be no motorcycle accidents; if we didn't have swimming pools, then people couldn't drown in them; if we didn't have jungle gyms, kids couldn't fall off of them; if no American citizen had animals, then animal cruelty in our country would stop.

Before we review this article further, we want to digress and discuss from where this article came. There is a group of government biologists that have come together to work on the "invasive constrictor" problem. The core group is made up of government employees working for the U.S. Geological Survey, the U.S. Fish and Wildlife Service and the National Park Service. There are ancillary researchers working with the group who are not government employees. Some are university researchers; some are independent but contracted and funded by the government agencies. These researchers have titled their working group the Giant Constrictor Risk Assessment Partnership. Now the acronym for that group, as hard as it is to believe, is Giant CRAP. The taxpayers are funding a bunch of biologists with an inappropriate sense of scatological humor—it's not funny that the action they support will destroy thousands of small businesses and could make as many as a million American owners of boas and python into potential felons. Just how serious is this research that comes from Giant CRAP?

Ken Salazar, the Secretary of the Department of the Interior presented the "Partners in Conservation Award," the most prestigious award given by the DOI, to the government biologists in Giant CRAP. We wonder—did he know he was giving his highest award to Giant CRAP?

GCRAP has published online its template and game plan for future studies of Burmese pythons. GCRAP biologists know that there is potentially huge funding for research for Burmese python studies in Florida. However, the first step toward reaping the millions of dollars they see on the horizon is to get the Burmese python and as many as possible other boas and pythons on the Injurious Wildlife List. They are using what they learned from the brown treesnake project and number one on the list is that the big bucks come when the Burmese python receives its federal and formal status as "injurious wildlife."

We note the following statement on the website of the North American Brown Treesnake Control Team: "The government biologists have published a comprehensive book and more than 100 papers, reports, and other products on the BTS and related topics." That means that American taxpayers spent about a million dollars per publication—this is good news? This is the GCRAP plan for Burmese pythons and as many other large constrictors species as possible.

The USGS Technical Announcement released 14 October 2010 is a news release about GCRAP receiving the award from Salazar; it states that GCRAP "issued a risk assessment, paving the way for the proposal to list the Burmese python and eight other large constrictor snakes as "injurious wildlife."

One of the authors of this article in review, R. L. "Skip" Snow, is a GCRAP biologist and a recipient of the DOI award. It follows that this article has a supporting function in enacting the plans of the group.

As has been true for all of the GCRAP articles we have reviewed, there are so many problems with this paper that it would be very lengthy and tedious to detail them all. Here follows what we feel are the worst problems of this paper.

Every variable used in the mathematical formula is an estimate. That means that, at best, every "scientific-looking" graph is no more than the authors' most "plausible" guess, and it equally allows that they could be purposefully specious. Why try to quantify, even simply, such a complex problem long before the data exists on which to base a calculation? In the words of the authors: " . . . the exact circumstances that lead to introduction and establishment of Burmese pythons in Florida will never be proven."

We think T. H. Huxley aptly summed up this problem in a speech he gave in 1869, intended as a criticism of Lord Kelvin's mathematical calculations of the age of the sun and earth (Kelvin declared they were about 100 million years old.) Huxley stated "This seems to be one of the many cases in which the admitted accuracy of mathematical processes is allowed to throw a wholly inadmissible appearance of authority over the results obtained by them… As the grandest mill in the world will not extract wheat flour from peascods, so pages of formulas will not get a definite result out of loose data."

The underlying central problem with this paper is that it is a premature extrapolation of a mathematical treatment of a biological problem. Hard data necessary to correctly analyze this situation simply do not exist. However, these authors go even further.

After making their premature estimations of population and population growth, they then glean through the six hypothesized possibilities of how the population grew and discard all that do not fit their best estimation of where the population started. They declare that this "nexus" is the mangrove area in the south area of ENP between Flamingo and West Lake.

The fact is that if a nexus even does exist, its location is not known with certainty, and there is no way short of a crystal ball to determine if the current nexus of the population is also where the species first established. Almost all samples of pythons in the ENP are taken from on roads or near to roads, and most of the territory of the ENP is unsampled. Nobody knows what is going on out there in the park.

The authors reject out of hand that Hurricane Andrew was responsible for the release of the founding population, as has been discussed elsewhere (Barker and Barker, 2008b). They state: " . . . the spatial and demographic patterns of python captures are not consistent with such scenarios [referring to Hurricane Andrew]. The nexus of python encounters in the region and the location where wild reproduction was first confirmed, is the mangrove forests and saline glades of the southern portion of ENP, located at least 30 km from the nearest reptile breeder/importers. Thus, in order for the python population in southern Florida to have originated from destruction of breeder/importer facilities, large numbers of pythons would have had to move over 30 km. . . . "

Apparently the authors do not understand that when the center of a hurricane like Andrew hits a building and destroys it, as it did the Quonset hut of a python importer in Homestead, that the destroyed building and its contents (900 Burmese pythons temporarily caged individually in lightweight delicatessen cups) would be blown to the south.

This is the exact scenario caused by Hurricane Andrew. As illustrated in Figure 1, Hurricane Andrew came straight into Homestead on a westward path. The direction of the wind would have been straight south in Homestead until the eye passed over.

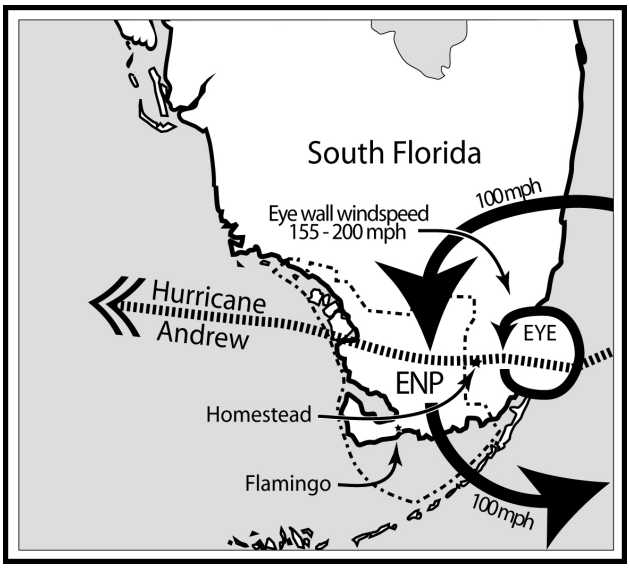

Figure 1.

Detritus picked up in Homestead would have been blown directly toward the hypothetical "nexus" of the authors. The wind speed of the eye wall of Andrew was in excess of 300 km/hr when it hit Homestead. At that velocity, it would take a little python in a delicatessen cup about 5 to 6 minutes to arrive in Flamingo.

This natural disaster could have delivered as many as 900 Burmese pythons into the mangrove forests in southern ENP in maybe 10 or 15 minutes even if they were moving in slower lead winds with a velocity of 160 km/hr. They might have been all together, still in the shell of the building. That seems to be a far more parsimonious, logical and likely explanation of how the founders arrived at the nexus, wherever it is, than the conjecture posed in this paper that an irresponsible keeper or several keepers waded out into an inaccessible mangrove swamp within a short time period prior to 1985, and released a "relatively small number" of unwanted pet pythons.

In fact, we do not believe that it is necessary for us to explain to Florida researchers how hurricane winds blow. Rather, it seems far more likely that the point of this paper is to lay the blame of the escaped/released founding pythons at the feet of herpetoculturists. It seems to us that the authors of the paper elected to ignore that the most likely scenario was that it was a natural disaster responsible for the founding population of Burmese pythons in the park. Indeed, if their location of the nexus of the population is actually correct, an inhospitable swamp away from roads, then the hurricane scenario becomes all the more likely.

So why have the authors discounted Hurricane Andrew? Like the tsunami in Japan, even when well prepared, some natural disasters just can't be stopped. The authors of this paper can't and haven't proven that keepers of pythons are responsible for the ENP pythons. But assigning blame is one way to deflect the criticisms that the proposal to list the constricting snakes on the Injurious Wildlife List is an ineffective knee-jerk reaction to the problem that will have no effect other than to significantly increase available government grants, taxpayer dollars, for GCRAP.

The conclusion the authors have drawn in this paper, derived from the mathematical treatment of estimation and supposition, is that it is statistically likely that keepers were responsible for pythons in the ENP. That, in turn, neatly supports GCRAP's goal of getting those constrictors listed on the Injurious Wildlife List.

Mark Twain said it best: "there are three types of lies—lies, damned lies, and statistics."

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