The Tympanum

Comments on a Flawed Herpetological Paper and an Improper and Damaging News Release from a Government Agency

In mid-February 2008, a news release issued by United States Geological Survey (USGS) indicated on a map of the U.S. mainland the "climatically suitable" areas for "invasive alien pythons." Now many people feel that there is nothing more terrible than being invaded by an alien python and the USGS news release quickly generated extensive publicity. Newspapers and television programs around the country made mention of the story. Federal biologists were interviewed. The resulting publicity was a lesson in fear-mongering promoted by a government agency.

The reports were based on a paper titled "What Parts of the US Mainland Are Climatically Suitable for Invasive Alien Pythons Spreading from Everglades National Park?" The authors are Gordon H. Rodda, Catherine S. Jarnevich and Robert N. Reed. Dr. Rodda graciously sent us an advance copy of the paper, which has been accepted and is in press at *Biological Invasions*. The authors are employed by the U.S. Geological Survey Biological Resources Division and are identified on the internet as "invasive species biologists." The invading alien python to which the title refers is the Burmese python, *Python molurus bivittatus*, an Asian species now included on the list of 45 exotic reptile species found in South Florida.

The conclusion of the paper is that the Asian rock python, *Python molurus*, could thrive in the climate of the southern third of the U.S.A., including Memphis, Oklahoma City, Dallas, Tucson, San Francisco, Fresno, Washington, D.C., and even southern Utah. In an interview published by the *San Francisco Chronicle* on 21 February 2008, biologist Rodda stated that already he had found one Burmese python that had traveled 100 miles from the Everglades on its way to California.
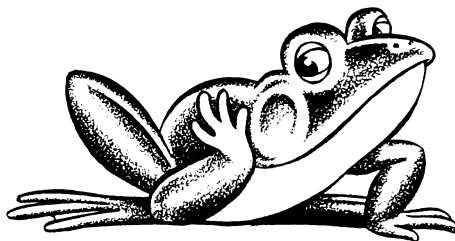
We find it irresponsible for federal biologists to have publicly stated or published that "invading alien pythons" from the Everglades were in the process of spreading throughout the country. As we will show, there are no data in the paper that would support this conclusion. The publicity sought and managed by USGS employees constitutes a grave abuse of the public trust. This was a careful presentation based on data that are severely compromised by selective interpretation, resulting in gross exaggeration of what are posed as probable future scenarios.

In our opinion, to disseminate as fact such fanciful predictions of disaster to a naive public in the name of science and government agencies amounts to ecoterrorism. It appears to us to be a self-serving attempt by federal biologists to bully and intimidate the American public into supporting unnecessary regulation, research and grants.

We here discuss our various criticisms of the paper and its conclusions.

Why Is the Indian Python Included in the Analysis?

A fundamental flaw of the study is the addition of the Indian python, *Python molurus molurus*, to the analysis. The first sentence of the second paragraph in the Introduction reads as follows: "The Burmese Python is a questionable subspecies of the Indian Python, *Python molurus* (McDiarmid et al. 1999)." This casual throwaway line is apparently intended as the justification to expand the analysis to include the western subspecies, *P. m. molurus*.

Close examination of the account for *P. molurus* in McDiarmid et al. (1999) clearly shows that there is nothing "questionable" about the validity of the taxon *bivittatus*. It is currently accepted and in wide use by all authorities and has been for nearly 80 years (Mertens, 1930; Stull, 1935; Stimson, 1969; McDiarmid et al., 1999). In fact, we are aware that there has been discussion among several groups to recognize *bivittatus* as a full species; at least one manuscript is in prep.

The Indian python, *P. m. molurus*, is listed as an endangered species by the U.S. Endangered Species Act, and as an Appendix I endangered species by CITES. The U.S. captive population is small, with fewer than 100 individuals (our estimate) spread across the country in private hands, and a few in zoos. The taxon has not been imported since 1972. There are no established wild populations in North America and there are no reports of escapes; to our knowledge, not a single specimen has ever been recovered from the wild in the U.S.A.

The Indian python is one of two python taxa endemic to the northern hemisphere, while the Burmese python distribution extends to 8°S latitude. The Indian python is a widespread, polymorphic taxon with some populations highly adapted in size, diet, behavior, and thermal tolerances in response to habitat, elevation and climate unique to the Indian subcontinent. Specimens from the populations in the xeric areas of Pakistan rarely exceed 3 m in length and adult size of some is less than 2 m (Minton, 1966, and pers. com.). Elsewhere in the range, specimens have been known to reach or exceed 5.5 m (Wall, 1912; Murphy and Henderson, 1997).

As evidence of their unique genetic identities, the two subspecies exist in sympatry in several areas of their distribution (Barker and Barker, 2008). They apparently maintain their genetic identities through resource partitioning of prey and habitats (O'Shea, 2007).

We question the logic and the motives of the authors that they would have even considered to include data derived from the distribution of the Indian python in this study when clearly only *P. m. bivittatus* is the focus of their concern. As is the case with other flaws in this study, this decision creates the distinct impression that the authors manipulated data purposely to create a particular result.

The decision to include the Indian python in the data set and analysis negates all validity to this study.

Problems with Burmese Pythons in the Analysis

Never mind the Indian python problem, an equally serious flaw exists in the data sample taken across the range of Burmese pythons.

Burmese pythons naturally occur in the countries of India, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, Laos, Cambodia, Vietnam, China and Indonesia. Most of these countries have never allowed commercial exportation of live Burmese pythons. To our knowledge, there has never been any specimen in captivity or for sale in this country that was identified as being from India, Nepal, Bhutan, Bangladesh, Myanmar, Laos, Cambodia, China or Indonesia.

The following import/export information for Burmese pythons comes from a 1989 data sheet created by CITES Trade Database (Global Python Trade, 1984–1998). Information on trade in pythons is available today at [http://www.unep-wcmc.org/citestrade/].

Thailand was the primary exporter of Burmese pythons from the late 1960s until commercial exports were stopped after 1985. We are told by Otis Whitaker, a Burmese python importer in the 1970s who spent many years traveling to Bangkok, that the bulk, if not all, of Burmese pythons exported from Bangkok were collected in the general vicinity of Bangkok. Most or all came from between 13 to 14°30′N latitude, at elevations not exceeding 100 m.

In 1986, Malaysia suddenly began exporting several thousand Burmese pythons; the following five years Malaysia was the dominant supplier to the American pet trade. Significant numbers of Burmese pythons were exported from Singapore in 1986 and from Taiwan in 1990. Interestingly, Burmese pythons are not known to naturally occur in any of the three countries (Barker and Barker, 2008). We do not know the origins of those pythons, but it seems parsimonious to assume that those shipments of extralimital pythons originated from Thailand. Hong Kong, then a colony of the United Kingdom, also exported live pythons in 1988, but the circumstances are the same as for Singapore and Taiwan, and it is highly unlikely that those pythons originated from anywhere near Hong Kong.

Numbers of imported Burmese pythons steadily declined from 1988 through the early 1990s. Relatively few live Burmese pythons were exported during 1991–1993.

In 1994, Vietnam began to export live Burmese pythons, and since that time has been the source of nearly all Burmese pythons imported into this country. These Burmese pythons imported into the U.S.A. are mostly from captive breeding farms in southeast Vietnam in the vicinity of Ho Chi Minh City. This is located between 10 and 11°N latitude at an elevation less than 50 m.

Therefore it is our observation and opinion that all Burmese pythons in the United States are from or descended from tropical, low latitude, low elevation populations. Rodda et al. (2008) even state "Furthermore, the gene pool of the North American population of *P. molurus* may include only a small subset of the genetic variability found in the native range. . . ." Regardless, they still chose to include in their data set samples derived from throughout the entire distribution of both *P. m. bivittatus* and *P. m. molurus*.

Again, decisions to include irrelevant data from populations that do not exist and have never existed in captivity very negatively skew the results of the analysis. One must infer that the decision to analyze data from throughout the range of the two subspecies was made purposely to create a particular result. This misuse of data alone negates all validity of this paper.

The Data

There is a discourse in the Introduction on how little is known about the natural history, ecology, and population biology from any locality. The authors state, "Unfortunately, relevant demographic, energetic, or physiological values are unknown for any place in the python's range." Apparently when faced with these daunting obstacles, invasive species biologists turn to climate data as a proxy in order to make predictive models.

We can only assume that the data set used in the analyses included climate data derived from localities north of 30°N latitude, elevations up to 2400 m, and temperatures as low as 2°C — these being some of the extremes mentioned in the text. In several places in the text the authors talk about localities in the "foothills of the Himalayas" and hibernation for extended periods of time — neither of which applies to southern Vietnamese pythons. It may be that there are small, outlier populations to which this applies, but it does not apply to the Burmese pythons now residing in the Everglades.

We don't know what parameters were set in the data analysis because the data are not included in the paper. We emailed a request to authors Rodda and Reed for information about what environmental factors and values were utilized in the analysis. Our requests were unanswered.

Again, this suggests the possibility that the data have been manipulated to achieve a foregone conclusion. How many separate analyses were made, each time stroking the data until finally the desired map was created?

We recommend that it would be a proper action now for the authors to publish the data used in all analyses, including the exact locations of the 149 weather reporting stations used in the analysis, what exact snake localities they supposedly were paired with, and all data used from each locality, including location, elevation, all temperature and climate data, annual and seasonal precipitation, and any other seasonal data. In particular, it would be important to list all analyses that were made, and all changes of the data set to achieve each analysis.

The Analysis and Results

This analysis used climate data from throughout the ranges of the two python subspecies to generate a map showing the general climatic conditions within the distribution. Then, correlating the Asian data to U.S. climate data, a map was generated of the climatic conditions in the U.S.A. theoretically suitable for the survival of the two taxa. In the results of the published study, the approximate lower third of the country was indicated as favorable in climate.

It is, however, an erroneous conclusion to state that the results predict that the Burmese python could survive anywhere in the lower third of the country, even if climate were the only limiting factor. Nevertheless, as given by the title of their paper, this was the statement made by the authors.

This conclusion totally ignores the fact that data for a second taxon were included in the analysis. Also, and more important, to arrive at this conclusion is to totally ignore the importance of adaptations that each population has made to its particular locality and habitat.

As interpreted by the authors, their results predict that a Burmese python from tropical southeastern Vietnam could survive

if it were placed in temperate Sichuan, China, or in the deserts of western Pakistan. That is no different than making the ludicrous statements that the Burmese pythons in the Everglades would thrive in Oklahoma City or San Francisco. Yet those exact statements were broadcast all across the nation on television, radio, newspapers, and magazines during the week of 18–22 February 2008.

We feel that the better conclusion to draw from the analysis is that if one could pick and choose from any of the populations of the Asian rock python in nature, then by selectively placing pythons from particular localities into climatically similar localities in the U.S.A., it might be possible to establish *P. molurus* populations in many localities in the lower third of the country — if climate was the only limiting factor.

Of course, another interpretation is that over a period of perhaps one or two million years, the Burmese pythons in the Everglades may be able to expand their range in the U.S.A. through adaptation and evolution, as has happened in Asia.

Somehow this is not the message that was broadcast in the USGS news release.

Conclusions

We don't fault scientists for setting up and working through unsuccessful projects. We don't fault scientists for coming to wrong conclusions. However, when biased, self-serving, and damaging information is disseminated in a tabloid-like manner by news releases to the national media, we must question the motives, integrity, and the agenda of the U.S. Geological Survey. We make the following points:

Before this paper was submitted to a journal, it should have undergone internal review within the U.S. Geological Survey. Was this paper released by the USGS in accordance with the strictly mandated protocol in the federal Information Quality Act (IQA)?

How did this paper pass the peer review ostensibly required before acceptance for publication in the journal *Biological Invasions*? We question the objectivity of the journal, the qualifications of the reviewers, and the choices made by the editor.

All persons involved with snakes, including snake keepers, hobbyists, snake breeders, importers, exporters, pet shops, nature centers, schools, zoos, and even children with pet snakes have been irreparably and immeasurably damaged by the false reports given to the media by USGS employees. Decades of work to educate the public about snakes were destroyed in the 15 minutes of fame enjoyed by these researchers.

This report and its circus-like news release constituted an attack on American small businesses. Reptile breeders, pet stores, rodent breeders, and other ancillary businesses have been drastically and negatively affected by this study. Tens of thousands of businesses have been damaged.

Additionally, in Florida and across the South, real estate brokerages and agents, developers and city governments also may have been damaged by the national hysteria created by the USGS News Release. The idea was planted in the mind of the public that pythons are invading the South, all based on this deeply flawed report.

We feel that the U.S. Geological Survey and its employees have acted improperly in the manner in which this report was prepared and then released to the public. This is particularly egregious considering that the paper itself is little more than yellow journalism cloaked as science. We question whether the agenda that was transparently the underlying basis for this paper, that being to exaggerate and inflate the problems posed by Burmese pythons in South Florida, was that of the researchers, or of the U.S. Geological Survey, itself. The highly subjective nature of this invalid study, the inflammatory and incorrect results publicized in the USGS news release, and the resulting media storm, have been the equivalent of yelling fire in a crowded theater — lots of people were hurt, and there was no fire.

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