

Via E-Mail and U.S. Mail

26 July 2008

Geospatial Information Office
U.S. Geological Survey
National Center
Reston, Virginia 20192

Re: "Complaint" About Information Quality; Request for Correction

I submit this request for information correction under the Federal Information Quality Act of 2001, section 515(a) of the Treasury and General Governmental Appropriations Act for Fiscal Year 2001, 114 Stat 2763A-154, PL 106-554, and guidelines adopted by the Director of the Office of Management and Budget, the U.S. Department of Interior, and the U.S. Geological Survey.

Material in Question

The material in question is found in:

- Rodda, Gordon H., Catherine S. Jarnevich, and Robert N. Reed. 2008. What parts of the US mainland are climatically suitable for invasive alien pythons spreading from Everglades National Park? *Biological Invasions*, published online on 27 February 2008, <http://www.springerlink.com/content/n3311274l052777t/>, 12 pages, DOI 10.1007/s10530-008-9228-z. ("scientific paper")
- Rodda, Gordon, Robert Reed, and Skip Snow. 2008. USGS maps show potential non-native python habitat along three U.S. coasts. USGS News Release dated 20 February 2008, 3 p. ("news release")

Incorrect Information

The material in question incorrectly concludes that Burmese pythons now established in Florida could, if limited by climate alone, spread to roughly the

southern one-quarter to one-third of the continental United States, as shown on maps published in both the scientific paper and the news release. The conclusion is erroneous because the USGS biologists made the following mistakes:

(1) They characterized the climate throughout the entire natural range of the Indian python, *Python molurus*, rather than the smaller range of the Burmese python, *Python molurus bivittatus*, and then used that characterization to project the potential range of Burmese pythons now established in Florida (this was justified in the scientific paper by the unsupported conclusion that *P. m. bivittatus* is a “questionable” subspecies);

(2) They ignored information available from the U.S. Fish and Wildlife Service that supports an inference that the Burmese pythons now established in Florida very probably came from tropical regions in southern Vietnam or Thailand;

(3) They inappropriately assumed that the climatic tolerance of the Burmese pythons established in Florida is the same as the climatic tolerance of Burmese pythons from the periphery of the subspecies’ natural range;

(4) They failed to account for the fact that Burmese pythons have been released or have escaped from localities in other parts of the United States, but have become established in the wild only in Florida; and

(4) They applied the precautionary principle to their scientific method, when that principle should be limited to management activities.

The faultiness of their conclusion is reinforced by information published since the publication of the material in question. Their mistakes are discussed in more detail below.

Failure to Meet USGS Standards

The incorrect information fails to meet the basic standard of quality established by the USGS Guidelines for Ensuring the Quality of Information Disseminated to the Public (which incorporate the OMB and USDOJ guidelines and definitions) as follows:

(1) The incorrect information is not objective. The mistakes described above each tend toward exaggeration of the potential range of *P. molurus bivittatus* in the continental United States. As a result, the incorrect information taken together is biased toward exaggeration of that range.

(2) Because of the mistakes described above, the incorrect information lacks utility. The incorrect information is useless in predicting the potential range of *P. molurus bivittatus* in the continental United States. Use of the incorrect information could lead to over-allocation of invasive species management resources to *P. molurus bivittatus*, at the expense of managing other invasive species that actually present greater risks.

Effects on Me

The incorrect information described above affects me in several ways. First, and perhaps foremost, it strikes unfounded, irrational fear in the hearts of many Americans – many people are absolutely petrified by the image of a 20-foot python squeezing their child or pet to death. The publication and promotion of the misleading range maps by USGS spreads that fear across a major portion of the United States. This fear can easily lead to irrational behavior by individual citizens and by government officials. That irrational behavior may adversely affect me (see below) and similarly situated citizens.

I have BA and MS degrees in biology. I have been interested in invasive species for over a decade. In the mid-1990s, I served on the Wildlife Integrity Review Panel, which was created by and advised the Oregon Fish and Wildlife Commission regarding the invasiveness of species not native to Oregon. My work with invasive species issues will be hindered by erroneous information in the scientific literature.

I keep nonnative reptiles. The erroneous information published by USGS could lead to inappropriate federal, state, or local regulations that would affect my ability to acquire or keep certain nonnative species. Those regulations, particularly at the state or local level, may be driven in large part by the irrational fear described above. Use of the erroneous information by resource managers and regulators is expressly mentioned in the material in question.

The erroneous information may be used by resource managers to allocate limited resources in the ongoing battle against invasive species. The irrational fear described above may result in pressure on state and local officials to take management actions that really are not necessary. A result could be the over-allocation of resources to the Florida Burmese pythons, at the expense of other invasive species issues that might be more serious. Such misallocation would harm me as a member of our society and as a federal, state, and local taxpayer, and may harm me more directly if the management of invasive species where I live is adversely affected by over-allocation of resources to management of Florida pythons.

Discussion

The U.S. Geological Survey Has Overestimated the Potential Range of Florida Pythons in the Continental United States

Rodda et al. (2008) concluded that roughly the southern one-quarter to one-third of the continental United States, from coast to coast, would be climatically suitable for invasion by the Burmese pythons (*Python molurus bivittatus*) that have established wild populations in Florida. Their approach was to characterize the temperature and aridity near the periphery of the native geographic range of *Python molurus* in

southern Asia, and then use that characterization to identify areas of matching climate in the continental United States. The maps are flawed for several reasons: (1) their conclusion is based in part on unwarranted assumptions; (2) they failed to take into account relevant information available before they published; and (3) new information published since their paper appeared requires reconsideration of their conclusions. They substantially overestimated the potential range of *P. m. bivittatus*.

The Smaller Geographic Range of *Python molurus bivittatus* Should Have Been Used, Rather than the Larger Range of *Python molurus*.

Rodda et al. assumed that *P. m. bivittatus* is not a valid subspecies, citing McDiarmid et al. (1999), and then considered temperature and aridity along the periphery of the entire range of *P. molurus*. In fact, *P. m. bivittatus* is a generally accepted subspecies; see the discussion in Barker and Barker (2008a) and the authorities cited there. McDiarmid et al. (1999) is a compilation, not a taxonomic or systematic revision that would warrant discarding *P. m. bivittatus* as a valid subspecies. The effect of this unwarranted assumption was to roughly double the area of southern Asia considered by Rodda et al. in characterizing climate, and almost certainly led to erroneous conclusions regarding the aridity tolerated by *P. m. bivittatus* within its natural range. Consideration of aridity within the more limited range of *P. m. bivittatus* might well eliminate much or all of the western half of the area in the continental United States otherwise projected by Rodda et al. as suitable for the Florida pythons.

The Cold- and Aridity-Tolerance of the Florida Pythons Should Not Be Assumed Equivalent to that of *Python molurus* Near the Northern and Western Periphery of Its Range.

Information on the sources of *P. m. bivittatus* imported into the United States over the last several decades was available before Rodda et al. published; see the discussion in Barker and Barker (2008a). Although the information regarding sources is incomplete, it supports an inference that the *P. m. bivittatus* that gave rise to the wild populations in Florida almost certainly came from Thailand, southern Vietnam, or both. Thailand and southern Vietnam are near the southern edge of the continental range of *P. m. bivittatus* in southern Asia, and near the center of its range if its Pacific island distribution is included. Rodda et al. tacitly assumed that Florida pythons had the cold- and aridity-tolerance of *P. molurus* near the periphery of its range. That assumption is unwarranted.

Daniel Janzen (1967) published a simple climatic-physiological model predicting that, because of the less extreme climate in lowland tropical areas, tropical organisms would have narrower physiological tolerances than their temperate relatives. Janzen's model was recently reviewed by Ghalambor et al. (2006) and found to be generally viable. The tacit assumption by Rodda et al. that the physiological tolerances of the tropical pythons that founded the Florida populations are equivalent to those of their more temperate relatives at the northern and western extremes of their natural range runs counter to Janzen's

model. In the absence of cold- and aridity-tolerance information specific to the Florida pythons, or clear evidence that the Florida populations are derived from high-latitude or high-elevation ancestors, the more appropriate assumption is that their tolerances are narrower than those of members of the subspecies near the periphery of its natural range. In other words, it is inappropriate to use climatic information from the periphery of its natural range to project the potential range of *P. m. bivittatus* from the Florida populations.

Available Evidence Suggests that Behavioral Characteristics of *P. m. bivittatus* Make It Unsuitable for Survival in Cold Climates.

Rodda et al. fail to take into account the fact that *P. m. bivittatus* has been kept in private collections throughout the United States, but wild populations have only become established in Florida. There is no reason to assume that pythons were not released and did not escape north of Florida, yet no wild populations have become established outside of Florida. This is anecdotal evidence that Rodda et al. should have accounted for.

Barker (2008) recounted experiences and an experiment suggesting that captive *P. m. bivittatus* are not behaviorally programmed to avoid lethally cold temperatures. The validity of that conclusion is bolstered by the fact that his experiences and the experiment showed that, in contrast to pythons, boas seem to be behaviorally programmed to avoid lethally cold temperatures. Barker's paper suggests that, regardless of the cold-tolerance of *P. m. bivittatus* near the northern limits of its native range, the Florida populations are not likely to survive in cold climates.

Conclusion

For the reasons discussed above, the projected range maps published by Rodda et al. (2008) are flawed and almost certainly substantially (perhaps even grossly) overestimate the potential U.S. range of the wild Burmese pythons from Florida.

Note that, assuming appropriate assumptions were made, the method employed by Rodda et al. would be useful in projecting the potential range of an ectotherm that has not yet invaded the United States. The method risks failure, however, when it is blindly applied to an ectotherm that has already invaded. When an invasion has already occurred, a meaningful projection of climatic limits must take into account the specific climatic tolerances of the invader population. Rodda et al. may have made a reasonable projection of the worst-case range of *Python molurus* in the continental U.S., but they failed to make a reasonable projection of the potential range of the Florida populations of *P. m. bivittatus*.

Literature Cited

Barker, David G. 2008. Will they come in out of the cold? Observations of large constrictors in cool and cold conditions. *Bulletin of the Chicago Herpetological Society* 43(6):93-97.

Barker, David G. and Tracy M. Barker. 2008a. The distribution of the Burmese python, *Python molurus bivittatus*. *Bulletin of the Chicago Herpetological Society* 43(3):33-38.

Barker, David G. and Tracy M. Barker. 2008b. Comments on a flawed herpetological paper and an improper and damaging news release from a government agency. *Bulletin of the Chicago Herpetological Society* 43(3):45-47.

Ghalambor, Cameron K., Raymond B. Huey, Paul R. Martin, Joshua J. Tewksbury, and George Wang. 2006. Are mountain passes higher in the tropics? Janzen's hypothesis revisited. *Integrative and Comparative Biology* 46(1):5-17.

Janzen, Daniel H. 1967. Why mountain passes are higher in the tropics. *American Naturalist* 101:233-249.

McDiarmid, Roy W., Jonathan A. Campbell, and T'Shaka A. Toure. 1999. *Snake Species of the World: A Taxonomic and Geographic Reference, Volume 1*. Herpetologists' League, Lawrence, KS. 512 p.

Rodda, Gordon H., Catherine S. Jarnevich, and Robert N. Reed. 2008. What parts of the US mainland are climatically suitable for invasive alien pythons spreading from Everglades National Park? *Biological Invasions*, published online on 27 February 2008, <http://www.springerlink.com/content/n33112741052777t/>, 12 pages, DOI 10.1007/s10530-008-9228-z.

Closing Thoughts

I have corresponded by e-mail with Dr. Rodda over a period of weeks regarding my concerns. I have not persuaded him that my concerns warrant corrective action, and he has not persuaded me that my concerns are unfounded. I think Dr. Rodda is comfortable with the qualifications stated in the text of the scientific paper, and that he may believe the precautionary principle justifies the assumptions I think are unjustifiable. If those are Dr. Rodda's views, they are problematic.

The qualifications stated in the text certainly are warranted, but they do not go far enough – they do not clearly state all the assumptions that have been made, and they do not attach to the range maps. The range maps are powerful images that have already been widely disseminated to the public by the news media as a result of the news release. They have been disseminated, and will continue to be disseminated and used, without any of the qualifying language from the text. In the minds of people seeing those images alone, they will be USGS's projection of the future range of the Florida pythons, and the only question will be how long it takes the pythons to get there.

The precautionary principle is mentioned at one point in the text. The fact that the errors cited above all tend to exaggerate the projected range suggests that the precautionary principle was in play in the design of the model. It should not have been. The precautionary principle is a management tool, not a scientific principle or model. It offers a way to make management decisions where the available science falls short. It is not a perfect tool, and has been criticized, sometimes severely. It has no place in scientific analysis.

Recommendations for Corrective Action

Because of the power of the range map images, strong and immediate corrective action is necessary. With the same fanfare as the original news release, USGS should issue a press release clarifying that the range maps show the possible worst-case range of the Indian python, *Python molurus*, that they do not show the worst-case range of the Florida pythons, that there is no way at present to accurately project the worst-case range of the Florida pythons, but that the worst-case range of the Florida pythons is probably considerably smaller than that of the Indian python. In addition, USGS should publish a note in the journal *Biological Invasions* making the same points.

As a leader in invasive species science, USGS should undertake studies to provide a sound basis for predicting the climatic limits on the range of the Florida pythons. One approach would be to keep Florida pythons in a series of carefully designed outdoor enclosures along a climatic, north-south gradient and monitor their ability to survive temperate winters and to complete their life cycle under temperate conditions. A complimentary approach would be to repeat Barker's experiment with more individuals and perhaps a more rigorous experimental design. Conducting such studies and publishing the results would be a long-term correction of the incorrect information addressed by this letter, but could not be substituted for the immediate corrective action described above.

cc: Gordon H. Rodda, senior author
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