

The Tympanum

Invading to the South: Comments on Research on Salinity Tolerance of Burmese Pythons

Apparently researchers in the Giant Constrictor Risk Assessment Partnership [GCRAP] in South Florida are coming to the realization that their hypothetical thesis that Burmese pythons would and could invade north into the continental United States is now in a shambles, shredded largely by the past two cold winters. The experiment of Dorcas and Willson (2010), leaving 10 pythons outside in Aiken, South Carolina, to freeze to death in snow and ice in a huge enclosure full of a variety of types of shelters certainly didn't help matters. So what do they do now?

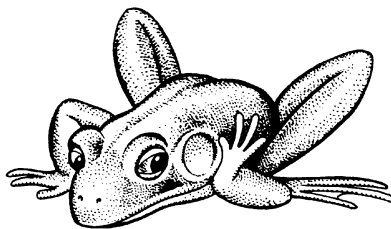
They start research projects to determine when and how those pesky pythons will invade to the south. That's right! Now they have set about determining just how the Florida Keys and the entire Caribbean beyond could be in dire danger of a flotilla of salt-tolerant pythons migrating southward, bringing with them all the scenarios of ecological collapse and eating poor pets and livestock that has never seemed to actually happen there in the Everglades. Well, there was one publicized goose incident. . . .

The brilliance of this idea is not lost upon us. We are certain that there were lots of high-fives and backslapping when someone had this brilliant idea. Really, would they rather be sitting in snowstorm in a swamp in northern Georgia setting up those ridiculously ineffective traps, preparing for the unlikely arrival of those giant slithering aliens, or sitting in Key West or Barbados, sipping piña colodas and waiting for the fleet to come in?

Of course it would be critical for them to get down there in advance and study the weaknesses of those insular ecosystems. GCRAP loves islands full of snakes—they've been monitoring brown tree snakes in Guam for 30 years now with funds well exceeding 100 million dollars of taxpayer money. Heck, they have never advertised the funding of that project and they have made it very difficult to discover—it might be 300 or 400 million dollars, courtesy of Congress, the military and the American taxpayer. Guam is where invasive snake biology was born.

So to start the ball rolling south, three researchers have published this very preliminary report titled: "Experimentally Derived Salinity Tolerance of Hatchling Burmese Pythons (*Python molurus bivittatus*) from the Everglades, Florida (USA)." The report is written by Kristen M. Hart, Pamela J. Schofield, and Denise R. Gregoire, all USGS employees, and published in the *Journal of Experimental Marine Biology and Ecology*. This is a report on a very simple experiment.

They took three groups of eight young Burmese pythons, shut them in cages, one to a box. They then gave one group only sea water to drink (salinity of 35), another group got brackish water (salinity of 10), and the third group, the lucky control group, got fresh water (salinity of .2). They then ran the experiment for 200 days. The snakes were checked five days a week, as invasive python biologists apparently don't work weekends.



Fourteen of the 16 babies in the two experimental groups died before the end of the experiment. We quote from the report: "Salinity strongly impacted survival of the hatchlings in the laboratory." They go on to state "[the result of . . .] each treatment was statistically different from the others." What that means is that the group receiving saltwa-

ter all died in 17 to 50 days (avg = 32 days). Six of the eight in the brackish-water group died (the first in 33 days, and the sixth in 197) and two in that group survived the experiment, bloated and not looking good. None of the control group died.

This is what is called a terminal experiment. Hart is a sea turtle researcher, or she was before she joined GCRAP—she knows all about salt glands and sodium balance in the blood. Schofield and Gregoire both have done very similar experiments to see how long freshwater tilapia will live in sea water and brackish water. They experimented on the animals until the animals died. The researchers knew that drinking sea water would kill the baby pythons—very few terrestrial vertebrates can survive drinking only sea water—the object was to see just how long baby pythons could live drinking only sea water and brackish water.

We suggest that this experimental design has a serious flaw. There should have been a fourth group of baby Burmese pythons that were given no access at all to water. Perhaps this was deemed too cruel, but this seems to us to be relatively important to the conclusions of this study. We don't know if anyone has tested this, but a baby Burmese python will live 20 or 30 days without drinking in normal captive conditions; in certain environmental conditions of high humidity and cool temperatures, baby pythons deprived of water probably can survive considerably longer than that. It appears to us that it is possible that this experiment shows how long a baby python can go without drinking before it is forced by thirst to drink sea water that then quickly kills it. It does not show any "experimentally derived tolerance" of baby pythons to poisonous levels of salt.

We note that in the manuscript the authors write that: ". . . individuals in the experimental treatment survived for about a month ***in*** full-strength sea-water (salinity of 35), and about five months ***in*** brackish-water (salinity of 10)." They go on to state that "Survival ***in*** salt water conditions during the first year of life for this species was unknown before now, and current global warming scenarios that incorporate sea-level rise are predicted to significantly reduce the area of suitable habitat for Burmese pythons, . . ." They then speculate that ". . . hatchling Burmese pythons could survive on average 32 days ***under full salt-water conditions*** . . ." [bold italics ours].

These statements take considerable liberty with the actual experiment. The baby pythons were never ***in*** salt-water and the researchers have no idea if baby pythons can live immersed and/or swimming ***in*** salt-water.

Taking every advantage of the media, the USGS is quick to advertise research that might increase their funding. Director

Marcia McNutt stated in a press release that came out the day of the publication “This study demonstrates the distinct possibility that pythons could spread to new suitable habitats one estuary at a time.” Apparently when Director McNutt read that the baby pythons were *in* salt-water conditions, she thought the snakes were actually in salt-water conditions, swimming their little hearts out for 32 days, not sickly, severely dehydrated, weak and bloated, dying of thirst.

The press release also credits Hart as saying “This recent study, based on lab experiments conducted by researchers from the U.S. Geological Survey, provides initial evidence that pythons may be able to survive in marine and estuarine environments such as bays, inlets and open seas.”

Our own conclusion on the results of this little study is that it clearly shows that drinking salt-water kills pythons. A lot of salt kills them fast and less salt kills them slower. It can kill them in as little as 17 days, about as fast as some of the poisons that have been tried on pythons in the USGS and USDA studies to “manage” the python problem.

Our second suggestion to the researchers for further experiments to investigate the resilience of pythons to swimming in salt water is this: Since there apparently are no objections to terminal experiments with baby pythons, it’s now time to actually investigate the swimming ability and endurance of pythons in fresh and salt-water conditions. We recommend that Hart and her colleagues buy 24 300-gallon Nalgene containers with smooth sides—round tubs 7 ft in diameter and 3 ft deep (expensive, but the government is paying). Then divide them into the three experimental groups and fill eight with salt-water, eight with brackish-water, and eight with fresh-water. Drop a baby python into each one and see how long they last until they drown. That seems to be the real way to determine the actual probability that baby pythons might swim over to the Keys and on out into the Caribbean.

USGS ought to be willing to maintain a live video feed on the USGS website showing those little pythons trying to keep their noses out of the water. It would probably have a huge audience and it would show us all the lengths that GCRAP researchers are willing to go to save the Everglades. **David G. Barker and Tracy M. Barker, vpi@beecreek.net**

Literature Cited

- Dorcas, M. E., J. D. Willson and J. W. Gibbons. 2011. Can invasive Burmese pythons inhabit temperate regions of the southeastern United States? *Biological Invasions* 13(4): 793-802 [doi:10.1007/s10530-010-9869-6].
- Hart, K. M., P. J. Schofield and D. R. Gregoire. 2012. Experimentally derived salinity tolerance of hatchling Burmese pythons (*Python molurus bivittatus*) from the Everglades, Florida (USA). *Journal of Experimental Marine Biology and Ecology* 413:56-59.
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