The Effect of Cold Weather On Large Constrictor Snakes

photo: Jemeema Carrigan, University of Florida

A female Burmese python is held down over her open nest, showing eggs, in south Florida. A prolific species, these snakes have a clutch size of up to 80 eggs.

The winter of January 2010 was one of the coldest on record in south Florida. While these conditions appear to have caused an immediate, yet unquantifiable, decline in the population of Burmese pythons, this species also showed signs of resilience and adaptability that could lead to breeding populations beyond the boundaries and warm climate of south Florida.

Despite the record cold, Burmese, Northern African and reticulated pythons survived in Florida, as did boa constrictors. We should expect invasive constrictor snake populations to persist, rebound and possibly increase their genetic fitness and temperature tolerance as a result of natural selection pressures caused by the unusually cold weather conditions in south Florida in January 2010.

In the months since that unusual cold-weather event, hundreds of adult Burmese pythons and more than 24 hatchlings were captured alive in Everglades National Park. During 2010, 322 Burmese pythons were captured or removed from Everglades National Park and vicinity, of which 67 were removed from October 18 to December 31, 2010—many months after the cold spell ended. The 322 Burmese pythons found in 2010 represent only a 12 percent reduction from numbers removed in 2009 (367 total). The freeze appears to have had a greater effect on pythons in the shallow marsh habitats, where underground and deep water refuge was absent.

Pythons can seek locations such as underground burrows, deep water in canals, or similar micro-habitats to escape the cold temperatures. In a study conducted in the Everglades, nine of ten radio-tracked snakes in shallow marsh habitat perished either from the cold temperatures or from complications experienced as a consequence of the cold temperatures. However, researchers observed many live pythons during the walking surveys to locate the radio-tracked snakes. These snakes were apparently able to maintain body temperatures using micro-habitat features of the landscape (Mazzotti et al. 2010).

Burmese pythons in the heart of the Everglades did survive, as evidenced by a mating aggregation of four adults found in March 2010 and several large adults found in April 2010. A live, pregnant female Northern African python was captured in the Bird Drive Basin Recharge area west of Miami in January 2010, immediately after the freeze. Later (December 2010 to January 2011), multi-agency efforts resulted in the capture of several Northern African pythons. Several species continue to breed in south Florida.

In a related study, Dorcas et al. (2010) relocated 10 Burmese pythons from the Everglades to an outdoor research setting in South Carolina in June 2009. The following January, the pythons all died. However, the pythons had not had a chance to acclimate to a milder winter before they were exposed to temperatures that were "appreciably colder than typical winters in South Carolina." Dorcas et al. (2010) concluded: "Some pythons in our study were able to withstand long periods of considerably colder weather than is typical for South Florida, suggesting that some snakes currently inhabiting Florida could survive typical winters in areas of the southeastern United States more temperate than the region currently inhabited by pythons. Moreover, our results are specific to translocated pythons from southern Florida. Burmese pythons originating from more temperate localities within their native range may be more tolerant of cold temperatures and would presumably be more likely to successfully become established in temperate areas of North America. The susceptibility to cold we observed may reflect a tropical origin of the Florida pythons or acclimatization of snakes to warm southern Florida winters early in life."

Given the climate flexibility exhibited by the Burmese python in its native range (as analyzed through the U.S. Geological Survey's climate-matching predictions in the United States), new generations within the leading edge of the population's nonnative range could become increasingly adaptable and able to expand to colder climates.

January 2012