

The Post-Release Success of Captive bred Louisiana Pine Snakes

By

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Abstract

The Louisiana pine snake is the rarest reptile in the United States, and the first and only SSP for a continental U.S. reptile. In this study, 19 captive bred and raised Louisiana pine snakes were surgically implanted with radio transmitters and released onto six sites on three patches of land in Louisiana, located in Kisatchie National Forest, Winn and Natchitoches Parishes, and International Paper land in Louisiana. The snakes were distributed evenly over fire-suppressed and regularly burned tracts of land and then monitored for 18 months. The snakes were relocated at four to six week intervals. Once found, fecal and cloacal samples were taken, and weight and lengths recorded. Through radio telemetry, we were able to collect data on home range, release site fidelity, and relative success rate of the Louisiana pine snake released onto the two types of managed land. Results are pending due to data still to be recovered from the field. Data so far has shown that at least five of the nineteen snakes have died in the field. Blood chemistry profiles show marked shifts in differential leukocyte composition and decreased serum protein. These data will enable us to determine optimum sites for releasing the most suitable captive-bred snakes. After this is established, a large-scale reintroduction program could begin to preserve this rare species.

Introduction

As humans continue to encroach on native animals' habitat, the need for greater and more thorough protection becomes more urgent. The Louisiana pine snake is an example of a species requiring our assistance. The Louisiana pine snake, *Pituophis ruthveni*, is the rarest reptile in the United States (USFWS 1991; Reichling, 1986). The current population stands at a precarious 68 individuals (Reichling, pers. comm.). Their range has been described as being confined to the longleaf pine forests in west-central Louisiana, extending into east Texas and historically into the northeastern corner of the Florida Parishes (Dundee, Rossman 1989). Because of their geographic isolation, this makes the species more vulnerable. The Louisiana pine snake is the first and only continental U.S. reptile managed by the American Zoo and Aquarium Association's Species Survival Plan. Only 6% of SSP's are for native wildlife. Because the Louisiana pine snake is a native animal, it is already at an advantage to reestablish its presence in the wild. Its locality enables the parties involved to work more closely together to maintain ties and connections necessary to make this SSP a success. Reintroducing a native animal can be much more realistic and less complicated than attempting to reintroduce an exotic SSP. Exotic SSP's can be much more problematic when trying to initiate and sustain relationships between crucial individuals involved, when the animal in question, or the parties involved are not in close proximity. Appropriate actions are now underway to guarantee that the invaluable captive population is being carefully managed for the future. Through comprehensive lineage analysis and accurate

breeding selections, as well as field work, the Louisiana pine snake SSP can be an effective model of conservation. With funding and data produced by the Memphis Zoo, Audubon Zoo, and the American Zoo and Aquarium Association, we are attempting to create a connection between the current Louisiana pine snake breeding program in zoos and future efforts to preserve this snake in its natural habitat.

The Louisiana pine snake's optimal habitat is longleaf pine forest located on deep, sandy ridges. This habitat is characterized by a lack of midstory and herbaceous understory vegetation. These critical conditions have historically been created and maintained by wildfire and in contemporary times by prescribed burning. However, forest managers are increasingly turning away from prescribed burning in preference of other underbrush control techniques, such as herbicide application. This shift is especially common in loblolly or slash plantations, which produce lumber and paper products here termed as "industrial forest". It has been hypothesized that the recent decline in the Louisiana pine snake population is due in part to fire-suppression leading to a development of a dense midstory, which eliminates the characteristic grassy understory (Rudolph and Burgdorf, 1997). These grasses are the primary food source of the local pocket gopher, *Geomys breviceps*, which in turn are the leading prey of the Louisiana pine snake.

Materials and Methods

The Louisiana pine snake project is currently managed by the Memphis Zoo and the Audubon Zoo. The principal investigator that initiated and currently oversees the entire project is Dr. Steve Reichling of the Memphis Zoo. A Conservation Endowment Fund grant enabled the initial project to become an inclusive experiment, which is currently an ongoing project. We began the study in September of 2000 to determine the response of captive bred and reared Louisiana pine snakes to repatriation into their native habitat. This began with the release of four snakes. Five snakes were later released in early 2001. These nine snakes were monitored over an eighteen-month period. A second replicate study consisting of ten snakes was performed the following year. These nineteen snakes were released on six separate sites, comprising three independent experimental replicates comparing repatriation success on burned versus unburned land.

The study is conducted in Kisatchie National Forest, in Winn and Natchitoches Parish, and on International Paper's Bodcaw Unit in Bienville Parish, Louisiana. Louisiana pine snakes were surgically implanted with radio transmitters at the Memphis Zoo and subjected to rigorous health screening prior to their release. The six sites are evenly distributed over two differently managed tracts of land; fire-suppressed and regularly burned. The Kisatchie land is managed by the U.S. Forest Service. Here habitat for red-cockaded woodpeckers, *Picoides borealis* is created with burn-management practices. International Paper's land is a large, even-age loblolly pine plantation that is intensely managed for commercial silviculture through fire-suppression. The snakes are relocated at four to six week intervals. Once located, we record the weight and length (SVL cm) of each snake. Blood, cloacal swabs and fecal samples are also collected in order to monitor changes in health and to determine prey being eaten.

Results

The results have been variable and are still being collected and analyzed. Some of the snakes are resurfacing during the winter and two have perished during this time. There are five confirmed

mortalities to date. Two snakes on the USFS land were found dead in 2001 soon after their release. Only partial skeletal remains of the snakes and the radio transmitters were found. Four snakes cannot be found due to signal loss. We have also found that the snakes spend the majority of their time dwelling in Baird's pocket gopher, *Geomys breviceps*, burrows. We have collected fecal samples from 3 snakes. The samples are frozen and will later be analyzed once all samples have been collected at the end of the study. We are expecting to confirm that not only are the snakes dwelling in the *Geomys* burrows, but that they are predated on the gophers as well. Blood samples indicate that protein levels dropped significantly in the post-release figures as compared to the pre-release figures. Blood analysis has also shown shifts in differential leukocyte counts that point to inflammation pathology. Over all, snakes have increased in length, but decreased in mass since their release. We have found distinct differences in distances traveled between male and female released specimens. Males have wandered farther from the release sites. Preliminary data suggest that males in industrial forest sites drift farther than males in more natural areas. Females have shown greater release site fidelity in industrial forests. These captive-reared snakes are utilizing much smaller areas as home ranges compared to home range data for native pine snakes.

Discussion

Snakes that are resurfacing during the winter are exhibiting unnatural behavior. This may be making them more vulnerable to predation. Finding only partial remains of the snakes' skeletons and torn or shredded radio transmitters under a probable raptor perch suggested to us that a bird of prey is most likely the cause of their death. Radio transmitter signal loss is most probably due to predation and out-of-signal range, not transmitter failure. We assume this to be true due to the fact that the transmitters were new at the time the signals were lost. Almost every released snake is found within a gopher burrow. There is evidence of active gopher mounds present at almost every site the snakes have been found and the snakes are actively using the extensive gopher burrow systems. Significant protein level changes in pre-release samples compared to post-release samples suggest the snakes have experienced a reduction in food consumption after having been released. This would account for the weight loss in all of the individual snakes. As the snakes appear emaciated, we suspect that they are unable to subdue pocket gophers, despite their instinctive ability to locate them. The shifts in leukocyte counts (that point to inflammation pathology) may be attributed to the implanted transmitters. As the sample size continues to increase, trends in blood chemistry changes and statistical comparisons will eventually be drawn.

Conclusion

The study is not completed and we will continue to collect data until April of 2004.

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