

Year of the Snake News

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www.yearofthesnake.org

New Jersey Pinesnakes: an Experiment in Relocation

by Kim Korth, New Jersey Division of Fish & Wildlife



A Northern Pinesnake (*Pituophis m. melanoleucus*).
Photo by Scott Smith.

New Jersey has some of the most stringent land use regulations in the country, and some of these rules give the state the ability to protect habitat for rare species in both uplands and wetlands. These regulations are strongest in the state’s Coastal Zone and Pinelands region, where development applications that would lead to adverse impacts on rare species habitat are typically not approved. However, in 2006 under a set of unique circumstances in this region

(involving the need to properly close a large, old municipal landfill), the state approved a development application that resulted in the loss of ~ 388 acres of state-threatened Northern Pinesnake (*Pituophis melanoleucus melanoleucus*) habitat. The development application was approved with the following set of required conditions: 1) to properly cap and close a “leaky” municipal landfill on the site; 2) to avoid direct mortality to pinesnakes on the site, the applicant had to contract an environmental consultant to capture all pinesnakes using the site and relocate them ~ 3,000 feet west to an adjacent property managed by the Division of Fish and Wildlife; 3) to create 16 acres of pinesnake nesting habitat (“management fields”) at the “relocation site” and to construct 6 artificial pinesnake hibernacula within these fields; and 4) at an overall cost of \$790,000, the applicant funded a 7-year radio-telemetry study to determine how the relocated snakes responded to being moved from their familiar habitat to the relocation site.

By the fall of 2006, a total of 101 pinesnakes (26 adults and 75 hatchlings/juveniles) were collected from the development site and temporarily held in a lab for release at the “relocation site.” The collected snakes were released in September 2006; 20 adult pinesnakes and 75 hatchlings/

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Pinesnake habitat in the New Jersey Pine Barrens.
Photo by Scott Smith.

sponsored by PARC - Partners in Amphibian and Reptile Conservation

Get Your October Photo Contest Calendar



Beauty can be found in the mud - if it's a Mudpuppy, like this month's calendar winner photographed by John White. Look by the water for the runner-up, too, or just download your free October calendar to take them both home at <http://parcplace.org/images/stories/YOS/YearoftheSnakeCalendarOctober.pdf>.

It's not over yet!

Call for Photos for the 2013 Year of the Snake Calendar Photo Contest

Yes! We are *still* seeking close-up, digital photos of snakes, preferably in their natural habitats or within an educational or conservation context. One winner will be selected each month to be the featured photo as part of the Year of the Snake online calendar. Runner-up photos will also be included in the calendar. Additionally, all submitted images will be considered for use in the Year of the Snake monthly newsletter and website as well as other Year of the Snake-related conservation, outreach, and educational efforts. Give us your best shot! For more information and for entry details, please visit http://parcplace.org/images/stories/YOS/YOS_Photo_Contest.pdf.

Have a Question? Ask the Experts!

Submit your snake questions via email (parcyearofthesnake@gmail.com) to our panel of snake experts, and we will select questions to answer in upcoming newsletters. Please include your name and location in your email message.

Submit Your Citizen Science Projects

A compilation of snake citizen science (volunteer) inventory and monitoring projects has begun. These will be featured in our monthly newsletters. Send any information on these types of projects to parcyearofthesnake@gmail.com.

Submit Your Snake Art, Stories, and Poetry

Submit photos of your snake art (jpg, tiff, or pdf files) and copies of your stories and poems via email to parcyearofthesnake@gmail.com. Please include your name, location, and any comments about the submission in your email message. We will select submissions to include in upcoming newsletters.

Upcoming Meetings & Events

The Wildlife Society [TWS] Annual Meeting, October 5-10, Milwaukee, WI.

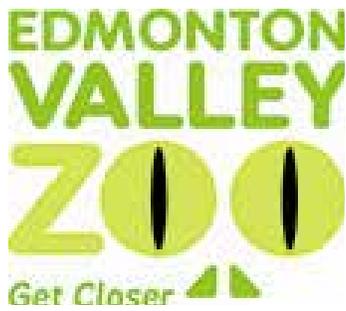
Effects of Wildlife Fire & Fire Management on Amphibians & Reptiles Symposium, October 7, at The Wildlife Society meeting in Milwaukee, WI. See http://www.parcplace.org/images/stories/meetings/meeting_-_2013-08-30b.pdf for details.

Wetland Restoration Workshop, October 10-11, Mt. Orab, OH. See <http://www.wetlandsandstreamrestoration.org/Training/Mt.%20Orab%20Wetland%20Restoration%20Workshop.pdf>

Sabino Canyon Lizard Walk, October 12, Sabino Canyon Rec. Area, Tucson, AZ. Meet at 8 am at the visitors' center.

Northern Copperhead program, October 16, 6:30 pm, Sessions Woods Conservation Education Center, Burlington, CT. See [CT DEEP Year of the Snake webpage for details <link>](#).

Year of the Snake Collaborating Partners



Edmonton Valley Zoo

www.valleyzoo.ca

Nestled on the banks of the North Saskatchewan River, the Edmonton Valley Zoo is a small, accredited and intimate zoo that provides authentic and engaging animal experiences. The Edmonton Valley Zoo team is passionate about working to preserve the natural world and promoting environmental responsibility. Zoo staff work with international organizations on ethical and strategic conservation projects – either actively raising animals in species survival programs or raising money and awareness – to support initiatives in other parts of the world. The Edmonton Valley Zoo houses 9 different species of snakes including local and exotic species. Rover, our resident Children's Python will be competing in the Edmonton Valley Zoo's Race for Animal of the Year. This race is a fictitious race where 4 animals are pitted against each other for a race of donations! All the money raised for Rover will be going to PARC, Amphibian and Reptile Conservancy and Year of the Snake for their efforts in improving reptile and amphibian habitats!

Zoo Atlanta

www.zooatlanta.org

We envision a world in which humankind values, protects and preserves the diversity of species on Earth. We strive to inspire the citizens of Atlanta and Georgia and all visitors to the Zoo to value wildlife on Earth and to help safeguard existing species through conservation. We do this by providing an informative, educational, and engaging experience, being respectful and responsible stewards of the animals and the physical and financial assets entrusted to us, and engaging in related conservation activities and research. We take personal responsibility for the animals in our care as well as all the resources we use. We are honest, fair, reliable and sincere. We are trustworthy and value the trust of our community. We maintain an environment of trust, openness, respect and transparency to maximize the creativity and productivity of our organization. We will recruit and support employees and volunteers with diverse perspectives and talents that result in a strong, focused and innovative organization. We create an enriching and welcoming atmosphere for all members and guests. We provide courteous and helpful attention to ensure they have a wonderful experience each time they visit.



If you are interested in contributing to the Year of the Snake efforts, please send an email to parcyearofthesnake@gmail.com with a brief description of your organization and its efforts. Our full list of partners can be found at: <http://www.parcplace.org/news-a-events/2013-year-of-the-snake/271.html>.

facebook

Follow all of the Year of the Snake news and happenings on Facebook (<http://www.facebook.com/YearOfTheSnake2013>) and Twitter (@yearofsnake2013).



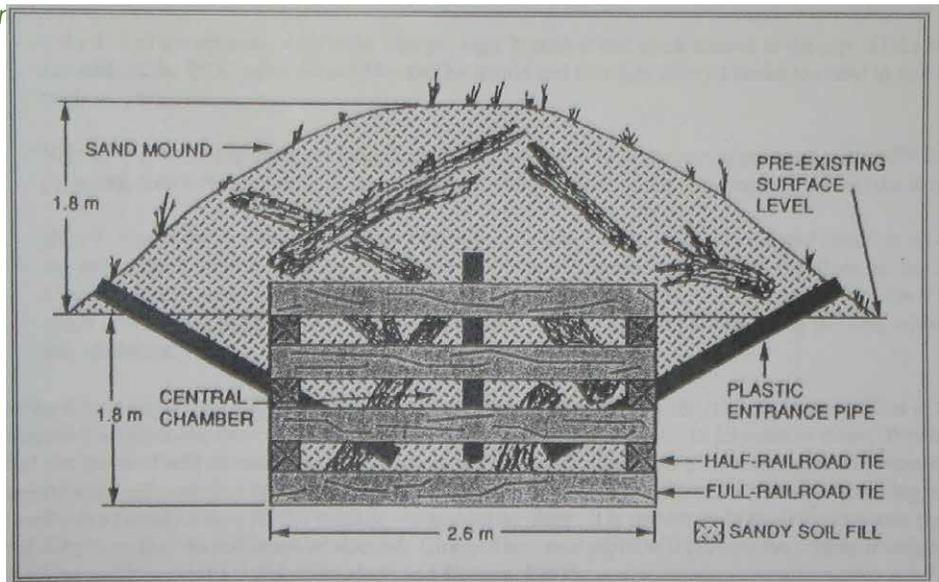
Are You an Educator or Interpretive Naturalist?

We are working to create resources for teachers and naturalists! If you are willing to share, please send your unit materials, educational program information, or PowerPoint presentations to parcyearofthesnake@gmail.com. Please include your name, the name of your school/nature center or organization, and location. If you did not create the materials, please be sure to tell us where you found the materials.

New Jersey Pinesnakes, *continued from* juveniles were placed in fenced enclosures around the 6 constructed artificial hibernacula. Due to health concerns, the remaining 6 adult snakes were released in spring 2007 when they were fit. The enclosures kept the snakes in close proximity to the hibernacula, thereby increasing the likelihood that they would use the hibernacula during the first winter. Overwintering success, daily movements, and habitat use by these snakes were monitored over the next 7 years, with a goal of determining:

- 1) if relocated Northern Pinesnakes successfully overwinter in artificial dens;
- 2) how the movements and habitat use of relocated snakes compare to that of “resident” snakes;
- 3) if pinesnakes (relocated and resident) use the created nesting habitat of the management fields;
- 4) if relocated snakes move back to the development site.

Adult pinesnakes that were moved from the development site in 2006 exhibited what appears to be high mortality (46% died by fall 2008). By the end of 2012, only 1 of the original adult 2006 relocated snakes was alive (96% mortality over 6 years). How this level of mortality relates to natural mortality for this species in this region is being investigated. This study did determine that pinesnakes successfully overwinter in artificial hibernacula; overwintering in artificial dens was common for relocated pinesnakes. In fact, the one remaining adult pinesnake from the original 2006 relocated cohort was found to have overwintered in an artificial hibernaculum during the winter of 2011/2012. Other “non-moved” pinesnakes from the area have been documented successfully overwintering in these hibernacula. In addition,



Schematic of artificial den (hibernaculum) from Zappalorti and Reinert 1994.



An artificial hibernaculum for Northern Pinesnakes (*Pituophis m. melanoleucus*) is constructed out of alternating railroad ties.



PVC pipes are placed in the cardinal directions to allow pinesnake movements in and out of the artificial den.



Rootballs and pinesnake sheds are placed inside to create internal cavities and scent attractants, respectively. Bob Zappalorti is pictured placing sheds.



The artificial den is capped with a waterproof fabric and then buried. Soil is mounded to insulate the den chamber. All photos above by Scott Smith.

relocated and resident snakes exhibited widespread use of the created “management fields,” and several observations of pinesnakes using the fields for shedding, foraging, concealment, and nesting were documented. Fall of 2013 will mark the end of the data collection and telemetry portion of this study. Over the next year, a detailed analysis of the data and a final report of findings will be generated. Detailed annual reports of this project (2007-2012) can be found on the NJ Division of Fish and Wildlife website at: <http://www.njfishandwildlife.com/ensp/literature.htm>.



The immediate den area is enclosed within snake-proof fencing to keep snakes inside through the first winter. Streamers were added to deter hawks after a number of young pinesnakes were predated.



A much larger area of pinesnake habitat is fenced, which encompasses the smaller artificial den enclosure. Pinesnakes that successfully overwinter in the artificial den are released into this area the following spring. This outer fence keeps pinesnakes within the immediate area through one more winter, giving them more time to imprint on their new home range.



Natural and artificial cover objects and plants were placed within the smaller enclosures to provide microhabitat and escape cover needs for the pinesnakes. Dave Golden (NJ DFW) finds a pinesnake under a coverboard.



PVC openings to an artificial den with a pinesnake entering.



Even out in the open, pinesnakes can be difficult to spot in their natural habitat, thanks to their cryptic coloring. All photos on this page by Scott Smith.

Smooth Green Snake Recovery in the Prairie State

by Allison Sacerdote-Velat, Ph.D.—Lincoln Park Zoo, Department of Conservation and Science



A head-started Smooth Green Snake explores the vegetation in a soft-release enclosure.



Reintroduction Biologist, Allison Sacerdote-Velat, Ph.D., recaptures a head-started Smooth Green Snake in the field.

Headstarting is rearing young animals in a captive environment to increase their chances of survival in nature. Supplementation, or augmentation, is the addition of individuals to small populations to increase population size and genetic diversity. Reintroduction is the establishment of new populations where the species was historically present, but has since become locally extinct. Supplementations and reintroductions use soft or hard releases. Soft releases provide zoo/captive-raised animals with an acclimation period outdoors, in an enclosure, prior to full release. This may improve survival and site fidelity. Hard releases do not include enclosures or acclimation. Animals are released directly into nature, often due to logistical constraints. In our program, we compare survival of headstarting efforts with both approaches to evaluate efficacy of the techniques.

We use Population and Habitat Viability Analyses to predict snake survival in particular sites under several scenarios. These analyses model how survival rates change with differences in population size, birth rates, number of snakes released, and in different habitats. The models inform decisions such as which sites will best support snakes into the future, and how many headstarted animals will protect the remaining wild populations from extirpation.

In many states, Smooth Green Snakes (*Opheodrys vernalis*) are a Species of Greatest Conservation (SGCN). Populations are declining through much of their range such that they are listed as State Endangered in Iowa and Indiana. Declines are attributed to habitat loss, and insecticide application limiting the insectivorous snake's prey. Smooth Green Snakes occupy a variety of grasslands. For these tiny snakes, many barriers limit recolonizing restored grasslands. Despite the presence of restored habitat, headstarting or reintroductions may be necessary for population persistence.

In 2010, a partnership was developed between Lincoln Park Zoo and Lake County Forest Preserve District (LCFPD) in Illinois with goals of integrating habitat restoration and applied population management for the conservation of Smooth Green Snakes. LCFPD Wildlife Biologists, Gary Glowacki and Tim Preuss, developed a wildlife monitoring program for District properties that identified the snake as warranting recovery.

The Lincoln Park Zoo monitors Smooth Green Snakes in restored and remnant grasslands. We use mark-recapture techniques to estimate population sizes, survival, growth, and birth rates. We collect habitat data to create models of habitat use. We then bring a few breeding pairs (founders) to Lincoln Park Zoo for the zoo breeding and headstarting programs. At Lincoln Park Zoo, we compare the success of several conservation techniques, such as how survival differs with release type, or how artificial overwintering affects growth.



At hatching, Smooth Green Snakes are dark olive green and typically weigh about one gram. Shown here with a penny for scale.

We have hatched eggs from 11 nests for headstarting efforts, including a communal nest of 84 eggs. Thus far, 36 have been released as one- or two-year-old headstarted animals at supplementation sites. Additional releases are slated for 2014. Survival and movements are monitored through surveys and limited radio tracking. Additional snakes remain at Lincoln Park Zoo breeding colony to produce future headstarted animals. Several snakes are on exhibit to inform the public about the need to conserve this native snake, and to increase appreciation for the role of snakes as umbrella species for habitat restoration.

Since the program began, surveys have expanded in additional counties. Expanded surveys will update knowledge of the number of Smooth Green Snake populations remaining in the region, assess the need for reintroduction and supplementation, and provide data about their use of restored lands.



Zoo biologists verify Smooth Green Snake ventral marks as they are placed into soft-release enclosures.



A fully-grown gravid female Smooth Green Snake is small in size and uses camouflage to avoid predators.



A zoo-hatched Smooth Green Snakes on exhibit at Lincoln Park Zoo.

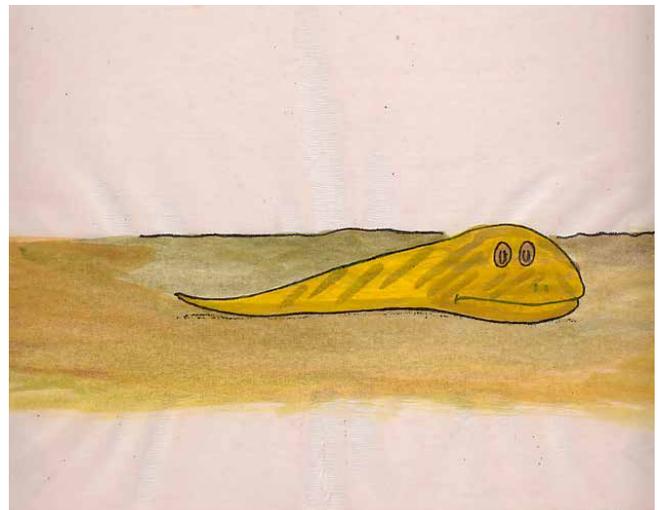
Snake Myths

by Carrie Elvey, *The Wilderness Center*

Because of their unique lifestyle, snakes are prone to being the subject of myth and legend. Some of these myths have a kernel of truth, others have no discernible origin. Read on to learn the truth about these myths.

Myth: Snakes Don't Have Bodies, Just Tails

Facts: Snake do have tails. In most species the tail is relatively short – a small proportion of the body length. A snake's tail starts at the cloaca (the sole opening for both intestinal and reproductive tracts.) Ever wonder how many ribs a snake has? Count the number of long belly scales - most snakes have a pair of ribs corresponding to each belly scale (up to the cloaca).



Artwork courtesy of *The Wilderness Center*

Return of the Eastern Indigo Snake to Alabama through Reintroduction

by Jim Godwin, Auburn University



Adult Eastern Indigo Snake next to a young Longleaf Pine, the characteristic tree of its chief habitat. Photo by Jim Godwin.

We're well into our fourth year of having Eastern Indigo Snakes back in Conecuh National Forest and the reintroduction is showing some success. But why go to the effort needed to re-establish a snake into a forest ecosystem? What factors underlie our reasons for reintroducing the indigo snake into Alabama? The Eastern Indigo Snake (*Drymarchon couperi*) is one of two upland serpent species that have been extirpated from the state, the other being the Southern Hognose Snake (*Heterodon simus*). Loss of the indigo appears to have been associated with loss of the Longleaf Pine forest and declines in Gopher Tortoise (*Gopherus polyphemus*) populations. The majestic longleaf forests were timbered, converted to pine monocultures, and fires were suppressed, and as the longleaf forests and associated sandhills were decimated, so were the tortoise populations. In the northern portion of the range the indigo snake overwinters in Gopher Tortoise burrows; thus, as tortoise numbers declined, so followed the snake. The best guesstimate of the extirpation of the indigo in Alabama places the time in the late 1950s to early 1960s.

Over the past few decades, Longleaf Pine forest ecosystem restoration has increased and the Gopher Tortoise is receiving protection through state laws. For example, in Alabama, not only is capture and possession of the tortoise illegal without the proper

scientific permit, the gassing of burrows is prohibited to the extent that possession of gassing paraphernalia is illegal. The combination of long-term longleaf ecosystem restoration on large tracts of land coupled with Gopher Tortoise protection and conservation provide the management and ecological underpinnings for the reintroduction of the Eastern Indigo Snake. Conecuh National Forest was selected because longleaf restoration and management has been underway for a few decades, will continue into the future, it encompasses a large ecologically heterogeneous tract, is connected to the Blackwater River State Forest in Florida, and is near other large parcels such as Eglin Air Force Base.

Before a reintroduction can proceed, a source of snakes is needed. We turned to Georgia as the source, as populations

in southeast Georgia were stable, and being at similar latitude as south Alabama should be ecologically similar. To minimize impacts upon the source populations, no adults were permanently removed. Instead, gravid females were collected and held until eggs were laid, then the females were returned to the point of capture. The indigo eggs were then hatched in the lab and the young reared for almost two years before release. The purpose behind holding young snakes for two years was to grow them to a larger size for holding a radio transmitter. A side benefit to this was that the snakes were head-started.

Radio telemetry was used in the first three years to follow snakes in order to understand snake movement patterns, survivorship, home range, and habitat use. Two release methods were also tested—hard vs. soft release. Large pens,



Tiny hatching indigo snakes break shell. Photo by Jim Godwin.

each about 1 hectare in size, were constructed at the release site, and a subset of snakes with radio transmitters were placed in the pens. These were the soft-release snakes. The concept is that the pens would limit snake movements and increase survivorship. Hard-release snakes were simply set free outside the pens. The pens were moderately successful at retaining snakes; as anyone who has kept snakes in captivity knows, containing a snake may be an on-going challenge, and this is even more the case with snakes in a wild environment.

The goal of the reintroduction is to establish a self-sustaining population of the Eastern Indigo Snake in an area where it has been absent for 50 to 60 years. The endpoint of human intercession will be when the population is deemed to be self-sustaining. But the overall success is more than demonstrating a biological integration of this species into the ecological framework of the Longleaf Pine ecosystem. Acceptance by the public, facilitated by education, and cooperation among the agencies that manage the land are needed.

Project success can be viewed in another light. While the work is being carried out in Alabama, this is actually a multi-state, multi-organizational, and multi-agency partnership. The core partnership is between Auburn University, Alabama Department of Conservation and Natural Resources, and The Orianne Society, with further support from Georgia Department of Natural Resources, Zoo Atlanta, U.S. Fish and Wildlife Service, U.S. Forest Service, and U.S. Army. All have come together to promote conservation of the Eastern Indigo Snake in the southeastern United States.



An Eastern Indigo Snake back home in Alabama. Photo by Jim Godwin.