



SHORT-TERM RESPONSE OF TIMBER RATTLESNAKES TO TIMBER MANAGEMENT IN INDIANA



Researchers always minimize handling venomous snakes as much as possible. Proper training and safety equipment such as handling tubes are essential for the safety of the researcher and the snake.

Current Status

Third year of a four-year project
(Jan. 1, 2009–Dec. 31, 2012)

Funding Sources and Partners

State Wildlife Grant (T07R08), Purdue University,
IDNR Nongame Fund

Project Personnel

Principal investigator, Brian MacGowan, extension
wildlife specialist

Mathew Cross, field crew chief (2009)
Jami MacNeil, technician (2009, 2012)
Keith Norris, technician (2009)
Lucas Woody, technician (2009)
Stephen Ritchie, technician (2010)
Bennie Johnson, technician (2010)

Kile Westerman, technician (2010)
Tim Jedele, technician (2010)
Megan Dillon, technician (2010)
Andy Mueller, technician (2011)
John Vanek, technician (2011)
Rebecca Rhodes, technician (2011)
Sara McManus, technician (2011)
Matt Hamilton, student (2012)
Seth Lagrange, student (2012)

Background and Objectives

Timber rattlesnakes (*Crotalus horridus*) are endangered in Indiana. Their distribution is restricted primarily to large forest patches with suitable den sites in the south-central part of the state. Timber harvesting is a common practice on Indiana forests that can change timber rattlesnake habitat. How a timber harvest affects timber



Although visually dramatic to people, clear cuts had little to no impact on timber rattlesnakes in terms of movements or survival.

rattlesnakes is often the result of three circumstances: the method of harvesting, time of year, and proximity to critical timber rattlesnake areas (e.g., hibernation sites). Learning how timber harvesting affects rattlesnake behavior and habitat use provides information necessary to minimize or avoid such impacts.

The objectives of this project are to:

1. Measure the home range, movements and habitat use of timber rattlesnakes on managed forests.
2. Assess the short-term impacts of timber harvesting on timber rattlesnake movement and habitat use.
3. Estimate timber rattlesnake adult annual survivorship during the active and hibernal seasons.
4. Assess den characteristics during the hibernal period.

Methods

The study sites are in Morgan-Monroe and Yellowwood state forests and are part of the Hardwood Ecosystem Experiment (HEEForestStudy.org). We randomly assigned one of three treatment control sites: (a) where no timber harvesting takes place, (b) that are uneven-aged, where some trees are harvested, and (c) that are even-aged, where trees are harvested in 10-acre clear cuts. We studied movements and habitat use of timber rattlesnakes to assess how those may change either positively or negatively in areas where trees are harvested.

Timber rattlesnakes are hard to find, even in areas where they are common. They blend with their environment and spend most of their time motionless in thick cover. For this project, rattlesnakes were located by searching for them or opportunistically finding them while driving or conducting other work. Upon finding a snake, trained technicians marked the location coordinates; measured and weighed the snake; determined its sex; and marked it using a PIT tag, which is a device similar to what veterinarians use to mark dogs and cats.

We used radio telemetry to relocate, three times per week, 40 snakes throughout their active season (April–October). Purdue University veterinarians implanted a small transmitter (about the size of an AA battery) in each snake. Habitat measurements for one location (and random point) per week per snake were collected during part of the summer. We organize and analyze the data while the snakes are underground during winter.

Progress to Date

Throughout the 2009 to 2011 field seasons (May–October), we tracked 44 snakes (21 males and 23 females) around seven core units. These totaled more than 5,150 locations. In addition, we measured habitat data at more than 1,100 points during summer. Multiple years of data collection are required to account for environmental

variability that occurs year to year. Information from this study was also instrumental in producing a technical guide on managing forests for reptiles and amphibians in 2012. The final year of the study was also spent on two undergraduate research projects.

The first undergraduate research project dealt with timber rattlesnake population ecology. How animals survive is ultimately one of the most important aspects of wildlife ecology. The three years of telemetry data we collected allowed us to estimate annual survival of rattlesnakes over each year. Annual average survival of rattlesnakes during the study was 93 percent (about normal for long-lived species) with male rattlesnakes having slightly higher survival rates than females. Survival rates did not vary across units—that is, rattlesnake survival was not lower or higher on units with clear cuts compared to control units. Causes of rattlesnake mortality over the study included predation by raptors, vehicles on roads, overwintering (cold or old-age) and human persecution.

The second undergraduate research project studied blood and biochemical characteristics of timber rattlesnakes throughout the active season. In 2012, blood samples were collected from telemetered snakes after emergence, during breeding and prior to hibernation. This information will be used to assess population health and provide baseline data for future studies of timber rattlesnake health.

A major challenge of the project is working in a large, remote area. A major portion of our expense is vehicle maintenance and gas. For example, our farthest study sites are more than 17 miles apart as the crow flies, and vehicle access on most areas is limited. Thus, getting from site to site takes significant time, as does walking around on a site.

Radio telemetry is another costly but necessary aspect to this project. Without radio transmitters, relocating snakes throughout the year would be impossible. Snakes must be relocated regularly to assess the size of area they use, length of movements, and the type of habitat structure they use within a year or between years. Doing telemetry in hilly, rocky areas with many trees takes a lot of time and money. Each transmitter costs about \$300. The battery lasts one to three years, depending on size. There are also costs for the receivers used to track the snakes (\$900–\$2,000 each), surgeries to implant the telemetry transmitters, and high-sensitivity GPS units to estimate locations.

The largest expense for the project is labor. Fourteen undergraduate students and eight recent college graduates have worked on the project. This offers each valuable experience in the design and application of wildlife field research while helping he or she gain full-time employment or admission into graduate school. Timber rattlesnakes were the focus of this project, but the research skills and techniques students learned while working on the project directly benefits the education and careers of many students.

Cost: \$321,924 for total four-year project



The dense vegetation and downed woody debris in clear cuts provided timber rattlesnakes an abundance of cover. This photograph of a timber rattlesnake was taken in a clear cut three years after harvest.