



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



This adult female timber rattlesnake patiently waits for a chipmunk or other potential prey animal to scurry by along this log. Photo by Brian MacGowan.

Current Status

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

Funding Sources and Partners

State Wildlife Grant, Purdue University,
DNR Nongame Fund

Project Personnel

Principal Investigator, Brian MacGowan,
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Mathew Cross, field crew chief (2009)
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Background and Objectives

Timber rattlesnakes (*Crotalus horridus*) are endangered in Indiana. Their distribution is restricted to primarily large forest patches with suitable den sites in the south-central part of the state. Timber harvesting is a common practice on Indiana forestlands that can potentially change timber rattlesnake habitat. The type of harvesting method, the time of year it is done, and its location relative to critical timber rattlesnake areas (e.g., hibernation sites) can affect the practice's level of impact to timber rattlesnakes. 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 rattlesnakes' movement and habitat use.

Timber rattlesnake locations

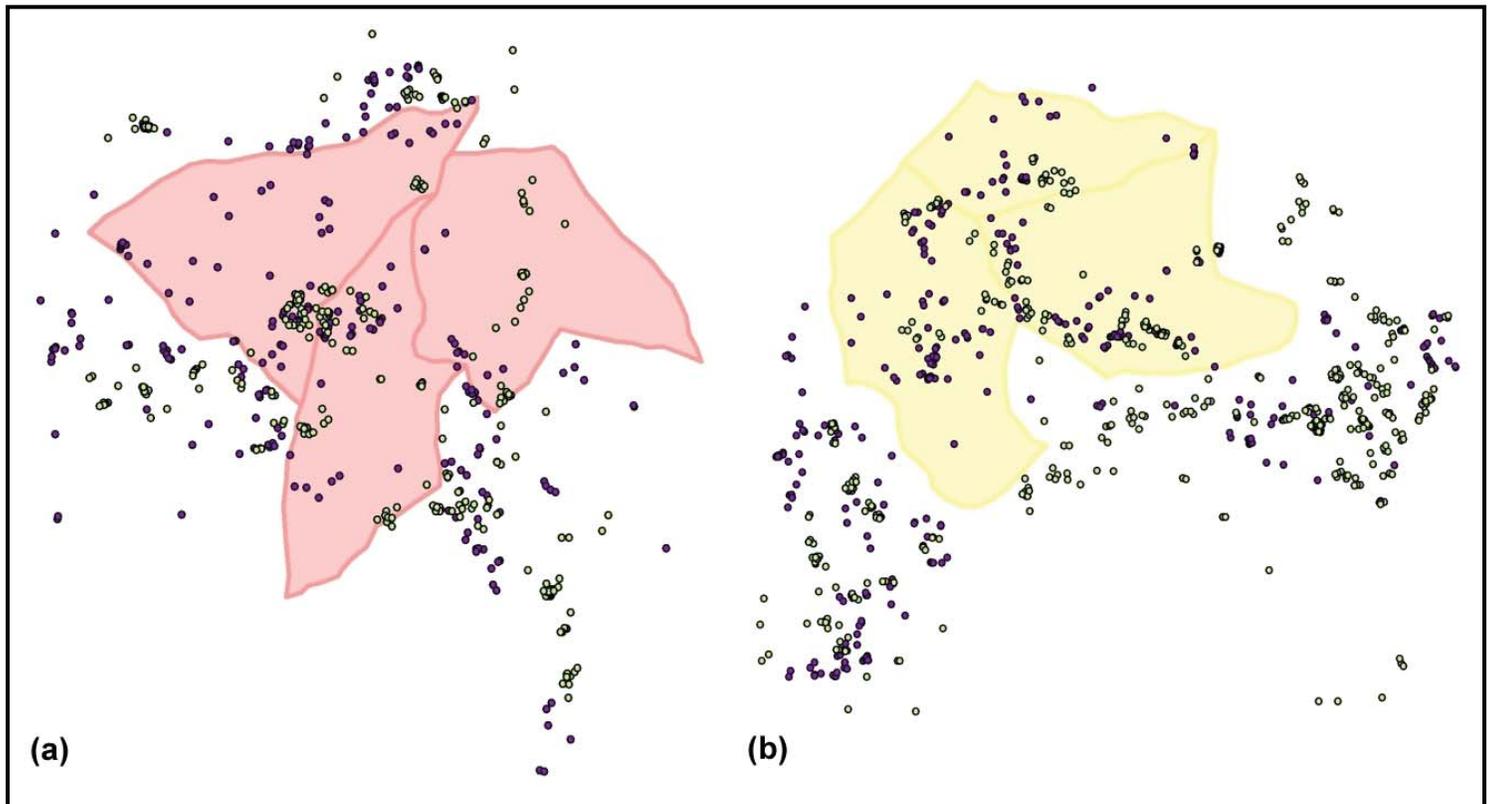


Figure 1. Timber rattlesnake locations mapped on (a) a control unit and (b) an even-aged treatment unit for the Hardwood Ecosystem Experiment, 2009 (blue) and 2010 (green). Mapping animal locations over time allows researchers to estimate animal area requirements and habitats they use.

Methods

The study sites are located on Morgan-Monroe and Yellowwood state forests and are part of the Hardwood Ecosystem Experiment (www.HEEForestStudy.org). We randomly assigned one of three treatment controls where (a) no timber harvesting takes place, (b) uneven-aged where some trees are harvested, and (c) 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 very hard to find, even in areas where they may be relatively common. They blend extremely well with their environment and spend most of their time motionless in thick cover. For this project, rattlesnakes were located by actively searching for them or opportunistically finding them while driving or conducting other work. Upon finding a snake, trained technicians marked the location coordinates, measured, weighed, determined the sex, and marked each snake using a PIT tag, 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 surgically implanted small transmitters (about the size of an AA battery) within each of these snakes. 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 the winter.

Progress

Throughout the 2009 and 2010 field seasons (May through October), we tracked 41 snakes (19M:22F) around six core units. These totaled more than 3,400 locations. In addition, we measured habitat data at more than 1,100 points during the summer. Multiple years of data collection are required to account for environmental variability that occurs from year to year; however, this information will help us map the areas each snake uses during the year and assess what habitat features they use in their environment. Many snakes remained almost exclusively on core units of study; however, many snakes wandered far (1-2 km) from units, which is normal behavior, especially for large males looking for mates during mid- to late summer.

An animal's home range, the space it uses in a given year, is a common metric used to estimate and compare wildlife use among different areas or habitats. If timber harvesting changes how rattlesnakes use their environment, we would expect to see differences in home-range size or a shift in the location of home ranges after harvesting occurs. From prior to timber harvesting (2007 and 2008) to post-harvest (2009), timber rattlesnake home range did not vary among years or between timber har-



Timber rattlesnake technician Matt Cross weighs a timber rattlesnake. Photo by Brian MacGowan.



Dr. Steve Thompson surgically implants a radio transmitter in a timber rattlesnake. After a period of recovery, it will be released at the exact site of capture and subsequently tracked three days per week. Photo by Brian MacGowan.

vest treatment areas and control sites. Home range overlap between years (a measure of home range shift) did not vary between treatments or sex. We have not included the 2010 data in these analyses yet, so these results should be considered preliminary; however, inclusion of this data and the vegetation plot data will help us understand how timber harvesting affects where rattlesnakes move and the types of habitat features that are important to them.

A major challenge of the project is working in a large, remote area. A major portion of our costs is associated with getting around (vehicle maintenance and gas). For example, our farthest study sites are more than 17 miles away from each other 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.



Purdue wildlife biologist Brian MacGowan transfers a timber rattlesnake from a bag to a handling tube. The tube allows researchers to safely handle rattlesnakes while collecting important biological information. Photo by Angela Garcia.

Radio telemetry is another costly but necessary aspect to this project. Without the assistance of radio transmitters, it would be impossible to relocate snakes throughout the year. Snake must be relocated on a regular basis 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. Aside from the challenge of doing telemetry in hilly, rocky areas with a lot of tree—that is, it can take time—each transmitter costs about \$300 and the battery lasts one to three years, depending on size. There are also costs for the receivers (\$900-\$2,000 each) used to track the snakes, surgeries to implant the telemetry transmitters, and high sensitivity GPS units to estimate locations.

The largest expense for the project is labor. A total of 12 undergraduate students and four recent college graduates have worked on the project during the first two years. This offers each valuable experience in the design and application of wildlife field research while helping them gain full-time employment or admission into graduate school. Thus, even though timber rattlesnakes are the focus of this project, it directly benefits the education and careers of many students.

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