

The Timber Rattlesnake: Pennsylvania's Uncanny Mountain Denizen



photo-Steve Shaffer

by **Christopher A. Urban**
Chief, Natural Diversity Section

Who would think that in one of the most populated states in the eastern U.S., you could find a rattlesnake in the mountains of Penn's Woods? As it turns out, most timber rattlesnakes in Pennsylvania are found on public land above 1,800 feet elevation. Of the three venomous snakes that occur in Pennsylvania, most people have heard about this one. It strikes fear in the hearts of some and elicits fascination in others. When the word "rattler" comes up, you may hear some folks grumble under their

breath, "the only good snake is a dead snake." Others are fascinated or drawn to the critter for its perceived dangerous appeal or unusual size compared to other Pennsylvania snakes. If left unprovoked, the timber rattlesnake is actually one of Pennsylvania's more timid and docile snake species, striking only when cornered or threatened. Needless to say, the Pennsylvania timber rattlesnake is an intriguing critter of Pennsylvania's wilderness.

Description

The timber rattlesnake (*Crotalus horridus*) is a large (up to 74 inches), heavy-bodied snake of the pit viper

family (Viperidae). This snake has transverse “V”-shaped or chevronlike dark bands on a gray, yellow, black or brown body color. The tail is completely black with a rattle. The head is large, flat and triangular, with two thermal-sensitive pits between the eyes and the nostrils. The timber rattlesnake’s head color has two distinct color phases. The black phase has a completely black head with black eyes, and the yellow phase has a yellow head and yellow eyes. The pupils are elliptical. The dorsal scales are strongly keeled, giving it a “rough” appearance. The ventral (underside) area of the snake is whitish to cream-colored with small, dark stippled markings. Male and female timber rattlesnakes differ in size and subcaudal (scales on the underside of the tail) scale count. The average length of males is 43 inches. The average length of females is 36 inches. Adult males have longer, thinner tails with 21 or more subcaudal scales between the vent and the base of the rattle.

Life history

Timber rattlesnakes inhabit the mountainous regions of Pennsylvania. They prefer upland forested areas where they forage for small mammals like mice and chipmunks. Talus slopes, rocky ledges and outcrops, and boulder fields with open, primarily southern-facing exposures, create conditions ideal for basking. Basking aids in thermoregulation, which facilitates maintenance of metabolic rates and assists with digestion and gestation. These southern exposures are also where the rattlesnakes brumate (hibernate) in dens. Dens consist of rocky crevices, outcrops or rocky slopes that occur near forested openings, which are used for basking in the spring and fall.

Timber rattlesnakes emerge (egress) from their dens in mid-April to late April, and they remain active through October. Adult males may travel up to two miles from the den before returning in the fall. Conversely, non-gravid females may move about a mile from the den, and gravid females stay very close to the den, moving less than 200 yards.

Rattlesnakes are ambush predators. They detect the trails of rodent prey on the forest floor using their tongues and specialized scenting organs. Their camouflage colors let them blend perfectly into their forest floor surroundings. Rattlesnakes wait for a rodent to pass by on an already established trail before striking them with a venomous bite. Using their pit organs as thermal sensors, they can detect the body heat of their prey from a distance. These heat detection organs are especially helpful in locating warm-blooded prey at night. Rattlesnake venom is hemolytic, which means it destroys red blood cells and quickly debilitates the prey’s central nervous system, causing rapid death. The snake trails its bitten but escaped prey by scent.

Envenomated prey is typically dead by the time the snake catches up to it. After swallowing its prey whole, the timber rattlesnake seeks solar heat exposure in an



photo-Aura Stumffer

Researchers draw blood from a “tubed” timber rattlesnake. Blood samples help researchers with a continuing DNA sampling project.

open, rocky area to aid digestion of its meal.

The snakes move from basking area to basking area in a circular pattern throughout their active season. Timber rattlesnakes begin traveling toward their den sites in August and enter their dens for winter dormancy in late September through October.

Females reach sexual maturity at 7 to 8 years old. Males reach sexual maturity at age 5. Timber rattlesnakes mate in late summer to early fall in Pennsylvania. Females hold the sperm until June of the next year, at which time fertilization occurs. The young are born live in early fall (late August to September). The average litter size is five to nine. Individual females reproduce at intervals of about two to three years. Because gravid females infrequently feed during the summer immediately preceding birth of their offspring, the intervening years are necessary to store sufficient body fat to sustain them through gestation and hibernation. So despite a potential lifespan of up to 30 years, a female timber rattlesnake may bear young only 10 to 15 times during its life.

There appears to be high juvenile mortality, because many young timber rattlesnakes fall prey to natural predators such as crows, ravens, hawks and carnivorous mammals. Adult timber rattlesnakes have few natural enemies except humans, whose activities have the greatest direct effects (roadkills, poaching) and indirect effects (habitat loss and degradation) on the timber rattlesnake population.

Distribution

Two timber rattlesnake subspecies are currently recognized. The northern subspecies (*Crotalus horridus horridus*) ranges from southern New Hampshire to New York and southern Ontario, through western Massachusetts and Connecticut, into northern and southeast New Jersey, and west through Pennsylvania to Illinois and southwestern Wisconsin and southeast Minnesota, then south to eastern Texas, and east to northern Florida. A southern subspecies known as the canebrake rattlesnake (*C. h. atricaudatus*) inhabits wetlands along the Atlantic Coastal Plain, but it is absent from Pennsylvania.

Before European settlement, the timber rattlesnake’s

range was thought to have spanned most of Pennsylvania. The current range is restricted to the more rugged, least accessible and less populated regions of the Commonwealth. Today, timber rattlesnakes occur in forested, mountainous regions that encompass mainly the central and northeast regions of Pennsylvania.

Threats and conservation

Given the slow maturity, high apparent juvenile mortality, and over-exploitation of the timber rattlesnake and its habitat, the timber rattlesnake is vulnerable to decline. Presently, the timber rattlesnake appears to be declining across its range and in Pennsylvania. The decline of the timber rattlesnake is attributed mainly to human activities related to habitat alteration, overhunting and poaching. Currently, the timber rattlesnake is protected or is a species of concern in more than half the number of states in which it occurs. In Pennsylvania, it is currently listed as a candidate species, which means that it could achieve threatened or endangered status.

Through time we have come a long way in timber rattlesnake conservation. At one time, some Pennsylvania counties offered a bounty on timber rattlesnakes, and they were considered a nuisance species to be rounded up



Tagging photo-Dominic Yost, equipment photo-Chris Uthman

Tagging a rattlesnake. Above are PIT tags, tag reader/scanner, and injector. Pit tags are injected under the rattlesnake's belly plates. PIT-tagged snakes will be used for research, population estimates and perhaps law enforcement purposes.



photo-Jim Chestney

Female yellow-phase timber rattlesnake "soaking." Rattlesnakes often exhibit this behavior before shedding their skins. However, this female appears to have shed already.

and eliminated. Rattlesnakes were largely unregulated until the 1970s, when the Pennsylvania Fish Commission took responsibility for the protection of reptiles and amphibians occurring in the Commonwealth. Today, the timber rattlesnake is legally protected in Pennsylvania and is managed with a regulated season and possession limit. In addition, the Fish & Boat Commission's Natural Diversity Section reviews and comments on development projects that might adversely affect timber rattlesnakes and their habitat. The Natural Diversity Section is also involved in continuing research projects including assessing, inventorying and monitoring the viability of timber rattlesnake dens.

Site assessment and inventory project

It is well-known that timber rattlesnakes use ancestral/communal den sites for hibernating. Dens are a central focus in the life history and ecology of timber rattlesnakes. Free-ranging and dispersing adult males can move several miles from a den. However, the majority of the individual timber rattlesnakes, including neonates, gravid females and subadults, which are found at a given den site, spend much of their time in these areas basking, feeding, mating and giving birth within several hundred yards of the den site. Therefore, protecting these dens and the surrounding habitat is crucial to rattlesnake conservation.

In the late 1980s and early 1990s, Commission non-game biologists began compiling more refined location information from amateur and professional herpetologists concerned with the conservation of Pennsylvania's timber rattlesnakes. Over 600 historic rattlesnake "dens" were mapped in Pennsylvania. Many reported sightings are not true dens, so field checking of the sites is needed to assess the condition of the local habitats. Unfortunately, in recent years, staff shortages and lack of funding have resulted in biologists checking and assessing only a

relatively small number of the sites for their habitat type and quality. Many sites are merely basking areas that are used seasonally, and they can occur miles from dens, or they are rookeries (basking areas where gravid females give birth) that are usually within 300 yards of a den.

The Commission has important short-term and long-term needs concerning the location accuracy, classification and viability information of these historic rattlesnake sites. The most immediate need for this information comes from the demand of environmental review projects. Environmental reviews address concerns about habitat alteration or destruction, the primary reasons for the timber rattlesnake's decline across its range. Each year, Commission biologists comment on about 3,000 proposed permitted development projects, which include highway and bridge projects; subdivisions; natural gas, fiber optic and petroleum pipelines; and cell towers. Timber rattlesnake location information, site classification and viability information are vital to biologists when providing recommendations to developers for avoiding and minimizing adverse effects to these dens during the environmental review and consultation process. In addition, the Commission needs this location and viability information to assess the population health and status of timber rattlesnakes in Pennsylvania.

Anecdotal reports from biologists and amateur "herpers" interested in timber rattlesnakes are consistent with the preliminary results of the Commission's inventory study. Preliminary results indicate that the population of timber rattlesnakes in northcentral Pennsylvania, which occurs mainly on state forest land and at the core of their Pennsylvania distribution, is doing fairly well. However, the populations on the periphery of their range in Pennsylvania, and those close to human habitation, appear to be in decline. Denning and basking areas are either not currently used, show signs of disturbance, or are encroached on by development. These areas include the South Mountain population in southcentral Pennsylvania, the northeast population on the Pocono Plateau, and the southwest population that occurs on the Allegheny Plateau and in the Laurel Highlands. Is there more to the story? The Commission's study will reveal the population status of the snake, and most likely lead to some important management decisions regarding the snake.

The future

Timber rattlesnakes in Pennsylvania have an interesting past and questionable future. As the human population in Pennsylvania increases, human encounters with snakes will most likely increase, further threatening the existence of this snake in Penn's Woods. We know that Pennsylvania has about 12 million human residents. As yet, we do not know for sure how many timber rattlesnakes are left. However, it is clear that if history is an example, the snakes usually come out on the wrong side of the equation. Therefore, accurate population, distri-

bution, genetics and even basic life history data are needed so that informed, conservation-based decisions about the protection of this species can continue to be made. A public armed with facts instead of fears is one of the best tools for those who would see this symbol of wilderness persist in Pennsylvania. The Commission encourages you to admire these animals for their unique place in the world and support efforts to conserve their populations. ☐

Visit the Commission's web site, www.fish.state.pa.us, for a wealth of information, products and publications on Pennsylvania reptiles and amphibians.

Pennsylvania Timber Rattlesnake Population Study

The Commission has begun a study on the Pennsylvania timber rattlesnake population through a State Wildlife Grant obtained from the U.S. Fish & Wildlife Service. The first aspect of the study concerns assessment and inventory of historic rattlesnake sites. In the spring of 2003, six teams of experienced rattlesnake surveyors started confirming and classifying historic rattlesnake sites as dens, rookeries or basking areas. Precise locations were obtained for the sites, as well as the boundaries of surrounding suitable habitat, with the use of handheld global positioning system (GPS) receivers. Teams assessed threats and viability at these sites.

The study also includes marking individual snakes using "PIT" tagging technology at targeted populations of rattlesnakes. A PIT tag, passive implant transponder, is a device no larger than a grain of rice that is inserted under the snake's skin. PIT tags use barcode technology so that a tagged snake reveals a numeric code when a handheld scanner is passed over its body. This allows biologists to follow the fate of individual animals.

PIT-tagged rattlesnakes will be used for future research, population estimates and perhaps law enforcement purposes. In addition, blood samples are collected to assist with a continuing DNA sampling project, funded by the Wild Resource Conservation Fund. Leading this project is Dr. Howard Reinert of the College of New Jersey in Trenton, New Jersey. Dr. Reinert is studying the population genetics of timber rattlesnakes in Pennsylvania.

Future aspects of the Commission's rattlesnake study will include documenting new locations of timber rattlesnake dens in the gaps of their range across Pennsylvania. Overall, this study will assist the Commission in protecting rattlesnake dens by collecting baseline data that can be used in the environmental review process. The study will ultimately provide vital information on the relative population health and status of the timber rattlesnake in Pennsylvania.—CAU.