

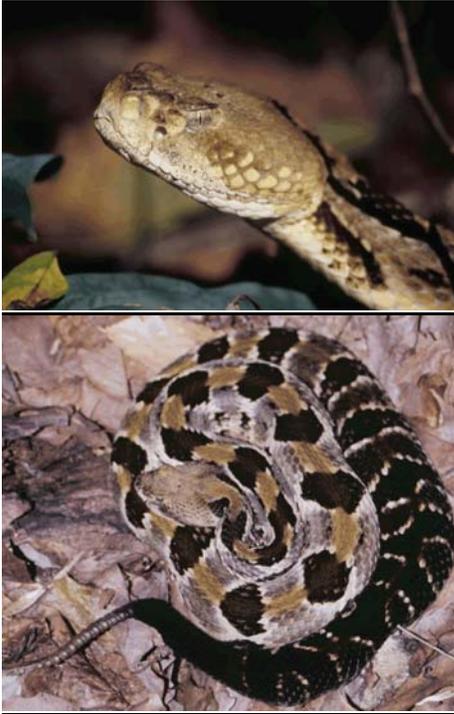
TIMBER RATTLESNAKE

Crotalus horridus

Identification, Status, Ecology, and Conservation

IDENTIFICATION

General Appearance



Dark chevrons, and a light dorsal stripe are characteristic features of the Timber Rattlesnake. Photos by S. Gibson.

Timber Rattlesnakes have the characteristic rattlesnake features: a large, angular head, heat-sensing facial pits, and caudal (tail) rattle.

The color pattern appearance of adults is highly variable, with ground coloration ranging from yellow and brown, to gray or black. All timbers do, however, possess dark, often chevron shaped, crossbands along the dorsal surface. In black individuals the crossbands may be less distinct and difficult to see. Ground coloration darkens posteriorly, and all timbers have uniform black or dark brown tails regardless of head or ground coloration. Dark bands behind the eyes can be found in some individuals, as can a rust colored middorsal stripe running from head to tail. Juvenile timbers are patterned with dark crossbands, but are always gray in ground coloration. Color patterns diverge as the snake ages and grows. **Adult Timber Rattlesnakes are large stout-bodied snakes that can reach lengths of 50 to 60 inches depending on geographic location.**

Subspecies

Taxonomically, there is considerable debate as to whether Timber Rattlesnakes can be broken into two subspecies: the northern subspecies, *C. h. horridus*, containing the black and yellow color phases, and the southern subspecies, *C. h. atricaudatus*, or canebrake rattlesnake. At this time however, most researchers lean towards leaving all variants together as one species.

Confusing Species

Range alone is often adequate to identify this snake, as it is frequently the only rattlesnake in much of the central and eastern portions of the United States.

However, in the Midwest, three other rattlesnake species have overlapping ranges with the Timber Rattlesnake: the Eastern Massasauga (*S. catenatus catenatus*), the Western Massasauga (*S. c. tergeminus*), and the Western Pygmy Rattlesnake (*Sistrurus miliarius*)

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streckeri). Because all three snakes are closely related, they will be described together after a brief overview of their ranges.

Within the Midwest, Eastern Massasaugas range across the northern halves of Ohio, Indiana, Illinois, north along the eastern edges of Iowa, northeastern and east central Missouri, and southern Minnesota. As such, Timber Rattlesnakes and Eastern Massasaugas do not generally occur in close association with each other within this area. This separation is further enhanced by the fact that Eastern Massasaugas generally prefer wetter habitats than timbers. However, range overlap does occur in parts of Illinois, Missouri, Iowa, Wisconsin, and Minnesota. The Western Massasauga only occurs within the Midwest in southwest Iowa and northwest and northcentral Missouri. Within this range the Western Massasauga generally prefers wetter habitats than timbers. Finally, the range of the Western Pygmy Rattlesnake within the Midwest is confined to southern counties of Missouri and into the eastern Ozarks. The Western Pygmy Rattlesnake is also usually associated with water.

Massasaugas and Pygmy Rattlesnakes belong to the genus *Sistrurus*, and as such can readily be identified from Timber Rattlesnakes, and all other members of the genus *Crotalus*, by the presence of nine large, plate-like scales on the top of the head. This is in contrast to numerous tiny scales on the heads of rattlesnakes in the genus *Crotalus*. In addition, the heads of Massasaugas and Pygmy Rattlesnakes are noticeably more rounded and proportionally smaller than timbers. Overall, massasauga and pygmy rattlesnakes are considerably smaller than timbers. In fact, these rattlesnakes rarely grow to more than two feet in length.

Eastern Massasaugas have a blotched pattern of rounded dark spots on a dark gray background and Western Massasaugas have a similar pattern on a light brown or pale background color. Both patterns are in sharp contrast to the barring of timbers. Western Pygmy Rattlesnakes are similarly spotted with background colors ranging from gray to black and brown to even reddish. Although this spotting pattern is generally easily distinguished from the barring of timbers, the spots of Western Pygmy Rattlesnakes may be thinner than those of massasaugas and appear more like bars than spots. Finally, both Pygmy rattlesnakes and Massasaugas possess a white-rimmed, dark stripe that runs through or near the eye and down the face. While similar postorbital bars may be present in Timber Rattlesnakes, they are never rimmed with white.



The Eastern Massasauga has a blotched dorsal pattern. Photo by A. Fortin.

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Copperheads have hourglass pattern along their dorsum. They also lack a caudal rattle. Photo by S. Gibson.



Eastern Hog-nosed Snakes may also have similar coloration to timbers, however they also lack the characteristic rattle. Photo by J. Sage.

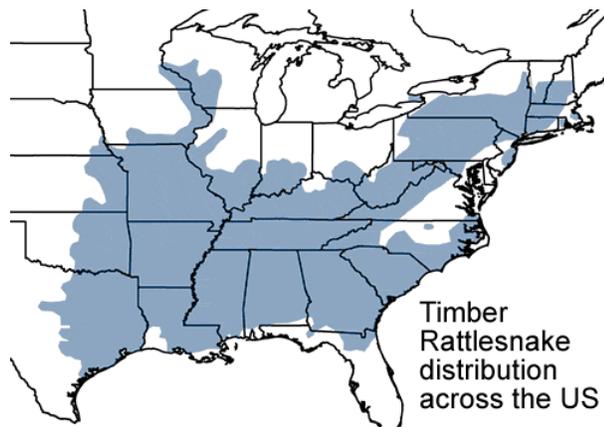
Several other heavy bodied snakes such as the Copperhead (*Agkistrodon contortrix*) and the Eastern Hog-nosed Snake (*Heterodon platirhinos*) can occupy the same habitat as Timber Rattlesnakes and may look superficially like timbers. Additionally, some snakes such as Milksnakes (*Lampropeltis triangulum*) and certain watersnakes (*Nerodia spp.*) may have similar coloration with blotched or banding patterns. However, all of these snakes lack rattles and have tails that come to relatively sharp points at the tip. Even if a rattlesnake has had its rattles broken off, it will still possess a tail that comes to an abrupt, squared off end.

Finally, it is not uncommon for non-venomous snakes such as the Eastern Racer (*Coluber constrictor*) and Milksnakes, or even the venomous Copperhead, to vigorously shake their tails in debris or dry leaves producing a rattle-like sound. However, true rattlesnakes when provoked to rattle, will always hold their rattle vertical off of the ground.

DISTRIBUTION AND STATUS

Distribution

Timber Rattlesnakes have a wide distribution ranging from New Hampshire south to Florida, West to Texas, and North through southeastern Nebraska to southeast Minnesota. However, despite this large range, most Timber Rattlesnakes are found in increasingly isolated populations, especially towards the western and northern fringes of their range.



Within the Midwest, Timber Rattlesnakes populations are extremely fragmented. In Ohio, Timber Rattlesnakes are confined to the hilly southcentral portion of the state, though until recently, they also existed along the Catawba and Marblehead peninsulas

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and nearby islands along Lake Erie's south shore. In Indiana and Illinois, Timber Rattlesnakes are similarly primarily confined to the hilly regions in the south with scattered populations across unglaciated areas of southcentral Indiana and the Shawnee Hills of Illinois. Timber Rattlesnakes are also found along the forested river bluffs of the Mississippi River in Illinois, and their range extends up through Iowa and into Wisconsin and Minnesota via this corridor. In Iowa, Timber Rattlesnakes are also found away from the Mississippi River at various locations in the southern third of the state. In Wisconsin and Minnesota, timbers are confined to the areas surrounding the Mississippi River corridor. In Missouri, Timber Rattlesnakes have a statewide distribution, though regional extirpations have occurred and small timber populations are now scattered across the state. Michigan is the only state in the Midwest not to have Timber Rattlesnakes.

Although not federally listed as Threatened, the Timber Rattlesnake is recognized as imperiled throughout the Midwest. It is listed as Endangered by the states of Indiana and Ohio, and Threatened in Illinois and Minnesota. Timbers are classified as non-listed Protected Wild Animals in Wisconsin, and receive no special protection in Missouri, though all herpetofauna is protected against indiscriminate killing in that state. In Iowa, the species is protected in counties that have known den sites. Outside of the Midwest, status varies, with many states in the northeast offering legal protection and many southern states affording no special protection to Timber Rattlesnakes. Experts agree that the Timber Rattlesnake is in trouble throughout most of its range. However, the fact that it is large and poisonous may preclude federal protection.

ECOLOGY

Habitat

Timber Rattlesnakes are generally associated with eastern deciduous or mixed deciduous/coniferous forest in rugged terrain. However, because of the timber's wide geographic distribution, there is considerable variation in habitat due to local differences



Timber Rattlesnakes inhabit eastern deciduous forests. Photo by S. Gibson.

in floral communities and geology, giving each area unique characteristics. In the Midwest Timber Rattlesnakes are most commonly found in mature forest in rugged, hilly, sometimes rocky terrain, or along rock bluffs and forest surrounding river corridors or riparian areas.

In southcentral Indiana, where much of the Midwest research on Timber Rattlesnakes has taken place, timbers occur in large tracts of well-developed oak hickory forest in steeply dissected ridge/valley terrain. In this location, exposed rock is scarce, and as such, is rarely used by timbers. In other parts of the Midwest, rocky areas appear to make up a greater percentage of

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the available habitat, and are often used by resident timbers for early spring basking and gestating young.

Habitat preference of the Timber Rattlesnake is highly influenced by reproductive condition. Although non-gravid timbers rarely leave the confines of closed-canopy forest, gravid females tend to use open, sparsely forested, sometimes rocky areas for gestating young. In Indiana, gravid females were also found to frequently utilize the inside of large hollow logs within these open areas. Such site selection likely provides the pregnant snakes with optimal environmental conditions, such as warmth, humidity, and a more stable microclimate, for embryo development.

Age class also appears to be a factor in Timber Rattlesnake habitat selection. Juvenile timbers prefer areas with more complete canopy closure than adult snakes and often associate with structures offering cover such as logs, shrubs, or woody debris. Some juvenile snakes have even been observed to spend considerable time above ground in trees and shrubs, a behavior that is rare, but not unheard of, in larger adults.



Juvenile Timbers may use trees and shrubs for refuge. Photo by S. Gibson.

[Hibernacula and Denning](#)

The Timber Rattlesnake is highly dependent on the existence of suitable winter denning habitat. In rocky areas, entry into dens may consist of cracks and fissures in rocks or talus and scree slopes. However, in areas where rock is scarce, such as the Pine Barrens of New Jersey, timbers may even use streambeds or eroded stream banks. In southcentral Indiana, where exposed rocks and rock outcrops are also scarce, snakes access hibernacula on steep hillsides where fallen trees or surface erosion have exposed the lip of underlying bedrock layers and corresponding rock fissures. **Absence of suitable den sites is likely a chief determinant of the historical range of the Timber Rattlesnake,** and may help to explain why the species is restricted to the hillier, relatively unglaciated regions of Ohio, Indiana, and Illinois, and river bluffs further west, where exposed rock and suitable den structures are more abundant.

Timber Rattlesnakes generally den communally, and in some areas dens may be utilized by many snakes. Additionally, dens used by Timber Rattlesnakes may also be used by other species of snakes such as Copperheads and Eastern Racers, making them important structures for numerous species. Reports suggest that some dens in the east historically had more than 100 to 200 snakes at one den site. Today, however, most dens appear to have only a fraction of their historical numbers.

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Hibernacula site in Indiana
Photo by Z. Walker

Den ingress in the fall usually occurs in late September or early-mid October, and snakes typically emerge in the spring by late April or early May. Timber populations in the north or at high elevations generally arrive earlier to the dens in the fall and leave later in the spring than populations further south or at lower elevations.

Timber Rattlesnakes show a high degree of fidelity to the same den

site and studies have shown that Timber Rattlesnakes frequently return to the same den every year. Walker (2000) and Gibson (2003) both found that 100% of all snakes tracked for consecutive years in Indiana returned to the same den from which they emerged, including juvenile snakes.

Patterns of Movement

Adult Timber Rattlesnakes travel extensive distances during the active season, though there is considerable variation between sexes. The area used by adult males over this time is considerably larger than that of females of the same age class. Research has found adult male Timber Rattlesnakes to use areas of approximately 200 ha and travel more than 6000m in the course of an active season (Reinert and Zappalorti 1988, Gibson 2003). Area use by male timbers is among the largest of any studied snake species. By comparison, non-gravid, adult females will typically use much smaller areas than adult males during the active season; a typical female will use an area of 30 to 40 ha (Reinert and Zappalorti 1988, Gibson 2003).

Differences in movements and area use between adult males and non-gravid females are largely attributed to the propensity of males to make lengthy movements during the mating season of late July and August. During this time, males frequently make long migrations in search of females, and will triple their movement rates from earlier months and often expand their range. In contrast, females show little, if any, range expansion or movement increases at this time. Both male and female adult timbers exhibit strong tendencies to use the same areas each year and may overlap movement paths from one year to the next.

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Reproductive condition also has a dramatic effect on Timber Rattlesnake movements. **Female timbers have been found to greatly reduce movement and area use when gravid.** In a study of timbers in Indiana, gravid females greatly reduced movements almost four-fold in late summer and characteristically remained in or near clearings or forest gaps until giving birth in early fall. Such behavior is likely in response to finding suitable areas for gestating young that may be rare across the landscape (see habitat section above). Additionally, pregnancy may limit the snake's ability to disperse or may make traveling dangerous.

Juvenile snakes rarely travel far from the vicinity of their respective dens and use significantly smaller areas than adult timbers over the active season. A typical juvenile snake may traverse an area of 5 to 10 ha in a given activity season (Gibson 2003).



Male Timber Rattlesnakes make lengthy movements during the mating season in search of females. Photo by S. Gibson.

Reproduction

Timber Rattlesnakes, like all rattlesnakes, do not lay eggs but give birth to “live” young. Litter size tends to vary geographically, but is typically from 5 to 15 young (discussed in Brown 1993). **The mating season for Timber Rattlesnakes generally lasts from late July through August, during which time male timbers make extensive moves in search of receptive females.** Although mating takes place in late summer, females will not give birth until the fall of the following year. It is likely that they overwinter with the sperm and that the eggs are fertilized in the spring.

Females are not reproductively receptive until they are relatively old. In a northern population, Brown (1991) found that female timbers were between 7 and 11 years old before their first reproduction. Age to first reproduction is generally shorter in more southerly populations. Male timbers usually reach reproductive maturity at approximately six years of age (Brown 1995).

Female Timber Rattlesnakes reproduce on an approximately triennial (three year) cycle. Such intervals coupled with a late age at first reproduction, mean that the reproductive output of a single female over a lifetime is relatively low. Timber Rattlesnakes in captivity may live to be over 30 years old but typically live to around 20 years in the wild. As such, a female may only reproduce three or four times in a lifetime.

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Diet and Foraging

Timber Rattlesnakes feed primarily on small mammals. Clark (2002) found that the diet of Timber Rattlesnakes varies geographically and is highly dependent on what mammalian prey are available. In the Midwest, voles, chipmunks, and even squirrels appear to make up a large part of the timber's diet. Timbers have also been known to consume birds and even other reptiles and amphibians. However, ingestion of these prey items is rare and constitutes only a small fraction of their diet.

Timber Rattlesnakes are sit-and-wait predators that rely on motionlessness and cryptic coloration to ambush prey. Timbers use their highly developed sense of smell to actively search out scent trails left by small mammals. Frequently, timbers will position themselves along side a fallen log that has been used as a mammal runway with their heads resting perpendicular to the log. In this posture, the snake has the ability to sense vibrations on the log, detect prey visually, and also has a large field of infrared radiation detection using its heat sensing pits.



Timbers often forage with their heads resting on the side of a mammal runway, such as this log.
Photo by S. Gibson.

Timber Rattlesnakes are bite and release predators, meaning that upon striking and envenomation, they release the prey item to die. Using their keen sense of smell once again, timbers are able to scent trail their dead or dying prey to where they have fallen and consume it.

THREATS TO TIMBER RATTLESNAKES

Because of low reproductive output, Timber Rattlesnake populations are extremely fragile and susceptible to degradation by human activities. Though most populations of timbers are now restricted to more remote locations, encroachment by human development and habitat destruction is the most serious threat to Timber Rattlesnakes. **Of particular concern is the protection of den sites, which are often rare or widely dispersed across the landscape.** Because timbers den communally, habitat destruction at a den may mean the loss of numerous snakes, and may thus critically imperil a population. In addition, the construction of roads in known timber habitat claims the lives of many snakes, especially during late summer when male timbers search for females.

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Collecting and deliberate killing of Timber Rattlesnakes is also a chief threat. While large-scale killing and collecting of timbers in the Midwest is predominately a thing of the past, populations in the east and further south have suffered tremendously from such activities. However, because of the low population levels in many areas, even low-level harvests may have a pronounced effect. Additionally, due to the propensity of gravid females to utilize more open habitat than non-gravid timbers, pregnant snakes are often the ones found and killed or collected.

MANAGEMENT GUIDELINES

Timber Rattlesnakes are not drawn to areas with expansive openings in the forest canopy. As a consequence, clearcutting is to be avoided in areas being managed for timbers. Select cutting of ten percent or less of such areas is preferable. Timbers may make use of small openings and trail edges to bask and to gestate young. Debris such as fallen logs should be left in place, since timbers and other animals will use it for foraging and shelter.

In areas where timbers do occur, management activities such as trail maintenance should be timed to reduce impacts to the snakes. For example, in Indiana, gravid females and even shedding snakes frequently utilize trail edges for basking. As a consequence, activities such as using a brush hog to clear trailsides may result in mortality. Waiting until late fall or winter would likely negate any chance of killing a snake. **Additionally, known den sites should be strictly protected and activities or disturbance should never take place in the vicinity of a den as these areas are critical for Timber Rattlesnake survival.**

Knowledge of Timber Rattlesnake ecology can also be used to help keep humans and snakes apart. **Because timbers frequently select habitat with complete canopy, fallen logs, and ground vegetation, removal of these components around human structures and campsites will make those areas less attractive to snakes.** Such areas would further be enhanced by a lawn or tree removal. A buffer of 10 yards should be adequate to deter most timbers. Implementing these strategies around roads may also help to curb road related timber fatalities. Additionally, keeping trailsides clear along popular trails may also help to reduce snake-human encounters in these areas.

Relocating Timber Rattlesnakes long distances should be avoided. Research has shown that Timber Rattlesnake survival is greatly decreased when they have been moved outside of their home area. Such moves cause the snake to actively search for familiar landmarks and frequently results in decreased foraging, increased disease, and failure to find suitable hibernacula in the fall. On the other hand, short distance translocations on the order of several hundred meters or less have been shown to have few detrimental impacts on timbers. Implementing this technique removes the snake from danger, yet does not displace the snake from familiar surroundings.

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In the long run, education may be the most important strategy in conservation and management of the Timber Rattlesnake. Most people are vastly misinformed about the biology and ecology of timbers. Though timbers are generally docile snakes choosing to remain motionless or flee rather than strike, most people see them as cold-blooded killers. By successfully informing the public, especially those who live in close proximity to populations, that these animals are an integral part of the ecosystem and pose little threat to humans, conservation efforts will be met with much greater success.

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This species description was created by staff at the Center for Reptile and Amphibian Conservation and Management. For related information please visit the Herp Center's website at: <http://herpcenter.ipfw.edu> Funding for the original draft of this fact sheet was provided by the U.S. Fish and Wildlife Service. V: 6-10.