# *Observations on Northeastern Snake Dens*

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# Observations on Northern Snake Dens

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Over a large part of our northeastern states the timber rattlesnake, (Crotalus horridus horridus) and the northern copperhead (Agkistrodon contortrix mokeson), together with many species of harmless snakes, take advantage of optimum hibernating conditions provided by a surprisingly complex habitat found only in select areas. The unusual aspects of these communal hibernacula led me to a study, which over the past 14 years has produced some interesting (and undoubtably controversial) conclusions, regarding the life history of these reptiles. My conclusions are based on data collected from 46 separate dens or "colonies" which include one or both of the pit vipers mentioned. The individual rattlesnake and copperhead populations now evident are a result of a comparatively recent change in the earth's climate.

Several thousand years ago the North American continent experienced a gradual cooling phase. This made it necessary for reptiles at higher latitudes to seek protection where they could maintain their minimum temperature requirements over increasingly cold winters. Only certain areas could support the more specialized pit vipers, thus the large areas these snakes once inhabited were condensed. In the northeastern United States rattlesnakes and copperheads modified their activities to center around the wintering quarters, leaving the dens in the spring and returning in the fall. The denning site is often a shelving ledge with horizontal crevices that extend inward 20 feet or more, enabling the snakes to penetrate well below the frost line.

The location of the pit viper dens are influenced by several different characteristics which are necessary in affording a suitable hibernating site. 38°-42° Hibernation occurs in a crevice "pocket" with winter temperatures between ~~33-36°~~ Fahrenheit plus sufficient dampness to prevent dessication during the 6-7 month hibernation period, averaging from mid-October to the end of April. These crevices are situated inside ledges or underneath rockslides or rock outcrops that face the warmer points on the mountainsides, from east-southeast around the southern points to due west. I have never found a den facing due east, the slopes facing this direction being more shaded and overgrown. Dampness is perhaps the second most important requirement; although often not easily evident on the surface, some moisture penetrates to the hibernating site preventing dessication. In some areas this is evident by patches of moss on the rocks, an area of seepage, or rarely a small spring entering the den area. In April, the flow of moisture increases with the thaw, perhaps alerting the reptiles to the approaching warm season. Occasionally, after a particularly wet early spring the

rattlesnakes and copperheads will emerge with dampness sores and swelling around their pits or heat sensors, and black racers (Coluber constrictor) and blackrat snakes (Elaphe obsoleta) with sores on their lower dorsum and bellies, probably from prolonged contact with excessive water

In the early spring, the rock ledges and outcrops facing southern directions are exposed to the sun for several hours on each clear day. This softens the surrounding earth and induces a thaw from the surface inward melting the ice accumulated inside the crevices over the winter. After a few days of relatively constant temperatures of 60° F and higher, the first snakes emerge from dens around the latitude of northern New Jersey, whereas further north, emergence may be delayed another 2-3 weeks due to the deeper hibernating pockets necessary to escape a more severe cold season. Although daytime temperature may differ only a few degrees between the areas, nighttimes may vary as much as 12° F. Occasionally the snakes come out on days that were previously thought to be too cool, 57°-60° F., a good example that the reptiles are not as vulnerable to cold as originally thought. This observation also holds true for the fall, prior to hibernation.

Snake dens cannot be found on just any rocky mountainside facing southeast to west in an area where rattlers and copperheads are reported. Both species live in colonies that in the summer may encompass an area of 3 square miles, other similar areas nearby may be devoid of venomous snakes. During the warm months, these snakes travel as far as 2 miles from their den site in search of food. However all the venomous snakes from a colony will re-convene at the den in the fall in rock crevices at the base of a ledge (occasionally on top) or rockslides or boulder-strewn slopes that often drop off at a precipitous angle. These areas are generally not larger than a few hundred yards along a ledge or a half-acre area in a rockslide. Some dens are much smaller; a single horizontal crevice at the base of a ledge is sufficient. I know of 5 different single crevice hibernacula where substantial numbers of copperheads, rattlesnakes, blackrat snakes and black racers hibernate together.

While venomous snakes are often found along a particular stream or mountaintop, the den could be more than a mile away in any direction. In some places this makes finding the "mother lode" quite difficult since it can be very secluded and inconspicuous. Knowledge of the pit viper's habits is essential and when checking a mountain in question. Places to look are rocky areas that have crevices penetrating below the frost line and shelving rocks on the surface providing quick retreat from enemies and warmth from a relatively open exposure to the sun. The ledges have migratory or "transient" rocks extending in one or more directions from the den leading along the mountainside and up toward the mountaintop, where more open rocky patches can be found. These are the summer feeding grounds, in which a sizable number of the local population remain until the fall. Farmers with knowledge of a summer feeding ground frequently mistake it for a "den". Rattlesnakes and copperheads rarely den below the 700 feet

elevation level, except the timber rattlesnake populations in the Pine Barrens of New Jersey, and copperheads along the Connecticut coastal plain. In spite of summations to the contrary, copperheads often den at the same elevation as rattlesnakes in areas where both are found. During the summer they are encountered crossing roads and in brushy areas that provide good foraging for rodents. A small percentage, less than 25%, never leave the den area (the rocks adjacent to and immediately above the den). These are usually gravid females. Females carrying young undoubtably aid their offspring by this close association, however litters of young have been found a half-mile away in September, with the dormant season approaching. Some of the young may spend the first winter at their birthplace, but the majority find their way to the den, probably by instinct or by following older snakes. Newborn rattlesnakes that are displaced at a different den site will follow the same distribution pattern as the native occupants. Displaced adult rattlesnakes and copperheads will colonize an unfamiliar den area and will adapt quite adequately to the new surroundings, even traveling abroad during the summer, though not as far as the indigenous snakes. This re-colonization has been noted in two areas.

Newly introduced snakes seem to acquire a knowledge of the immediate area by close association with the "locals". In one situation Rudy Komarek (personal communication) re-located a dozen rattlesnakes in each of two copperhead dens, under the mistaken impression that both places formerly had rattlesnakes which had since been exterminated. At a large rockslide den, the home of an abundant population of copperheads, blackrat snakes and black racers, he found the skeletons of 10 rattlesnakes. In the other den, a ledge and rockslide, the rattlesnakes survived and now occupy the same areas as the smaller pit vipers.

Both pit vipers occasionally select a favorite hibernating crevice and/or summer feeding ground. A few oddly marked individuals have been seen several consecutive seasons by the same den crevice in the spring, or shelter rock in the summer. While many snakes have also been observed using different hibernating crevices each year, most individuals have their own summer areas that they return to after leaving the den.

Another area of speculation is how these snakes achieved the colonization of the territory they now occupy. A "chain reaction" pattern can be recognized for rattlesnakes, but the spotty distribution of copperheads in some areas leaves several questions unanswered. Timber rattlesnakes extend their range through the large adults of both sexes, which travel the furthest during the summer. It is easy to surmise a large gravid female being caught by a cold snap far from the den, luckily finding a hibernating site in a ledge near her feeding area and there bearing her young, which then grow and flourish and establish a new colony. This is shown quite well in one known area. The rattlesnakes came from the south and extended northward, primarily along the western ridge of a mountain range on which 6 dens have been found, all within 1-2 miles of each other until the northern-most den, beyond which no ledges face a southeast to southwest direction. On the east-southeastern slopes of the same range a series

of huge cliffs and rockslides make ideal copperhead habitat but the rattler population becomes very spotty. To further complicate matters, copperheads are found in only two of the six dens on the western slopes. This does not mean copperheads prefer a more eastern exposure, several known dens face southwest. In areas of large cliffs and rockslides copperheads usually spread out evenly in the talus slopes, having separated den pockets with a straggling population in between.

Copperheads range northward on the west side of the Hudson River to the vicinity of Kingston and westward to Ashokan Reservoir, being absent in the Catskills and further west, except for the very southeastern corner of the Catskill Forest Preserve. Further south they become more frequent, following the Delaware River valley up to the town of Lackawaxen, from there following a basically western direction which includes a good deal of Pennsylvania.

Rattlesnakes follow the Hudson River valley further north, being absent from the main portion of the Catskills, but re-appearing in some locations to the west, around Downsville, Delhi and Cooperstown. They follow the Berkshires in spotty patches up to the western slopes of the Green Mountains, Lake George and the southern point of Lake Champlain. They are absent from the main part of the Adirondacks. East of this area rattlers are rarely found, being reported from one place near Keen, New Hampshire, with Ditmars (1931) recording specimens being found by Lake Winnipausaukee. Southward into Massachusetts they become more common. They are relatively abundant in southern New York, some parts of northwestern New Jersey, and most of Pennsylvania. The reason for widely scattered populations in their northern extensions is a slow but constant changing of environment over what was a more uniform distribution in the past. One example is the Catskills, which through thousands of years evolved into a hardwood forest. Dense stands of hemlock trees shutting out light and warmth covered most of the mountain slopes, creating an unsuitable habitat for rattlesnakes. In recent years human depredation has taken its toll, man being by far the biggest contributing factor in the depletion of the venomous snake population in the northeast. Copperheads continue to hold their own, being seriously threatened only by widescale land development in the immediate area of their colonies. In mountain areas where long ridges with extensive cliffs and rockslides occur, the local copperhead colonies will probably continue to remain stable for many years.

Individual den populations vary considerably according to the degree of human interference and size of the hibernating area. Some dens have only one crevice that contains the hibernaculum, others have numerous crevice pockets where the snakes congregate, as in rockslides. Occasionally in ledge or slide dens there may be two congregating areas separated by a few hundred yards. Generally the dens occupying a greater area have more snakes, but single crevice dens in folding ledges often open up extensively inside, creating ideal conditions for a large colony. Available cover in the surrounding area is another important factor: rocky areas where the reptiles can receive protection from cold snaps and predators. These open, rocky areas are preferable for the growth of various types of berry bushes, in turn which attracts an abundant supply of



A typical rock Ledge den.



A typical "rockslide" denning area.



summer basking area

A snake ^ situated on a "boulder strewn" slope.

the rodents and birds that the snakes prey upon. Again, man is a major concern in determining population size, few dens being remote enough to completely escape molestation. I have noted many times pit vipers wandering close to two miles in the summer, and crossing trails and roads where they are usually killed if seen. In recent years den hunting has become popular, with the serpents being taken for skins and exhibition in roadside zoos.

A healthy colony has relatively even proportions of young, juveniles, and adults. When most of the adults are taken, the population is decreased for several years until the juveniles reach breeding age. A den can remain depleted for 10 years (Komarek, personal communication) until the proper ratio of each age group is re-established. With continued molestation this may take a progressively longer time. Were it not for the remarkable tenacity of these reptiles they would have been exterminated in many areas where they are still common.

The average timber rattlesnake and copperhead den that receives little attention throughout the active season can contain a surprising number of snakes, sometimes over 100 of one species, with several other species present. Accurate data on population sizes is available to me from Rudy Komarek (personal communication) who, unfortunately, over a period of 10 years took 300 rattlesnakes from an exceptionally large den. An extensive colony, of which a few are left here in the northeast, may hold over 300 snakes, with rattlesnakes or copperheads being the predominate species.

In some instances blackrat snakes, black racers, garter snakes, red-bellied and deKay's snakes have their own dens. These differ from the pit viper hibernaculum, being less "modified". Garter snakes (and northern watersnakes) usually den in an earth or shale bank along a stream swamp, occasionally even a man-made retaining wall (Komarek, Jewell, personal communication). DeKay's and red-bellied snakes have similar hibernating habits, with man-made rockpiles and quarries also used. Some of these dens may contain over a hundred harmless snakes of several different species. The hibernacula for the smaller snakes may face any direction, however, blackrat snakes and black racers den in ledges, hollow trees, or rocky slopes that face the warmer southern and western directions.

The number of species present varies with the location also. Personal records show more than 100 rattlesnakes or copperheads being observed at four different den areas. Some dens have only rattlesnakes, others only copperheads, still other places have varying proportions of both reptiles. In one instance a den in a ledge facing southwest contains only copperheads, black racers and blackrat snakes, whereas 100 yards further southeast is a ledge harboring rattlesnakes, blackrat snakes, black racers and a few copperheads. Only one young adult rattlesnake has been found in the copperhead den, which apparently followed them "home for the winter". Even in an area where both venomous species are found, the existing population may be exclusively one or the other. Many harmless species can be found in company with the pit vipers: garter snakes,

red-bellied snakes, ringneck snakes, milk snakes, black racers, blackrat snakes and on rare occasions hognose snakes, smooth greensnakes, worm snakes and northern watersnakes! A juvenile and an adult watersnake have been found in two separate den areas. Other reptiles and amphibians found close by are the five-lined skink, box turtle, red eft, slimy salamander, red salamander, marbled salamander, leopard frog, wood frog and spring peeper.

Observing snake dens is a facinating pastime which has unfortunately become all too popular in recent years. The occupied ledges often open up to sweeping vistas of the surrounding mountain ranges, making these areas ideal for hiking trails as well. Some locations may be found to contain an exceptionally colorful genetic strain. One den produced an albino rattlesnake and a normally patterned female thàt gave birth to five albino young.

The major problem facing our two pit vipers at this time is a depredation by man. Individuals have contributed heavily in the recent reduction of rattlesnakes in New York, the western corner of Massachusetts and Connecticut. Over a 30 year period one person has taken and sold to various institutions over 4,000 timber rattlesnakes. Further north another person is responsible for the depletion of the timber rattlesnake around Lake George, which formerly had great numbers of rattlesnakes on the western side of the lake and around Black Mountain and Whitehall, near the southern tip of Lake Champlain. Both these people believe that by leaving the young they insure no lasting damage to the colonies under persecution.

In the early 1900's logging and quarrying were two major industries in the northeast. The hemlock forests of the Catskills disappeared to tanning factories; the rocks quarried for bluestone patios and front walks. This was a heavy blow for the local reptile populations, the trees and rocks often being cut from the immediate vicinity of snake dens. Discarded rock slabs were dumped over the ledges, sometimes covering the den crevices. Some of these rock dumps look exactly like natural talus slides, creating an ideal environment for the surviving members of the colony after portland cement brought most of the quarrying industry to an end.

After a 25 year period the snakes had re-established themselves in these areas to almost as great a degree as formerly. Then a growing interest in local wildlife dealt a second blow to the reptile clan, with bears, bobcats, and other fur-bearing mammals suffering even more heavily. In recent years some snake colonies had begun to build up appreciable numbers again until a host of amateur snakehunters began exploiting them for profit. Although copperheads continue to thrive, the rattlesnake population faces a slow decline in ensuing years unless protective measures are taken.

I have often talked to rangers who believe poisonous snakes should be left alone except when encountered near trails, camps, or other recreational sites, in which case they should be killed to protect the people. Such ideas are erroneous and should be discarded along with myths like toads causing warts. In over

a decade of studying venomous serpents only one timber rattlesnake was frightened into striking when suddenly observed at close range. This includes six different instances of friends stepping or sitting beside rattlers or copperheads while I was checking a den. One friend in particular has an uncanny knack for finding snakes without looking for them. These "close encounters" occurred because the pit vipers have remarkable camouflage and are easily overlooked. Given less than a decent chance to escape the snake will either do so with alacrity, sneak away, or remain motionless. Occasionally rattlesnakes will even "play possum" by ducking the head under the coils after repeated harrassment. Rarely will a timber rattler or copperhead stand it's ground.*

Because venomous snakes are a vital aspect of our natural wilderness and are shy and retiring by nature, stringent laws should be passed to protect them. Unless proper steps are taken they will eventually become as infrequently seen as the black bear in southern New York State. To lose these unique denizens of the mountain ledges would be a shame to anyone truly concerned with preservation of wildlife.

LITERATURE CITED

Ditmars, R.L. 1931. Snakes of the World. New York, pp xi-207.



The author inspects a Ledge den for pit vipers.

* The editorial board of HERP does not concur with the opinions of the author concerning venomous snake behavior and bites in light of the numerous venomous snake bites reported annually in the United States. We feel the best advice is to be able to sight recognize the venomous species in your area and to exercise caution.

* The editorial board has had very little field or lab experience with venomous snakes and are justifiably shy of them.