PENNSYLVANIA FISH & BOAT COMMISSION
Division of Environmental Services
Natural Diversity Section
450 Robinson Lane
Bellefonte, PA 16823-9620

Guidelines for Timber Rattlesnake Habitat Creation

(revised 3-5-2010)

Food Plots – Gas Well Openings – Access Roads – Pipelines

Timber rattlesnakes (C*rotalus horridus*) are declining across their range, mostly due to habitat destruction/alteration, wanton killing, and poaching. The Pennsylvania Fish & Boat Commission (PFBC) is the state agency charged with the protection of Pennsylvania's reptiles, and therefore, since the early 1980's has been involved in collecting information about the timber rattlesnake and its habitats in Pennsylvania. The PFBC is aware of numerous forest openings, access roads, and pipelines on private, State Forest, and State Game Lands across the state, that are used by gravid (pregnant) timber rattlesnakes on an annual basis. Gravid females use these sites mainly to bask for gestation (embryonic development) purposes. Through years of monitoring we have noted characteristics that will be helpful in guiding the future construction of effective timber rattlesnake gestation habitat. This memorandum describes these characteristics and makes recommendations for creation of critical timber rattlesnake habitat.

Life History

Timber rattlesnakes inhabit the forested, mountainous regions of Pennsylvania. Their active season is mid-April through mid-October. They prefer upland forested areas where they forage for small mammals (e.g., mice, and chipmunks). Talus and/or scree slopes, rocky ledges, outcrops, and boulder fields generally with southerly exposures contain the entrances to over-wintering dens. Dens usually have rocky crevices, or other features that provide access to ancestral underground chambers to which the snakes return yearly for hibernation. These sites generally have rocky habitat containing a semi-open canopy close by that is used by gravid females for gestation. Timber rattlesnakes begin emerging (egress) from their dens in mid to late April. Adult males may travel up to 3 to 5 miles away from the den before returning in the fall, unlike non-gravid females, which move approximately 1 to 3 miles from the den, and gravid females, which stay close to the den (100-400m). Timber rattlesnakes begin traveling towards their den sites in September and enter their dens (ingress) for winter dormancy in late September through October.

Distribution

The current range of the timber rattlesnake encompasses 31 states from Vermont and New Hampshire south to northern Florida, west to eastern Texas and then north through eastern Oklahoma, Kansas, and Nebraska, through Iowa into southeastern Minnesota. From southwestern Wisconsin the range retreats south, away from the Great Lakes, through western and southern Illinois and southern Indiana and Ohio.

In Pennsylvania the Allegheny Plateau and the Appalachians are encountered and the range goes north through New York back to southern Vermont and New Hampshire. Prior to European settlement, the range of the timber rattlesnake is thought to have spanned most of Pennsylvania. The current range of the timber rattlesnake 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 region of Pennsylvania (e.g., Ridge and Valley Province, Laurel Highlands, Allegheny Plateau, and the Pocono Plateau).

Threats and Conservation

Given the slow maturity, low fecundity, and the many threats posed by the overexploitation of its habitat, the timber rattlesnake is vulnerable to decline. Presently, experts believe that the timber rattlesnake is

declining across its range, and in Pennsylvania particularly in the peripheral areas of its range. The decline of the timber rattlesnake is attributed mainly to human activities related to habitat alteration, highways, illegal/wanton killing, and poaching. To date, the timber rattlesnake is protected in over half of the states where it occurs. In Pennsylvania, it is currently listed as a candidate species (an animal that could achieve threatened or endangered status in the future). The timber rattlesnake is legally protected in Pennsylvania and the Pennsylvania Fish and Boat Commission's Natural Diversity Section comments statewide on development projects that have potential to adversely impact timber rattlesnake populations. The Natural Diversity Section is also involved with research projects on monitoring, inventory, and den viability that are being conducted on Pennsylvania timber rattlesnakes.

Critical Habitats

The PFBC considers two types of habitat used by timber rattlesnakes as extremely vital and thus refers to them as "Critical Habitat": over-wintering dens and gestation sites. The loss of either of these habitats will adversely impact the timber rattlesnake. Studies have shown that snakes cannot be successfully relocated and the loss of a den through destruction usually results in the loss of that particular den population, which may be critical to the local population (Reinert and Rupert 1999*). The key to understanding why a den exists in a specific location is the underground microclimate. Although attempts to predict specific den locations by researchers have proven difficult, temperature, humidity, and a water source appear to be critical to den site selection for timber rattlesnakes (H. Reinert, pers. comm..). **Efforts to create den habitat have not proven to be successful.** Recent telemetry studies have been useful in determining specific den location selection of timber rattlesnakes (H. Reinert and PFBC, pers. comm.). Dens are often located in obscure habitats, which on the surface appear no different than any other location on a particular mountain. (See Den Habitat Photos illustrating this point showing how few rocks or none may be present.) Generally, they are located in and around rocky habitat, not necessarily extremely rocky habitat, but on a slope, under tree canopy, and usually not in large rock outcrops. Because dens are difficult to locate without telemetry and there is such a short window of time to locate them, it is critical to protect the potential den habitat (rock areas) located on slopes having an exposure ranging from southeast to west (135° to 270°). **Simply put, in order to protect den sites, slopes in this degree range should be avoided**.

The other type of timber rattlesnake critical habitat is the gestation site. This is an area where gravid female rattlesnakes congregate for several months (June-September) for the sole purpose of gestating young and birthing. Gravid females require a higher body temperature for embryonic development than the other snakes in the local population, which spends most of the summer months foraging under the forest canopy. **Gestation habitat *can* be created** to improve the viability of the den populations over the long term. Well clearings, pipelines, and their associated access roads provide opportunities to create excellent gestation habitat, as detailed below.

Habitat Creation

<u>Placement and Engineering of Access Roads</u>

Based on the information we have concerning dens, it is best to avoid construction in rocky areas on slopes having an exposure ranging from southeast to west (135° to 270°). It is important to avoid any slope with that exposure**,** because some den entrances occur in relatively small ledges or simply a small opening or hole occurring on the ground under semi-open canopy that is used to access the underground over-wintering den. Despite our best efforts to route access roads through areas which appear devoid of rocks, large rocks will still be unearthed during the excavation of a road. **We recommend the large rocks be pushed to the north or east side of the roads and left lying flat in the open area between the tree line and the traveled portion of the road.** This manipulation of the rocks will optimize solar exposure and provide attractive basking habitat for gravid females. We recommend that these access roads be gated and locked, thus preventing many people from accessing the site and indirectly protecting the gestating snakes from excessive human disturbance. (See Access Road photos showing this habitat.)

Alternatively, if high use of these roads is expected during the summer months, then the margins should be completely cleared of all rocks, logs, and debris in order to *discourage* their use as gestation sites by rattlesnakes.

Habitat Creation in Clearings

There are opportunities at food plots, gas well clearings, and pipelines to create excellent gestation habitat by utilizing the larger rock slabs, which were unearthed during the excavation of the opening. Forest openings created in more remote areas or in areas only accessible by gated access roads should be the areas targeted for the creation of rattlesnake gestation habitat. The lack of disturbance is necessary, because rattlesnakes imprint to these locations and will arrive at the gestation rocks in late May or early June and remain there, without feeding, until early September. If the snakes are consistently disturbed they may abandon the location.

The important factor in creating excellent gestation habitat is the rock placement in a position so the rocks receive a daily minimum of 5 to 7 hours of direct sunlight. Rock placement is important. If it is done correctly, it enables the females the opportunity to bask and good rock placement also affords the snakes the opportunity to retreat to shade during intense sun which occurs in the middle of the day. The rocks absorb and hold the high heat during the day and make it possible for the gravid female to thermoregulate during the 18 hours a day the rock is not in the sun. **Large flat slabs (minimum of 4' x 6') should be placed on the north or east side of the well openings and food plots approximately 5 to 10 yards out into the opening from the existing tree line.**

Shade for the rattlesnakes can be provided by diverse vegetative cover, or by additional layers of rock. Seeding between the forest edge and the newly placed rocks should be avoided if possible in order to allow for colonization of local vegetation. Additionally, the required shade can be provided by placing the large flat rocks flat on the ground, approximately 5 to 10 yards from the tree line, leaving approximately two (2) feet between the slabs. A second layer of slabs can then be placed on top of the first layer covering the two (2) foot open space separating the base slabs and also leaving spacing between the top layer of rocks. Additional rows of rocks may be added, based on availability, but all rows of rocks should consist of not more than two layers. Any additional layers should be avoided because they prevent the base slab from warming to the required temperature needed by the snakes during the hours of the day without sun. In this type of structure the snakes will utilize the base slab and the shade created between the base slabs by the top layer of slabs. (See Forest Opening and Pipeline Edge photos showing this habitat.)

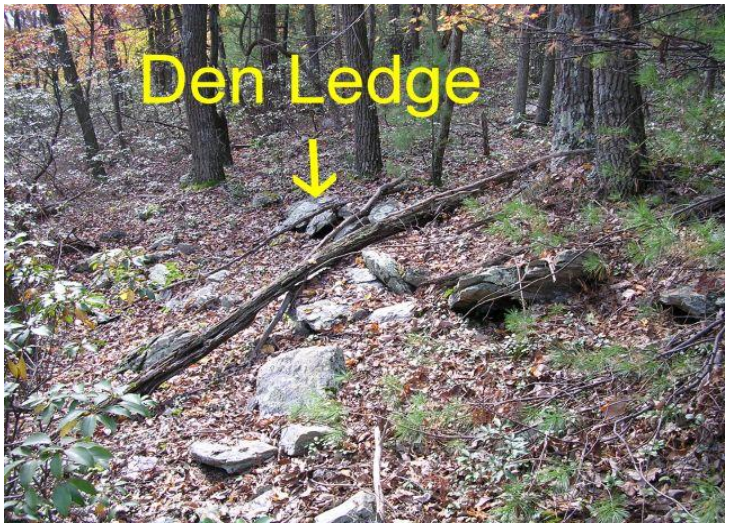
Monitoring

It is important to notify the Pennsylvania Fish and Boat Commission, Natural Diversity Section, 450 Robinson Lane, Bellefonte, PA 16823, (814)359-5237 of the location coordinates of all sites where habitat construction was performed in order for the PFBC to monitor the timber rattlesnake use of the created site over time. Once established, certain rocks within the created habitat area will be used annually by the females from one or multiple den populations and will aid in increasing the viability of that particular population.

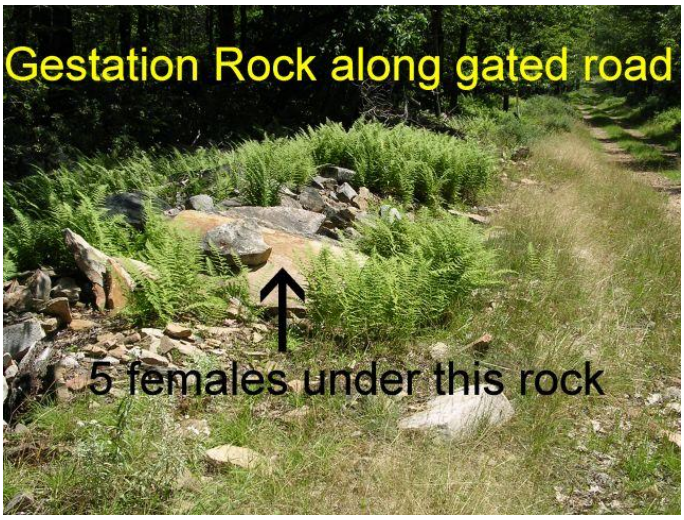
Through proper management, habitat creation, maintenance, research, and the continuing cooperative efforts of land managers, private landowners, and industry, the timber rattlesnake will continue to be a part of our forests and a reminder of our wilderness heritage. Thank you for your cooperation in this conservation effort.

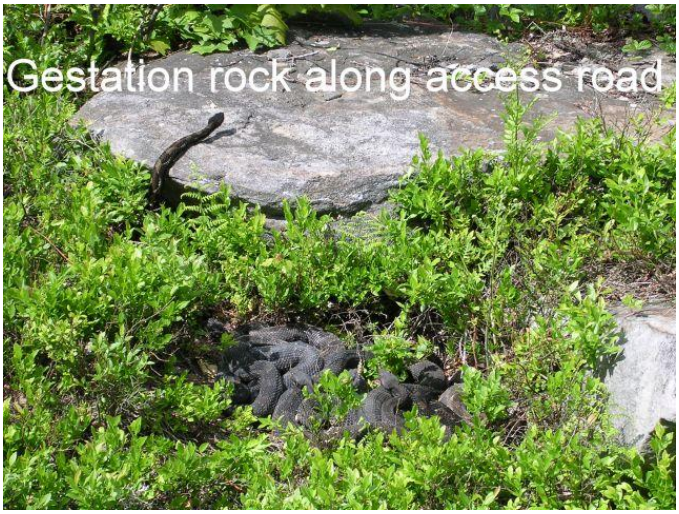
*Reinert, H. K. and R. R. Rupert, Jr. 1999. Impacts of translocation on behavior and survival of Timber Rattlesnakes, *Crotalus horridus*. Journal of Herpetology 33:45-61.

Examples of Den Habitat

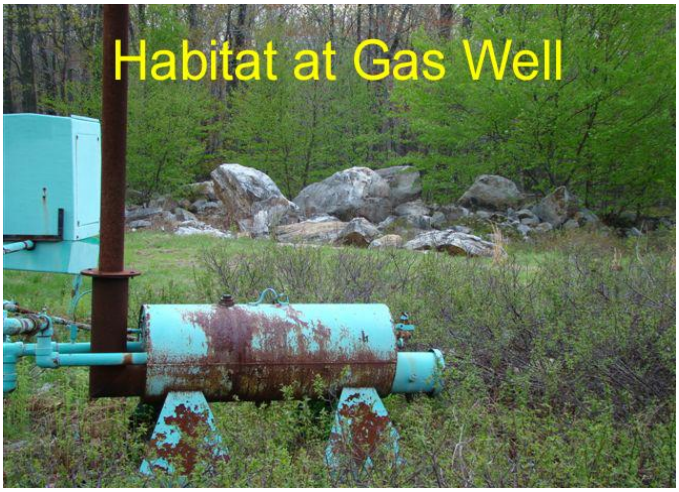


Examples of Habitat along Access Roads





Examples of Habitat in Forest Openings



Examples of Habitat along Pipeline Edges