

**Pennsylvania Fish & Boat Commission**  
**Natural Diversity Section**

**Timber Rattlesnake Presence-Absence Survey Guidelines**

(revised 2/11/2010)

**Timber Rattlesnake Natural History**

**Description**

The timber rattlesnake (*Crotalus horridus*) is a large, heavy bodied snake of the pit viper family (Viperidae). Timber rattlesnakes have transverse “V” shaped or chevron-like 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 situated between the eyes and the nostrils. The head color of the timber rattlesnake distinguishes two distinct color phases – the dark phase has a completely black head with, generally, black eyes, and the light phase has a yellowish tan to brown head and yellow eyes. The pupils of the eyes are elliptical in shape. The dorsal scales on the timber rattlesnake are strongly keeled, giving it a “rough” appearance. The ventral (underside) of the light phase is yellowish to creamy colored while the dark phase is white with small, dark stipple-like markings. Male and female timber rattlesnakes differ in size and subcaudal scale count. Adult males are usually larger than females (average size of males 42” snout-vent length, compared to 36” for females), and have longer tails (21 or more subcaudal scales between the venter and the rattle).

**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.

Rattlesnakes are ambush predators. They identify rodent trails on the forest floor via scent detected with their tongues. They sit and wait for a rodent to pass by on an already established trail before striking them with a venomous bite. After swallowing its prey whole, the timber rattlesnake seeks solar heat exposure to aid digestion of meals by moving to various, usually open, areas to bask.

Females reach reproductive maturity when 7 to 9 years old, as compared to males, which reach reproductive maturity at approximately 5 to 7 years of age. Timber rattlesnakes mate in late summer to early fall (July to mid-September) in Pennsylvania. The young are born live, the following year, in late summer (late August into September) with an average litter size of 5 to 9. Individual females reproduce at intervals of approximately 3 to 5 years. Since the gravid female infrequently feeds during the summer preceding birth of her offspring, the intervening years are necessary for building sufficient body fat to sustain her through gestation and then hibernation. So despite a life-span of up to 30 years, a female may only have 4 to 7 reproductive attempts during her lifetime.

There appears to be high juvenile mortality, since many young timber rattlesnakes fall prey to a variety of natural predators (e.g., birds of prey, carnivorous mammals). Adult timber rattlesnakes have few natural

enemies except humans, whose activities have the greatest direct (e.g., road-kill, illegal/wanton killing) and indirect (e.g., habitat loss) impacts to the timber rattlesnake population.

### **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.

#### **Impact Review: Development Projects and Potential Conflicts with Timber Rattlesnakes**

Many new projects are proposed on lands that are in close proximity to areas that have long been known to harbor timber rattlesnakes. During the environmental review process, the Natural Diversity Section staff may request a timber rattlesnake presence-absence survey if: 1) a timber rattlesnake habitat assessment was positive, and/or 2) the vicinity of the area that is proposed to be developed is currently or historically known to support timber rattlesnakes. Given the terrain, timber rattlesnakes may be utilizing the project area for denning, reproduction (gestation), basking, and/or foraging. These surveys are to be conducted by a PFBC-approved timber rattlesnake surveyor (list enclosed). Following the survey, a report documenting the surveyor's findings is submitted to the PFBC for review and comment. This information is pertinent for the staff to provide recommendations for avoiding adverse impacts from the proposed project to the timber rattlesnake population and its habitat.

#### **Presence - Absence Survey Guidelines/Methods**

##### **Habitat Assessment**

If a timber rattlesnake habitat assessment has not been conducted, areas within and at least 300ft around the project area need to be identified that are most likely to support timber rattlesnakes (e.g., talus slopes, scree areas, boulder fields, rocky outcrops, rocky right-of-ways). Although search ranges will vary with project location and size, in general, a search range should include the entire project area (including temporary and permanent impacts) and **a minimum of 300ft from the project boundary**. Results of the habitat assessment should be recorded on the included form. Presence/absence surveys are to target areas that

have been identified as potential hibernaculum/den and/or gestation/basking habitats and have a high potential to support timber rattlesnakes.

### **Sampling Times and Targeted Search Areas**

Timber rattlesnake presence-absence surveys are to be conducted when rattlesnakes are active (i.e., no earlier than April 15, nor later than September 15, with an emphasis on the visitations/surveys being completed prior to parturition and when the ground temperature is  $\geq 75^{\circ}$  Fahrenheit). Air temperatures should be at or above  $65^{\circ}$  Fahrenheit, and surveys cannot be conducted during rain events. Surveys are to target areas that have high potential to support timber rattlesnakes (e.g., talus/scree slopes, boulder fields, rocky outcrops, and rocky right-of-ways).

Each of the identified potential habitat areas, must be visited a minimum of four (4) times on separate dates during the date ranges listed below based on the type of habitat identified.

- Potential Hibernacula/Den Areas: April 15 – May 31; minimum of 4 separate surveys for each identified area. Surveys must not be completed on successive days and are to be timed to coincide with the emergence period for the particular region.
- Potential Gestation/Birthing Areas: June 1 – September 15; minimum of 4 separate surveys for each identified area. Surveys must be separated by one (1) week and are to be scheduled and completed prior to parturition to avoid the transition period when snakes are less likely to be encountered.

Site visits should coincide with optimal weather conditions needed to detect rattlesnakes. Sampling of a potential habitat area may cease upon detection of timber rattlesnake presence; however, the PFBC review of potential project impacts will benefit from as much information as can be gathered about the extent of use of each habitat area.

### **Methods/Handling**

Timber rattlesnake surveys are to be conducted by PFBC-approved timber rattlesnake surveyors who have the proper skills and permits required (PFBC Type III Scientific Collecting Permit) to handle this venomous species. Once the targeted areas and sampling times have been established, the targeted sites are to be visited by qualified personnel and their permit-listed assistants (see PFBC Scientific Collecting Permit). Dens, gestation/birthing areas, and/or individual occurrences are to be mapped and described accordingly. Color phase, sex, total length, snout-vent length (SVL), and reproductive condition should be recorded from timber rattlesnakes observed at the site.

### **Reporting Requirements**

Upon completion of the timber rattlesnake presence-absence survey, the surveyor is to submit a report to this office (Natural Diversity Section) for review. Survey reports are to document both abiotic and biotic parameters observed. The survey report must include the following information:

- Project narrative/description, exact project location, equipment to be used in earth moving activities, alternatives, etc.
- Survey dates, names of surveying personnel, USGS 7.5 minute maps showing the project area relative to the survey location, start and end times, start and end temperature, ground and air temperature, % cloud cover, other weather conditions, and calculation of person hours/search area.

The following information is to be reported from timber rattlesnakes observed at the site:

- Color phase, sex, total length, snout-vent length (SVL), and reproductive condition.

In addition, the following locational information and habitat descriptions are to be reported:

- Exact location (latitude/longitude and map datum used, located on topographic map), color photograph of animal(s), micro and macro habitat descriptions (vegetation descriptions, % cover, rock size and % cover), color photographs of habitat (dated, labeled, and keyed to a map), all herpetofauna seen, and any behavioral notes.

### **Qualified Personnel**

Timber rattlesnake surveys may only be conducted by PFBC-approved timber rattlesnake surveyors using the appropriate methods and times necessary during the appropriate seasons to detect timber rattlesnakes. Please see the attached list of qualified surveyors. The surveyors approved by the PFBC have demonstrated the proper experience to detect timber rattlesnakes and their habitat, and have the skills necessary to handle this venomous species as well as the proper PFBC Scientific Collecting Permit.