CHAPTER 15. KANSAS

LEGAL STATUS

Timber Rattlesnakes (Crotalus horridus) in Kansas are identified as a species in need of conservation (SINC). The statute definition is “any non-game species deemed to require conservation measures in attempt to keep the species from becoming a threatened or endangered species. SINC is the lowest category of recognition under the last adjustment of the species list (1992) of the Act. SINC species do not have the level of statutory protection as those species listed as threatened or endangered in Kansas.” (Sources: Kansas Statutes Annotated, 1986, Chapters 21, 32, 58 and 79; 1992 Cumulative Supplement.)

The act places the responsibility for identifying and undertaking appropriate conservation measures for listed species directly upon the Kansas Department of Wildlife and Parks and Tourism (KDWPT) through statutes and regulations. Regulations require the department to issue special action permits for activities that affect species listed as threatened and endangered in Kansas. Department personnel conduct environmental reviews of these proposed activities, and if necessary, issue action permits with special conditions that help offset negative effects to listed species and critical habitats.

HISTORICAL DISTRIBUTION

The historical distribution is presumed similar to the present distribution; however, historically there were more den sites and a larger overall population of snakes (Fitch and Pisani 2004), especially in the northeastern glaciated part of the state where development is becoming more intensive.

PRESENT DISTRIBUTION

Timber Rattlesnake are native to the eastern third of Kansas and limited to the west by the Flint Hills (Collins 1993) (Figure 15-1). The most southern and western localities recorded are along rivers, though the snakes are not riparian sensu stricto. This distribution likely reflects the availability of both suitable hibernacula and the Eastern Woodrat (Neotoma floridana), an important prey species for adult Timber Rattlesnakes. The
snakes are known to utilize woodrat nests as refuges, possibly from extreme summer heat as well as from predators (G. Pisani unpubl. data).

**POPULATION STATUS**

The officially recognized status is species in need of conservation as noted above. However, several factors have, over time, greatly increased the pressure on extant populations in northeast Kansas. These are, in probable order of importance:


2. Degradation of dens by successional woodland overgrowth (as a consequence of numbers 1. and/or 3. above) or outright destruction of dens as a consequence of expanding development.

3. Increasing elimination of fire in habitats, both natural fires and controlled fires used for management of vegetation.

4. Elimination of open, grassy areas favored as feeding grounds by all but the largest Timber Rattlesnakes. The loss of these grassy areas is a consequence of numbers 1. and 2. above, and a corollary consequence of reduced acreage used as pasturage for livestock.

5. Greatly increased traffic volume on county roads and an associated increase in rattlesnake road kills (G. Pisani pers. obs.).

As rural land becomes more valuable for development than farming, agricultural acreage increasingly is sold and platted for development or is broken into parcels of 4.0 to 12.1 km (10 to 30 ac) for less dense housing. However,
these small parcels are often further subdivided for even more dense development once land values increase. In all cases, habitats favorable for Timber Rattlesnakes are depleted, and because the snakes are feared by an unknowing populace, they are more likely to be killed and their dens are more likely to be destroyed (see Whitney 2001).

**HABITAT REQUIREMENTS**

Timber Rattlesnakes are found throughout suitable microhabitat in the Dissected Till Plains and in the Osage Cuestas region of the eastern Osage Plains of Kansas, with dens also being known from the Chautauqua Hills physiographic region (see discussion of physiographic regions in Bare 1979:1–4). The Dissected Till Plains constitute the glaciated part of the Osage Plains region. These areas continue to undergo successional change as land use patterns change.

Some of the most detailed habitat studies were carried out by Henry Fitch at both of the Kansas Biological Survey and Ecological Reserves properties. At these locations he observed: “Ecological succession [at the] Fitch Natural History Reservation (FNHR) caused habitat deterioration; although the Timber Rattlesnake is known as a forest inhabitant, the spread and development of forest in an area free from fire and grazing has produced conditions unfavorable to the snakes. Dense undergrowth and an unbroken leaf canopy eliminate the open sunny places favorable for basking that seem to be a prime requirement for the snakes. Nelson Environmental Study Area (NESA), adjoining FNHR on the north, retains extensive open areas of prairie and mowed fields, and continues to support a population of rattlesnakes” (Fitch 1999).

Concerning the FNHR, Fitch (pers. obs.) added: “On this [239 ha] 590-acre area, timber rattlers seemed moderately abundant in 1948. Some were
captured and marked almost every year until 1964. Then they disappeared (after 43 had been captured). This disappearance can be attributed to successional changes, with the spread of trees and the elimination of basking places. Several records 1964–2005 were obviously wanderers from farther north. One of these was killed by a survey crew; others were captured and marked. No dens were located. Many of those caught were fall neonates. Some were still associated with mothers and/or siblings."

During our 2003 and 2004 telemetry study of this species, it was apparent that snakes utilized wooded ledges as den sites and avenues of dispersal, but that considerable feeding activity occurred in open fields of brome or in degraded pastures overgrown with forbs and cedars. Additional captures and the observations of other biologists involved with vegetation research on our study area plainly indicate that during summer, Timber Rattlesnakes also range widely through the prairie acreages of the Nelson Environmental Study Area and similar habitat on adjacent private lands. Since the publication of Fitch (1999), we have more than doubled the number of observations of feeding by this species in Kansas. Of 30 such records in total, 9 feedings were on Microtus spp., and 5 on Peromyscus spp.; both are abundant in the open areas favored by Timber Rattlesnakes through the summer. Fitch (2004) documented higher average weights in Eastern Copperheads (Agkistrodon contortrix) from such habitat as opposed to those from the adjacent, more heavily wooded areas.

During summer 2003, adult snakes tended to associate closely with lightly-wooded ledges throughout the area. However, this may have been an artifact of the very high average temperatures and accompanying drought of that summer. Temperature in wooded areas, and the woodrat nests used by snakes as shelters, likely were lower than in open fields of low grasses and forbs during the hottest months. Even the subadult snakes that frequented such open areas through the hottest months of that year were...
associated with the scant shade provided by taller fencerow vegetation and Eastern Red Cedar (*Juniperus virginiana*) or dogwoods (*Cornus* spp.) out in fields. In 2004, a far less extreme summer, snakes made greater use of open grass and forb areas.

Lightly-wooded south or southwest-facing ledges of rock that are fractured deeply enough to allow snakes (especially the largest adults) to escape winter temperatures are essential hibernacula. Not all geologic formations show such fracturing; in Douglas County, areas of the Oread Limestone formation contain dens on FNHR, NESA, and various surrounding locations. Several dens have been located in abandoned limestone quarries in central and western Douglas County, and it is likely that quarrying through the mid- to late 1960s opened a number of ledges subsequently utilized by Timber Rattlesnakes as hibernacula. Since that time, quarrying has been less for stone building blocks than for gravel, and the increased mechanization and large scale of this activity has not seemed to provide snakes the same number of potential den sites. Timber Rattlesnakes found hibernacula in the naturally fractured ledges of the Osage Cuesta habitat characteristic of northeast Kansas (Bare 1979). A detailed discussion of the geology of the Tri-county Kansas Biological Survey and Ecological Reserves (KSR) properties (FNHR, NESA) may be found in Whittemore (1991).

**ACTIVE PERIOD**

The snakes usually emerge in mid-April and begin to move back to dens in mid-September. Snakes may be seen basking on ledges prior to hibernation ingress as determined by local temperature regimes each year.

Whittemore (1991) indicates that the average dates for the last killing frost in spring and the first killing frost in fall are 10 April and 23
October respectively with wide annual variability. Egress/ingress of Timber Rattlesnakes reflects adaptation to this variability, with a general activity season of about 170 days. However, as learned from our telemetry studies of the species, potential activity and feeding may be greatly curtailed by the not infrequent high temperature and low precipitation extremes of summer. In summer 2003 there were many days with highs in the upper 90’s and low 100’s (F), with no rainfall during July and August. Most radio tracked snakes did not feed during July and August, and resumed feeding following heavy rains the first week of September. Activity of most adult snakes was confined to the sheltered areas associated with wooded rock ledges, and the two radio tracked second-year young rattlers sought similar shelter in the taller vegetation of the study area. One of these females spent considerable time about 3 m (10 ft) up in the canopy shade of locust trees along a fencerow. When cooler weather and rainfall occurred in September, this snake descended and resumed normal terrestrial activity (Fitch and Pisani 2004). Both snakes were habitual climbers (usually less than a meter [3 ft] from the surface), and this behavior in subadult Timber Rattlesnakes (Collins 2003) is interesting and should be fully explored by telemetry.

THREATS

There are two main threats to Timber Rattlesnakes in Kansas:

1. Increasing development/suburbanization in northeast Kansas, accompanied by destruction of den sites and killing of snakes by humans (see Population Status above).

2. Succession to wooded habitat from the historical habitat of grazed/burned prairie lowlands. This habitat change degrades the thermal regimes of dens and areas used by gravid females for summer thermoregulation.

CONSERVATION MEASURES COMPLETED

The following two ongoing projects, the first by George Pisani and the second by Dean Kettle...
of the Kansas Biological Survey, are the major conservation initiatives completed to date.

1. Research of the movements, breeding, and life history parameters of *Crotalus horridus* in northeast Kansas.

2. Restoration of a degraded upland prairie and associated overgrown ledges used as snake hibernacula. As part of the management practices of the Kansas Biological Survey and Ecological Reserves (KSR), prairie areas on NESA and similar tracts are burned in spring on a three-year rotation. FNHR has been allowed to go through successional change. KSR is in the process (since 2005) of expanding restoration efforts at a ledge system formerly used as a hibernaculum by Timber Rattlesnakes, and to one current den site in danger of degradation. Trees are being removed to thin the canopy, and plans are to burn the existing den’s surrounding woodland thereafter, prior to the snakes’ emergence.

**CONSERVATION MEASURES NEEDED**

1. On public lands, one of the most pressing conservation needs is to reverse the present trend towards habitat succession on upland ledges that have been used as den sites and rookeries. Lack of financial resources has led to hands-off management of many upland areas, with concomitant invasion of trees and shrubs on areas formerly kept more open by grazing and fire. In 2005, the Kansas Biological Survey started a restoration program of radical thinning of canopy vegetation on such ledges. Given the extensive use of adjacent grassland areas as feeding grounds by females and sub-adult Timber Rattlesnakes, land management to restore degraded (by succession in a fire-suppressed management regime) prairie areas adjacent to den ledges should also be pursued on public lands and encouraged on private lands, especially those whose owners receive tax incentives through placing their lands into conservation easements (see Plich 2001).

2. Research is needed to assess population status, movements, and ecological requirements beyond the well-studied FNHR.

3. A program of public education needs to be mounted near habitats in northeast Kansas threatened by increasing urbanization and destruction of dens and feeding habitat. Funds to establish educational displays at the several area nature centers (such as at Wyandotte County Lake Park) would do much to assuage public apprehension about conserving these snakes.

4. The glaciated northeast portion of the state, the region most subject to development and suburban expansion, is home to two other snake species designated in Kansas as threatened -- Smooth Earth Snakes (*Virginia valeriae*) and Redbellied Snakes (*Storeria occipitomaculata*) (Collins 1993). For this reason, it would seem worthwhile for the Kansas Department of Wildlife, Parks and Tourism (KDWPT) program to initiate a Landowner Incentive Plan (LIP) for general habitat conservation and management on private lands in this region.

The apparent success of LIP in Minnesota (Edwards and Spiering 2005) is encouraging. KDWPT uses a somewhat similar program to achieve public access to private hunting lands; the Walk-in Hunting Program provides financial incentive to cooperating landowners for allowing public hunting access. Structuring of a LIP by KDWPT Nongame Wildlife Program would preserve habitat needed by Timber Rattlesnakes and other species, and additionally would involve more landowners in active conservation and management of such habitat. Kansas Biological Survey was funded for a pilot project involving restoration of degraded prairie areas and is in the process of planning what is hoped to become a standing series of workshops for persons interested in the restoration and/or management of such areas. A Timber Rattlesnake den ledge degraded by succession (Fitch 1999) is included in the Survey’s effort.

5. Elevating the legal status of the species from SINC to threatened, or to a new category of regionally threatened, with concomitant restrictions on destruction of dens and capture/killing of snakes, is needed.
LITERATURE PERTINENT TO KANSAS

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