

DISTRIBUTION AND ABUNDANCE OF REPTILES
IN HANOVER BLUFF NATURE PRESERVE
JO DAVIESS COUNTY, ILLINOIS

BY

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Prior to and during my investigation several local residents were kind enough to answer questions about this area. Mr. James Lewis, an adjacent land owner and contributor to Hanover Bluff, gave much valued information. Mr. Vic Mason, another adjacent land owner, also graciously answered my questions and was helpful. Mr. Roland Sieman lived in the now razed residence on the property for many years starting in 1951 and gave me much detailed information on rattlesnake den locations of years past and related his experiences living in a rattlesnake area with his family.

Mr. Les Deininger, a local Galena rattlesnake hunter, agreed to an extensive interview and provided much insight into the habitat propensities and behavior of the timber rattlesnake in Jo Daviess County, Illinois and I am very grateful.

Thanks also to Mr. Herb Shelly, owner of the land south of the preserve, for kindly granting permission to search his property.

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INTRODUCTION

Hanover Bluff Nature Preserve has similar features to Mississippi Palisades State Park but far less human use. A previous study attempted to determine the current population of the timber rattlesnake, Crotalus horridus horridus, in Mississippi Palisades State Park (Bielema, 1990). This study, conducted over approximately one full year of the active season for reptiles, revealed that the population of rattlesnakes was greatly reduced as no specimens were encountered at the Park where once their numbers thrived. The dolomite cliff area of Hanover Bluff provides much the same habitat for this species and it was proposed that a similar study be done in this area to determine if a viable population existed there. Additionally, a comprehensive inventory of Heritage resources at this preserve has not been completed and it was suggested that the rattlesnake project include the recording of all reptile species encountered. During the study, therefore, all reptile sightings were logged and plotted on a map of the area.

As in Mississippi Palisades State Park, the timber rattlesnake was prevalent in Hanover Bluff Nature Preserve years past, prior to the dedication of the preserve. In the 1920's and 1930's spring burns were conducted at the northern section of the property in an attempt to kill the abundant rattlesnakes. Ten rattlers per year were being

killed by Roland Sieman around his residence in the 1950's. This residence was razed but the foundation still exists in the preserve in the northern half along South Whitton Road. Rattlesnake hunters commonly searched the cliffs where many snakes were taken. Six to eight dens were described by Sieman and were distributed along most of the cliff area of the preserve.

Mr. Les Deininger of Galena has hunted rattlers for many years catching as many as 55-60 per year throughout a large part of Jo Daviess County. He stated that all of the few dens that still exist (6 or less) show a decline in numbers.

The timber rattlesnake has played a prominent role in the history and culture of both the red and white man. It is one of the few remaining symbols of the wilderness in Illinois. It deserves to have its numbers determined and sanctuary areas dedicated to ensure that it survives in Illinois. The Wisconsin Driftless Area in northwestern Illinois once supported a thriving population with many active dens. Today this population is steadily declining and this study was initiated to determine if a viable colony could be found and maintained on a state owned and controlled property of the region.

STUDY AREA

Hanover Bluff Nature Preserve is located in southwestern Jo Daviess County, Illinois. The area is described in detail in the proposal for the dedication of this nature preserve (Nyboer, 1986). The proposal describes six natural communities: sand hill prairie, dry dolomite prairie, dry-mesic and mesic upland forest, seep springs and the predominant dolomite cliffs. The cliffs are Mississippi River bluffs which now overlook sand terraces to the west and then the Mississippi River 3.5 km away.

The dolomite cliffs are extensive and run almost the entire length of the preserve from north to south (approximately 1.5 km). This cliff area was the main focus of the study and typifies the Mississippi River bluff outcrops in northwestern Illinois and throughout the Wisconsin Driftless Area.

There are no trails for human use at the site and only old lanes exist in a few places now grown over with vegetation.

South Whitton Road, a moderately travelled gravel road, forms the western boundary of the preserve which is less than 100 meters from the parallel cliff.

MATERIALS AND METHODS

From 16 July 1990 through 17 October 1990 and from 24 April 1991 through 13 June 1991 thirty three searches totaling 74.6 hours were conducted on foot. These searches primarily were concentrated in the dolomite cliff community but also covered the forest and prairie above the cliff as well as the forest between the base of the cliff and South Whitton Road. Searches were performed during daylight hours. Search day temperatures fell within the minimum and maximum voluntary temperatures for Crotalus horridus (Brown et al, 1982). A sighting made in the fall of 1989 is included as a road killed specimen was identified during a drive past the area.

Most search days began by driving the entire length of the preserve (approximately 1.9 km) on S. Whitton Road to locate any specimens dead or alive on the road surface. After this was completed, a section of the preserve was slowly walked for periods of 1-4 hours. Obvious debris items encountered such as logs, fallen bark, boards, tin, etc. were carefully moved to search for specimens. A timber rattlesnake "search image" developed over 20 years experience combined with a very slow search speed enabled sightings to be made with as little as 10 cm or less of the snake's body visible from distances as great as 10-15 m.

Of the 74.6 hours, 31.8 were concentrated in and around the southern quarter of the preserve after the first C. horridus sighting. These hours were not logged consecutively as the other areas were still searched intermittently. This concentration was necessary to determine the numbers present of this species in what is believed to be a den area.

All reptile specimens encountered were identified as to species, had physical details recorded, and, when possible, the pattern sketched and/or photographed for future recognition (Bielema, 1973). Specimens were not handled to keep the disturbance to a minimum. Identification was aided by Smith (1961), Conant (1975) and Vogt (1981).

Sightings were plotted on a topographic map and details of the site rock and vegetation association recorded.

Timber rattlesnake small mammal prey item species (Keenlyne, 1972) were noted when evidence of their presence was found (Hoffmeister and Mohr, 1957).

Interviews with three local residents familiar with the area and a Galena rattlesnake hunter were conducted to determine historical snake populations and habitat characteristics.

Maturity estimations for C. horridus were based on size and rattle composition as per Klauber (1972), Galligan and Dunson (1979), and Brown (1987). Size and pattern were used to determine maturity for the other species.

Maps were taken from the U.S. Geological Survey Green Island Quadrangle 7.5 minute series (topographic). Map 1 is reproduced directly from the original and Map 2 is enlarged by 2.4 times.

RESULTS

Sightings of the following species occurred in and near the Hanover Bluff Nature Preserve and are believed to be resident species: Elaphe obsoleta obsoleta (Black Rat Snake), Lampropeltis triangulum triangulum (Eastern Milk Snake), Coluber constrictor flaviventris (Blue Racer) and Crotalus horridus horridus (Timber Rattlesnake). A large Pituophis melanoleucus sayi (Bullsnake) was found dead on Route 84 approximately 3.5 km south of the preserve and should be included as a probable resident due to the presence of extensive sand prairie both in and around the preserve.

Sightings of blue racers and timber rattlesnakes were restricted to a small area (approximately 3 ha) of private land bordering the preserve to the south. These sightings were 50-200 m south of the boundary fence.

The following sightings by species occurred: Elaphe obsoleta-2 (1 at 1.5 km south of the preserve on S. Whitton Road), Lampropeltis triangulum-1, Coluber constrictor-3, and Crotalus horridus-18 (13 different individuals). Two shed skins found were also recorded.

Table 1 provides data for each sighting.

Maps 1 and 2 show locations of sightings. Sightings MLN (Map Location Number) 1 and 2 appear on Map 1, MLN 3 not on either and MLN 4-27 on Map 2.

KEY TO TABLE 1.

MLN: Map Location Number

AGE: A- Adult (greater than 6 years for C. horridus,
Brown, 1987)

SA- Subadult (3-6 years for C. horridus only)

J- Juvenile (1-2 years for C. horridus)

N- Neonate (less than 1 year)

RATTLE: T- Tapering

S- Straight sided

()- Number of segments when able to count

+b- Button present

SITE: a- Base of cliff

b- Talus slope below base of cliff

c- Soil slope below base of cliff

d- Boulder/slide rock base of slope

1- Not concealed by but near rock

2- Partially under rock

3- Fully under rock (visible from side)

DOR- Dead on road

LOR- Live on road

s- Totally shaded by vegetation

ps- Partially shaded by vegetation

o- not shaded by vegetation

u- under board near razed house foundation

NOTES (species column): 1- eyes cloudy indicating pre
shed condition

2- 1 m off ground in sumac tree

3- 20 cm off ground in vine

*, **, *** - indicate same individual at same
location

TABLE 1. Sighting data

<u>MLN</u>	<u>SPECIES</u>	<u>DATE/TIME</u>	<u>AGE</u>	<u>RATTLE</u>	<u>SITE</u>
1	<u>Elaphe obsoleta</u>	Fall 1989	A	--	DOR
2	<u>Elaphe obsoleta</u>	6 Sept 90/0925	A	--	LOR
3	<u>Pituophis melanoleucus</u>	8 Sept 90/0915	A	--	DOR
4	<u>Crotalus horridus</u>	29 Sept 90/1227	J	T(2+b)	c,1,ps
5	shed skin <u>C. horridus</u>	29 Sept 90/1300	N	--	a
6	<u>Crotalus horridus</u>	29 Sept 90/1356	SA	T(-)	b,1,o
7	<u>Crotalus horridus</u>	17 Oct 90/1150	A	S(10)	a,1,ps
8	<u>Crotalus horridus</u>	17 Oct 90/1150	SA	T(-)	a,1,o
9	<u>Coluber constrictor</u> 2	17 Oct 90/1328	A	--	b,1,ps
10	<u>Coluber constrictor</u>	28 Apr 91/1301	A	--	b,1,o
11	<u>Crotalus horridus</u>	15 May 91/1353	SA	T(6+b)	a,1,ps
12	<u>Crotalus horridus</u>	15 May 91/1455	SA	T(-)	a,1,s
13	<u>Lampropeltis triangulum</u>	16 May 91/1230	J	--	u
14	<u>Crotalus horridus</u>	27 May 91/1216	SA	T(4+b)	b,2,o
15	* <u>Crotalus horridus</u> 1	6 June 91/1435	SA	T(5+b)	b,2,o
16	** <u>Crotalus horridus</u> 1	6 June 91/1501	SA	T(-)	b,3,o
17	<u>Crotalus horridus</u>	6 June 91/1535	SA	T(4+b)	a,1,ps
18	<u>Crotalus horridus</u>	6 June 91/1622	SA	T(-)	b,1,ps
19	shed skin <u>C. horridus</u>	10 June 91/1333	A	--	c(near d)
20	* <u>Crotalus horridus</u> 1	10 June 91/1351	see MLN 15		b,2,o
21	* <u>Crotalus horridus</u> 1	12 June 91/1320	see MLN 15		b,2,o
22	** <u>Crotalus horridus</u> 1	12 June 91/1336	see MLN 16		b,2,o
23	*** <u>Crotalus horridus</u> 1	12 June 91/1426	A	S(9)	d,3,o

Table 1. Sighting data (cont.)

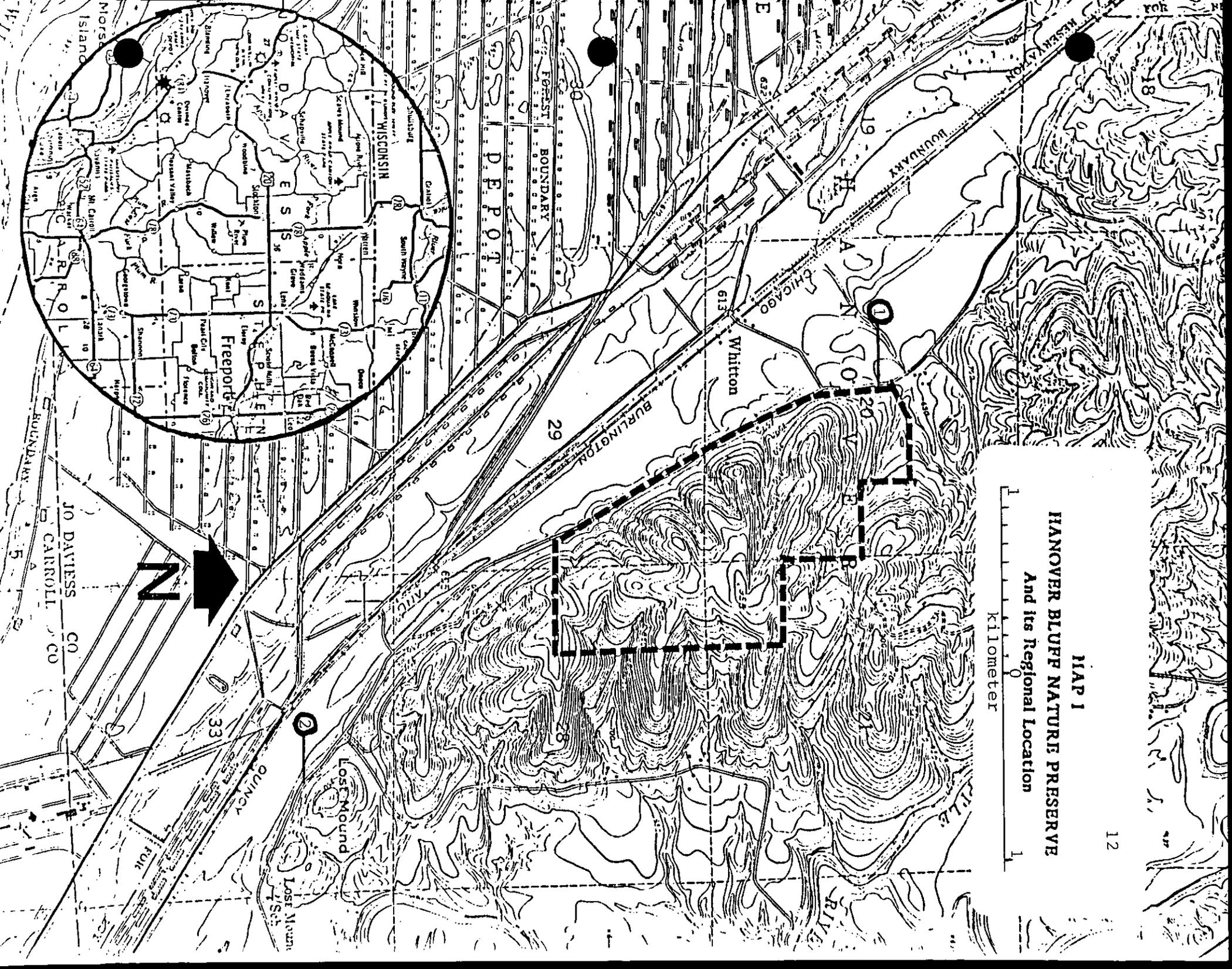
<u>MLN</u>	<u>SPECIES</u>		<u>DATE/TIME</u>	<u>AGE</u>	<u>RATTLE</u>	<u>SITE</u>
24	*** <u>Crotalus horridus</u>	1	13 June 91/1126	see MLN 23		d,3,o
25	* <u>Crotalus horridus</u>	1	13 June 91/1140	see MLN 15		b,2,o
26	<u>Coluber constrictor</u>	3	13 June 91/1204	J	--	a,1,ps
27	<u>Crotalus horridus</u>		13 June 91/1257	A	S(10)	d,2,o

Sightings of the following small mammal species occurred: eastern cottontail (Sylvilagus floridanus), eastern gray squirrel (Sciurus carolinensis), eastern fox squirrel (Sciurus niger), and eastern chipmunk (Tamias striatus).

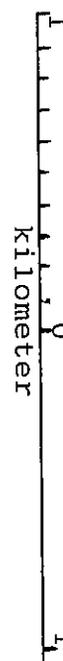
Mouse nests were found in and under debris in the forested areas and white-footed mice (Peromyscus leucopus) are indicated.

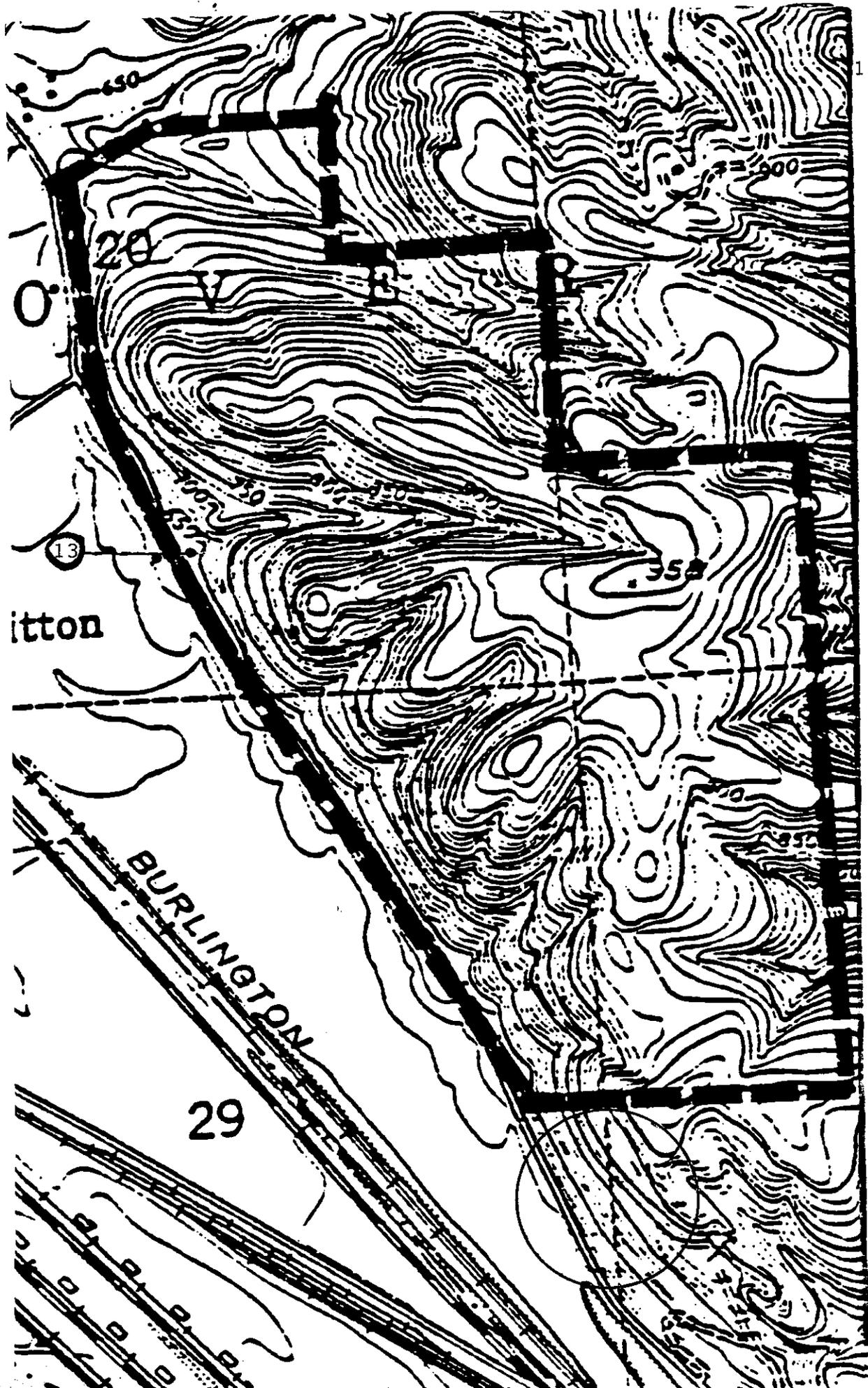
Prairies and other grassy areas show runway evidence of voles (Microtus spp.).

Interview results are included in the discussion section.



HANOVER BLUFF NATURE PRESERVE
And its Regional Location





13

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29

MLN
4-12,
14-27
within
circle

DISCUSSION

Species sighted.

The species sighted in and near the preserve are typical for the communities present. The eastern milk snake and the timber rattlesnake are not commonly encountered due to the secretive nature of the milk snake and the rareness of the rattlesnake. The concentration of rattlesnakes at the southern edge was probably due to the den believed to be present there. Blue racers were also seen there and may also hibernate in this area. Black rat snakes are probably distributed throughout the forested bluff of the preserve.

Age determination (*C. horridus*).

The age class groups used were based on size and rattle structure. When the rattle retains the button and several tapering segments, a sub adult is indicated as adults tend to break off the button and smaller, early life segments leaving a more straight sided rattle of usually no more than 10 segments (Brown, 1987; Klauber, 1972). Estimations of age by rattle structure must also consider the number of times that snakes shed each year. This number is given by Brown (1987) as 1 (66%) to 2 (33%) per year and by Klauber (1972) up to 3.9 average per year. Neonates born in late summer or fall shed once within about 10 days of birth resulting in a button segment on the tail. An additional segment is added

at each shedding thereafter which usually occurs in the spring (Brown, 1987). The numbers given by Brown (1987) are probably correct for this area as the active season (earliest sighting 15 May to latest 17 October) coincides closely with the New York populations he studies. A very small shed skin was found in September indicating a neonate and a large adult cast was found in June supporting Brown's ecdysis schedule. Although exact measurements were not taken, the size of the snake was used to determine age also. A female rattlesnake of 770 mm produced a litter observed by Galligan and Dunson (1979) and one of 920 mm was found to be gravid by Brown (1987). Snakes sighted could be classed, therefore, by using these figures as a guideline plus the girth of the body and rattle formation. The sub adults were noticeably smaller than the ones classed as adults and the rattle formation was distinctively different. The juvenile sighting was a very small bodied snake with 2 segments and a button believed to be 1 to 2 years old.

Reproduction (C. horridus).

The lack of newborn sightings may indicate low production of young. A single shed skin suggests that at least one newborn was in the den area in September. The late age of sexual maturity of 5-8 years, 2-3 year reproductive cycle and litter size average of 7-9 give a relatively low rate of young production for the species

(Brown, 1987; Galligan and Dunson, 1979; Keenlyne, 1972). Other factors which may cause a lack of newborn sightings include a high rate of juvenile mortality due to predation and the inability of the neonates to locate suitable hibernacula resulting in freezing (Brown, 1987). Parturition sites may be distant from the den at times and newborns probably depend on scent-trailing of adults to find it (Brown and MacLean, 1983; Galligan and Dunson, 1979; Reinert and Zappalorti, 1988). Additional study time needs to be devoted to this population to determine reproductive viability. There seem to be adequate numbers in close proximity but only 3 individuals were considered to be sexually mature. The number of sub adults of similar age may provide an adequate breeding pool as they will apparently mature within the next 1-3 years.

Prey abundance (C. horridus).

Based on the sightings of small mammals and signs of their abundance it is believed that a suitable prey population exists composed of species known to be utilized (Keenlyne, 1972; Reinert et al, 1984).

Ecdysis and movement (C. horridus).

Table 1 shows that three individuals were sighted at the same locations for periods up to 7 days. These individuals all exhibited the cloudy eyes indicative of a

pre shed condition. The fact that these were found in the same location and position supports the theory that post emergence movements are delayed until after ecdysis. MLN 15 was sighted on 4 different days under the same rock in a talus slope. It appeared to be emaciated and it probably had not fed since the previous fall. The frequency of the cloudy eye condition suggests that many may shed during the same spring period in June. The adult shed skin found also supports this June ecdysis. Additional research is needed to determine if dispersal occurs after spring shedding. Timber rattlesnake movements are influenced by reproductive condition. Males and non gravid females (to a lesser extent) move farther than gravid females to forage for food (Brown et al, 1982; Keenlyne, 1972; Reinert et al, 1984). Gravid females do not feed during the period from emergence to young production in late summer or fall of that year (Keenlyne, 1972).

The sightings in this study are believed to be around a den representing fall and spring congregations. The preserve was extensively searched in the summer of 1990 but the location of specimens in the summer foraging area is very difficult without radiotelemetry (Howard K. Reinert, pers. comm.). The fact that gravid females are sedentary in open rocky habitat enables sightings throughout the active season. The only habitat of this type occurred in the den area south of the preserve. Foraging distances from the den

of a mean distance of over 500 m were found by Brown et al (1982) for nongravid females and males which would take them into the preserve.

Behavior on approach (C. horridus).

The behavior of each individual rattlesnake upon approach varied. Most individuals allowed approach to within 3 m without obvious reaction. MLN 15 was very docile and allowed close examination from less than 1 m. MLN 16 was the opposite and immediately rattled and crawled into crevices in the rocks when approached within 5 m. Some individuals detected the searcher prior to being seen and began to rattle. This was almost always combined with a slow to rapid movement into a crevice or under a nearby rock. The 3 adults were slow to retreat but also did not rattle unless touched with a snake hook. No aggressive behavior or strikes were observed throughout the study which is typical for this species of rattlesnake.

Site characteristics and thermoregulation (C. horridus).

All rattlesnakes sighted appeared to be at rest thermoregulating by slight movements in and out of the sun. Each site was characterized by rock and/or vegetation providing shade. Vegetation consisted of low forbs or vines up to small to medium sized trees. MLN 15 was checked up to three times in a single search trip and was observed to

shift its body increasingly into the shade of a rock as the heat of the sun increased.

Habitat considerations (C. horridus).

The den area where all timber rattlesnake and blue racer sightings occurred is characterized by dolomite cliffs, extensive talus runs below the cliffs and large slide rock boulders. Some of the slope below the cliff is loose sandy soil. The entire area of sightings is roughly 3 ha with a concentration of sightings in 1 ha immediately south of the south western corner of the preserve. This area is currently grazed by cattle and horses which manage to climb the unstable slope in places creating trails and keeping the grassy sections low. The footing in the talus runs is so precarious that few signs exist of any large mammal presence at any time either human or livestock. This feature may have contributed to the survival of the rattlesnakes here. Grazing appears to affect the area in a favorable way by restricting the growth of vegetation in the slope area preventing forestation. Indeed, the rattlesnake's rattle has been suggested to have been advantageous in bison country to prevent trampling. Thus this selective advantage may have given rise to the rattle. Hogs are notorious snake killers and are consumers of them but cattle and horses probably detect and avoid them. The growth of shrubs and trees is believed to be a limiting factor which was

overlooked in the previous study at Mississippi Palisades State Park by Bielema (1990). This factor may rank with the deleterious effects of over collecting, direct killing and destruction of habitat. Many studies have determined that gravid females are sedentary, basking for the development of the young (Keenlyne, 1972; Reinert, 1984 a-b; Brown et al, 1982). Basking also is important for thermoregulation on cold fall and spring days around the den. The open canopy of the den area is in sharp contrast to the preserve land to the north. Light levels on the ground are as different as night and day when moving from the heavily forested cliffs of the preserve to the open pastured land. An early photograph of Mississippi Palisades State Park shows outcrop bluffs denuded of trees. Many trees were cut for use in the steamboats of the era. Snake numbers during this time were thriving. Today the palisades are barely visible during the summer due to the heavy forest present. Roland Siemen, former resident of the now razed house in the preserve stated that the preserve land was extensively pastured in the 1920's and 1930's by horses and cattle. He said that old photographs show the cliff area to be far more open than it is today. He claims that grazing by horses results in the nipping off of the young red cedar trees preventing their growth and expansion. In 1951 when he moved into the house, grazing was reduced and the red cedar trees were already rapidly colonizing the bluff. He cut many for fence

posts. Today the preserve is thickly forested with red cedar and broad leaf species along the dolomite cliffs. Some red cedar control efforts in the prairie are present. The deposition of cut trees has covered the outcrops below the prairie in some places. As a result of this rampant growth of forest very few openings are present along the cliff.

The absence of rattlesnake sightings in MPSP and in the preserve may partially be the result of the dense forest canopy. Human use of the preserve is minimal but the cliff conditions are similar to MPSP. If the human factors are not present, the lack of sightings may be caused by habitat changes.

Mr. Les Deininger, the rattlesnake hunter, stated that he has also seen a great increase in trees and shrubs around the dens he visits and he has seen progressively lower numbers at them. He is catching fewer and smaller individuals which he believes may be the result of agricultural sprays and collecting as well. Studies by Reinert (1984 a,b) and Keenlyne (1972) have shown the timber rattlesnake to be a species which utilizes an open rocky habitat for denning and young production and a forested habitat for foraging. The average canopy cover percentages were 68.8 for males, 67.1 for non gravid females and 21.9 for gravid females for all captures over a 3 year period of telemetrically monitored individuals by Reinert (1984 a,b)

in a typical C. horridus habitat in Pennsylvania. The canopy cover was determined by methods used by Reagan (1974). The need for habitat of open canopy cliff and talus with suitable slide or table rocks may be critical. The number of open rocky areas with viable dens today in Illinois are few. The study area den faced southwest to west agreeing with the direction of recorded dens in the literature which range from the southeast around to the west. This placement gives optimal sun exposure. Forces of freezing and thawing, wind and water erosion and grazing have helped to maintain the unstable open slope of the den. The top most peaks of the cliff fall away sharply to the east into the bottom of a minimally used quarry. The absence of upland forest may also have contributed to reducing the forestation below. Much of the talus south of the den is showing signs of canopy closure due to the growth of forest. Without some external control measures the forest may yet overgrow the small open den area.

Acquisition proposal.

The results of this study indicate that the preserve may be suitable for foraging for Crotalus horridus but there may no longer be an active den on the property. The use of forest and the resulting fallen logs for foraging has been observed by Reinert et al, 1984. The preserve provides this aspect of habitat. What the preserve does not have is

the open rocky environment which may be vital. The acquisition of the den area would complete the habitat picture. A narrow strip of roughly 200 m wide from the South Whitton Road on the west to the visible peaks of the quarry cliff to the east and south approximately 700 m to the dwelling would include necessary den talus and cliff habitat. A phone conversation with the owner, Herbert Shelly, revealed that he owns 100 acres including the limestone dwelling, which he is willing to sell for \$130,000. This includes all the quarry area plus 40 acres of forest which he says contains some young American chestnut trees. He said he has had this on the market for awhile but has had no offers and is eager to sell to add to the preserve. The land adjoins the preserve entirely. The limestone house would make a good nature center structure for the preserve.

Management (C. horridus).

Management of this area must include canopy control measures to insure that the den area is not overgrown by trees. Grazing may be helping to maintain this but the treacherous peaks and talus need attention to cut back the advancing forest. The cliff and talus areas of the preserve near the south boundary could be opened to encourage the expansion of the den area. The rock structures are present throughout much of the preserve but the canopy must be opened to provide suitable basking areas. Randomly clearing

trees to allow sunlight into the cliff community would be necessary along the entire length if it is desirable to restore the bluff/talus characteristics of years past.

Conservation (C. horridus).

Sanctuaries are needed to ensure the survival of Crotalus horridus in northwestern Illinois. The number of remaining viable dens must be determined and steps taken to preserve them. Until its numbers are known it should be declared threatened or endangered as it has been in many eastern states.

Hanover Bluff Nature Preserve is distant from large population centers. It has few residents nearby and would be an ideal sanctuary site. There are no trails and little human use of the property. Historically many residents of northwestern Illinois have lived in areas of thriving rattlesnake populations yet records of bites are almost non-existent. This non-aggressive creature is not a serious threat to man and due caution would allow anyone to travel through rattlesnake environments with impunity. The management and expansion of this preserve for the benefit of the timber rattlesnake would be the first step in a long history of persecution toward the safeguarding of the survival of this interesting form.

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