



I L L I N O I S

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

PRODUCTION NOTE

University of Illinois at
Urbana-Champaign Library
Large-scale Digitization Project, 2007.

Doc.
IL NHS
BIOD
1995(4)

A Limited Survey of the Amphibians and Reptiles of the FAP 301 (U.S. 20)
Project Area, Jo Daviess and Stephenson Counties, Illinois

Center for Biodiversity Technical Report 1995 (4)

31 January 1995

Submitted by
Christopher A. Phillips
Center for Biodiversity
Illinois Natural History Survey
607 E. Peabody Drive
Champaign, IL 61820

Prepared for
Bureau of Design and Environment
Illinois Department of Transportation
2300 Dirksen Parkway
Springfield, IL 62764

INTRODUCTION

The Illinois Department of Transportation (IDOT) has proposed upgrading U.S. 20 (FAP 301) to a four-lane, limited access highway from just west of Galena, Jo Daviess County to just west of Freeport, Stephenson County. Some of the expansion will follow existing U.S. 20 but several long stretches in the western end of the corridor will require new alignment and will therefore alter current land use patterns. This report presents the results of a survey of amphibians and reptiles of the FAP 301 project area.

Surveys for amphibians and reptiles are usually conducted in a single effort because of the similarities of the two groups. They are both secretive in their habits and being ectothermic, they are generally active under a narrower temperature range than birds and mammals. However, there are also a number of differences between amphibians and reptiles that make combined surveys very difficult. Amphibians are restricted to moist conditions because they exchange gasses through their skin and lay eggs that usually must be submerged in water. Most amphibians also have an aquatic larval stage that may last several months to a year. Reptiles, on the other hand, are less restricted by available moisture and may go weeks without direct contact with water. All these factors combine to make amphibians and reptiles one of the most difficult vertebrate groups to survey, especially in a single effort.

The approach that I have used in this study is 1) to compile a list of the species whose ranges overlap the general project area (Stephenson and Jo Daviess Counties), 2) search for historical records of sensitive species (endangered, threatened, or watch list in Illinois or candidate for Federal listing) from the general project area, and 3) conduct fieldwork designed to determine which species currently inhabit the project corridor. For the last portion, emphasis has been put on species listed as endangered or threatened in Illinois.

SPECIES OF THE PROJECT AREA

Table 1 lists the reptiles and amphibians whose ranges are included in the project area (Stephenson and Jo Daviess Counties). This information was taken from range maps in Smith (1961) and Conant and Collins (1991). Of the species in Table 1, only three are listed as endangered or threatened in Illinois; the Four-toed Salamander (Illinois threatened), Eastern Massasauga (Illinois endangered and a candidate for Federal listing), and Timber Rattlesnake (Illinois threatened). In addition, the Blanding's Turtle is a Watch List species in Illinois and a candidate for listing at the Federal level.

Table 1. Amphibians and Reptiles whose ranges are included in the project area (Stephenson and Jo Daviess Counties). This information was taken from range maps in Smith (1961) and Conant and Collins (1991).

Amphibians

spotted salamander
tiger salamander
central newt
four-toed salamander
mudpuppy
American toad
cricket frog
chorus frog

Ambystoma maculatum
Ambystoma tigrinum
Notophthalmus viridescens
Hemidactylium scutatum
Necturus maculosus
Bufo americanus
Acris crepitans
Pseudacristriseriata

spring peeper
 gray treefrog
 bullfrog
 green frog
 northern leopard frog
 wood frog
 pickerel frog

Hyla crucifer
Hyla versicolor
Rana catesbeiana
Rana clamitans
Rana pipiens
Rana sylvatica
Rana palustris

Reptiles

snapping turtle
 stinkpot turtle
 Blanding's turtle
 painted turtle
 false map turtle
 map turtle
 smooth softshell turtle
 spiny softshell turtle
 six-lined racerunner
 slender glass lizard
 ringneck snake
 western hognose snake
 eastern hognose snake
 smooth green snake
 racer
 black rat snake
 fox snake
 bullsnake
 milk snake
 western ribbon snake
 plains garter snake
 common garter snake
 brown snake
 red-bellied snake
 water snake
 eastern massasauga
 timber rattlesnake

Chelydra serpentina
Sternotherus odoratus
Emydoidea blandingii
Chrysemys picta
Graptemys pseudogeographica
Graptemys geographica
Trionyx mutica
Trionyx spinifer
Cnemidophorus sexlineatus
Ophisaurus attenuatus
Diadophis punctatus
Heterodon nasicus
Heterodon platirhinos
Opheodrys vernalis
Coluber constrictor
Elaphe obsoleta
Elaphe vulpina
Pituophis melanoleucus
Lampropeltis triangulum
Thamnophis proximus
Thamnophis radix
Thamnophis sirtalis
Storeria dekayi
Storeria occipitomaculata
Nerodia sipedon
Sistrurus catenatus
Crotalus horridus

HISTORICAL RECORDS FOR LISTED SPECIES

Historical records for the four listed species were taken from the following sources: 1) Specimens from museum, university, and private collections (referred to as vouchered records, see Appendix I for a list of the collections that were searched), 2) unvouchered records from the literature, 3) unvouchered records taken from reliable biologists and naturalists, and 4) the Illinois Department of Conservation Natural Heritage Data Base.

Four-toed salamander--This salamander is primarily associated with undisturbed forests containing seeps or bogs. Recently, Illinois specimens have been taken in wooded ravines near rocky, spring-fed creeks (Thurow, 1981). The four-toed salamander is primarily terrestrial but it is usually found near woodland ponds with sphagnum mats or other mosses. The activity period in northern Illinois is probably late March to October. Females congregate near woodland ponds in March and April for egg laying and brooding. Nests are situated so that the larvae fall directly into

the water when the eggs hatch. The most common nest sites are in sphagnum mats but grass hummocks, leaf litter and rotten logs are also used (Pfungsten and Downs, 1989). Smith (1961) included all of Jo Daviess County in the range of the four-toed salamander but no specimens have been recorded from the county despite recent attempts to locate colonies in Apple River Canyon State Park (Brandon and Ballard, 1991).

Blanding's Turtle--Prairie marshes and floodplain sloughs of larger rivers are the primary habitat of this semi-aquatic turtle. They are most commonly found in shallow (10-20 cm) open water areas of cattail marshes, sloughs, ponds, and flooded ditches, although Moriarity (1986) reported them from small streams in southeast Minnesota. Aquatic plants, especially emergent vegetation and a mud bottom are important habitat components (Johnson, 1987). The activity period in northern Illinois is probably late March to October. Nesting occurs in June in sandy, well drained soil near the aquatic habitat. Hatching usually takes place in September (Vogt, 1981). Smith (1961) considered all of Jo Daviess and Stephenson Counties in the range of the Blanding's turtle but no records are available.

Massasauga--This venomous snake prefers wet prairie areas with heavy grass cover or floodplain forest adjacent to open fields. The activity period in northern Illinois is probably mid-April to October. In some parts of their range, massasaugas move from moist prairie conditions to drier habitats in the spring (Seigel, 1983). Massasaugas are often found in association with crayfish burrows which they use for shelter and hibernation (Maple and Orr, 1968). They may also overwinter in mammal burrows, old tree stumps, and rock crevices. They apparently do not hibernate with other snake species. The range of the massasauga includes all of Jo Daviess and Stephenson Counties but no records were found for either of these counties.

Timber Rattlesnake--This venomous snake usually occupies three distinct habitats (Brown, 1993): heavily forested areas for foraging (summer), south or west facing rock outcrops or talus slides containing deep cracks and fissures for denning (fall to mid-spring), and more open woods, fields and other disturbed habitats when moving between these two habitats (fall and spring). In addition, gravid females may occupy rocky open sites close to the den for gestation and birthing (summer). The activity period in northern Illinois is probably early April to October. Smith (1961) included "all Mississippi River counties in which the river bluffs have not been denuded of forest" in the range of the timber rattlesnake. This includes Jo Daviess County. Both the timber rattlesnake and the massasauga were common in Grant County, Wisconsin (just north of Jo Daviess County) at the turn of the century (Vogt, 1981). There are several museum records for the timber rattlesnake in Jo Daviess County:

CA 3979-3982 (4 specimens)	1937	Apple River Canyon
CA 4461 (1 specimen)	1938	Galena
CA 7480 (1 specimen)	no date	Galena
INHS 1552-1555 (4 specimen)	1939	Jo Daviess Co.
UMMZ 79429 (2 specimens)	no date	Jo Daviess Co.

In addition to these museum specimens, several unvouchered records exist for the project area. Nickerson and Mays (1968) reported two timber rattlesnakes from the Apple River bluffs between Elizabeth and Woodbine. Fieldwork conducted in 1994 in Jo Daviess County for the Illinois Department of Conservation resulted in the identification of a stable population of timber rattlesnakes in the vicinity of Hanover, approximately 10 km (6 miles) from the southern route of the project corridor in Irish Hollow (Brandon, et al., 1994). One of the investigators on this project, Brian Bielma, has identified other potential den sites within the project corridor through interviews with local rattlesnake hunters. To date, these potential dens have not yielded any rattlesnake sightings but Bielma believes that these areas need to be investigated further. See the section on Areas of Special Concern, below, for more information on the timber rattlesnake in the project corridor.

FIELD SURVEYS

I conducted field surveys in the project corridor during 1994 using the following methods: visual encounter surveys, road collecting, listening for frog and toad calls, and interviewing local residents. Visual encounter surveys involve walking through an area turning appropriate cover items such as logs, rocks, and miscellaneous debris. Detailed descriptions of the survey methods can be found in Heyer, et al. (1994). The entire corridor was driven and all vegetation cover types and delineated wetlands were visited on foot and visual encounter surveys were performed. More thorough investigations were made at those vegetation cover types and wetlands with the potential for the highest amphibian and reptile species diversity. Factors such as level of vegetational disturbance, size and degree of fragmentation, or hydrology of sites were considered when deciding which would be re-visited. Table 3 lists the sites that were chosen for more intensive sampling. Appendix II gives the mapped location of each of the intensive survey sites. Three of these sites were listed as hot spots on the original topographic maps submitted by the Illinois Natural History Survey. No listed species were encountered during the field surveys. Table 4 lists the species observed or heard during the field surveys.

Table 3. Sites chosen for intensive sampling of amphibians and reptiles in the FAP 301 project corridor.

Site Name	Site Description	Location
Irish Hollow wetlands	marsh, wet meadow, wet shrubland, pond, pasture, floodplain forest	2 km SE Rodden T27N, R2E, sec. 28 see also Appendix II, Map A
Wooded Wonderland (includes Botanical Sites G and 6 on hot spots map)	upland forest, pasture, hayfield, tree plantation, native grassland, non-native grassland	T27N, R1E, sec. 1 & 2 see also Appendix II, Map B
Smallpox Creek Bluffs	upland forest, pasture, agricultural land, non-native grassland, native grassland	T28N, R1E, sec 26 SE 1/4 see also Appendix II, Map C
Galena Hill Prairies (Botanical Sites 1&2 on hot spots map)	native grassland, non-native grassland, pasture, shrubland	T28N, R1E, sec 9 SE 1/4 see also Appendix II, Map D
Yellow Creek Timber (Botanical Site J on hot spots map)	upland forest, pasture, floodplain forest, river, wet meadow	T27N, R5E, sec. 5 see also Appendix II, Map E

Table 4. Amphibians and Reptiles Observed in the U.S. Rte. 20 Project Corridor, 1994.

<u>Common Name</u>	<u>Species</u>	<u>Location</u>	<u>T.R. Sec.</u>	<u>Date</u>	<u>Qty.</u>
Garter Snake	<u>Thamnophis sirtalis</u>	Glen Hollow Rd. at Rte. 20, Smallpox Creek bottoms	T28N, R1E, sec. 35, NW	1 June	1
Northern Leopard Frog	<u>Rana pipiens</u>	Irish Hollow Wetlands, 2 km SE Rodden	T27N, R2E, sec. 28	7 April	25-30
Garter Snake	<u>Thamnophis sirtalis</u>	Irish Hollow Wetlands, 2 km SE Rodden	T27N, R2E, sec. 28	20 April	1
Garter Snake	<u>Thamnophis sirtalis</u>	Irish Hollow Wetlands, 2 km SE Rodden	T27N, R2E, sec. 20, SE	1 June	2
Chorus Frog	<u>Pseudacris triseriata</u>	Irish Hollow Wetlands, 2 km SE Rodden	T27N, R2E, sec. 20, 28, 29	20 April	calling
Spring Peeper	<u>Pseudacris crucifer</u>	Irish Hollow Wetlands, 2 km SE Rodden	T27N, R2E, sec. 28, SW 1/4	7 April	calling
Milksnake	<u>Lampropeltis triangulum</u>	Irish Hollow Wetlands, 2 km SE Rodden	T27N, R2E, sec. 20, SE	1 June	1
Northern Leopard Frog	<u>Rana pipiens</u>	Rindsbacher Creek at Mossbach Rd.	T27N, R4E, sec. 9, center	21 April	8
Northern Leopard Frog	<u>Rana pipiens</u>	Rush Creek at Rt. 20	T27N, R4E, sec. 5, SW	21 April	3
Snapping Turtle	<u>Chelydra serpentina</u>	sedge meadow in Irish Hollow, abandoned pasture	T27N, R1E, sec. 2, SW	1 June	1
Green Frog	<u>Rana clamitans</u>	sedge meadow in Irish Hollow, abandoned pasture	T27N, R1E, sec. 2, SW	1 June	1
Water Snake	<u>Nerodia sipedon</u>	Snipe Hollow, wet meadow	T27N, R2E, sec. 11	10 June	1
Bullsnake	<u>Pituophis melanoleucus</u>	South Irish Hollow Road, surrounded by pasture, fence rows & old fields	T27N, R1E, sec. 11, NE1/4	20 April	1
Bullfrog tadpoles	<u>Rana catesbeiana</u>	Wolfe Creek at Pleasant Hill Rd.	T27N, R4E, sec. 25, SW	20 April	15
American Toad	<u>Bufo americanus</u>	Wooded Wonderland, upland forest	T27N, R1E, sec. 1 & 2	20 September	2
Snapping Turtle	<u>Chelydra serpentina</u>	Yellow Creek, 3 mi E Stockton	T27N, R5E, sec. 5, NW 1/4	19 April	1

AREAS OF SPECIAL CONCERN

Several areas were identified that contain suitable habitat for one or more of the listed species. These areas have been given a letter designation which is used to identify the sites on the accompanying aerial photographs. Maps of these special concern sites are also presented in Appendix II. A detailed discussion of each site is presented below.

Site A. Irish Hollow Wetlands. T27N, R2E, sec. 28 & 29, Hanover Quad. Map A, Appendix II. This wetland complex consists of a chain of seeps, flooded ditches, cattail marshes, pothole ponds, pasture ponds, and larger bodies of water along the abandoned Chicago and Northwestern railroad grade. The complex parallels Irish Hollow Creek and is approximately 3 km (1.9 miles) long. It is surrounded by agricultural fields and pasture. Six species of amphibians and reptiles were observed or heard at this site. In addition, I identified a seepage area just east of the intersection of South Irish Hollow road and the abandoned railroad grade that is suitable habitat for the four-toed salamander (*Hemidactylium scutatum*). The area contains wet meadow and floodplain forest with several small pools and abundant nesting cover, including mosses, grass clumps, and rotting logs. The Irish Hollow wetland complex is also potential Blanding's turtle (*Emydoidea blandingii*) habitat. Cattail marshes with shallow open water areas are abundant throughout the wetland chain.

Site B. Wooded Wonderland. T27N, R1E, sec. 1 & 2, Hanover Quad. Map B, Appendix II. This site consists of upland forest, pine plantation, shrublands, non-native and native grassland, pasture, hayfields, abandoned farm buildings, and rock outcrops. The importance of this site is its potential as habitat for the timber rattlesnake (*Crotalus horridus*). It has the main components required by rattlesnakes: rock outcrops for den areas and heavy timber for summer foraging. In addition the grasslands could provide open areas for gravid females. The presence of abandoned farm buildings and large piles of cut pine logs from the plantation adds to the potential of this site.

I interviewed the owner and resident of this property, John Eisbach. He reported that his daughter caught and ate a "large timber rattlesnake" in August of 1994. See Map B, Appendix II for the location of the sighting. He has the skin and photographs of the specimen but he was unable to produce either during several visits to his property. I surveyed this site extensively on three occasions but was unable to verify Mr. Eisbach's report. Also of note is the fact that 2 km (1.5 miles) south-southeast of this site is an area of more extensive rock outcrops known historically as "rattlesnake ridge". Mr. Tom Stafford, a local resident, said that there are still rattlesnakes in this area.

Site C. Smallpox Creek Bluffs. T28N, R1E, sec 26 SE 1/4, Scale Mound West Quad. Map C, Appendix II. This site is another potential area for timber rattlesnakes. It has the same features as the Wooded Wonderland (heavy timber and rock outcrops) but with more extensive rock outcrops. It is also near open areas for gestation and birthing and thick timber for summer foraging.

DISCUSSION

More than half of the land within the FAP 301 corridor is agricultural and the majority of the remaining acreage is in pasture. However, there are still widely scattered opportunities for amphibians and reptiles in this landscape, especially in the western one-quarter where the rugged terrain has protected large areas from disturbance.

Table 1 lists fifteen species of amphibians and twenty-seven species of reptiles that could potentially inhabit the project corridor. There are actual records for only about half of these species

from the two county area and even fewer for the project corridor proper. However, this region of the state has not been adequately surveyed for amphibians and reptiles. This point is illustrated by noting that four of the species that I encountered in my field surveys were not recorded from the two-county area in Smith's (1961) summary of Illinois' amphibian and reptile distributions. A more accurate estimate of the number of species that inhabit the project corridor is nine species of amphibians and twelve species of reptiles. This list generally includes the most common species of the upper midwest such as those encountered in my field surveys (Table 4). A few common species such as cricket frog (*Acris crepitans*), gray treefrog (*Hyla versicolor*), painted turtle (*Chrysemys picta*), rat snake (*Elaphe obsoleta*), and racer (*Coluber constrictor*) were not encountered in my fieldwork but undoubtedly will be found in future surveys.

Listed Species

The four-toed salamander (*Hemidactylium scutatum*) is a very small, secretive amphibian that is difficult to survey without considerable effort. A thorough salamander survey requires the use of drift fence and pitfall traps around suspected breeding ponds. In addition, this species is rarely noticed by most people, even those who consider themselves outdoorsmen, so interviews with local residents are not useful. The floodplain forest-seep at the northwest end of the Irish Hollow wetland complex meets all published habitat requirements (described above) for the four-toed salamander. I consider it a potential site even though no historical records exist for the area. There are two reasons for this conclusion: this area of the state is poorly studied from a herpetological perspective so individuals may have escaped attention and all of the recent discoveries of populations of the four-toed salamander in Illinois have been isolated from other populations by distances up to 300 km (180 miles, e.g. Thurow, 1981; Phillips, 1991). Smith (1957) interpreted this patchy distribution as the result of recent (4-8,000 years before present) climatic warming that forced this mainly boreal species to move northward leaving behind only isolated relictual populations in cool, wet microhabitats. The floodplain forest-seep in Irish Hollow fits this description.

The Irish Hollow wetlands meet all published habitat requirements (described above) for Blanding's turtle (*Emydoidea blandingii*). The lack of historical records for Blanding's turtle in the project area is stronger evidence that they are not inhabitants of this region than it is for the four-toed salamander. The nearest record for Blanding's turtle is southwest Carroll County, Illinois, approximately 45 km (27 miles) from the FAP 301 corridor. Blanding's turtles are extremely wary when basking, therefore visual encounter is not a very efficient survey method. Turtle surveys require the use of baited hoop traps or long hours of observation with a spotting scope. I would recommend that such methods be employed if alignments including Irish Hollow wetlands are advanced to the next stage of planning.

The two rattlesnake species very rarely escape the attention of local residents. Brown (1993) states that if three or four separate residents living in proximity to suspected rattlesnake range report no sightings, very likely no rattlesnakes exist in the region. While I have no doubt that historically, the two rattlesnakes were inhabitants of the FAP 301 corridor, the lack of any local reports or museum records of the massasauga leads me to the conclusion that this species does not currently inhabit the project area. The timber rattlesnake, however, probably inhabits at least one portion (possibly two) of the FAP 301 corridor. The capture of a timber rattlesnake by local resident John Eisbach's daughter in the area known as Wooded Wonderland would seem to be conclusive evidence that a population exists in the corridor. However, this report remains questionable until I see either photographs or the skin of the specimen. In my opinion, further surveys for timber rattlesnakes are required before an acceptable conclusion can be reached.

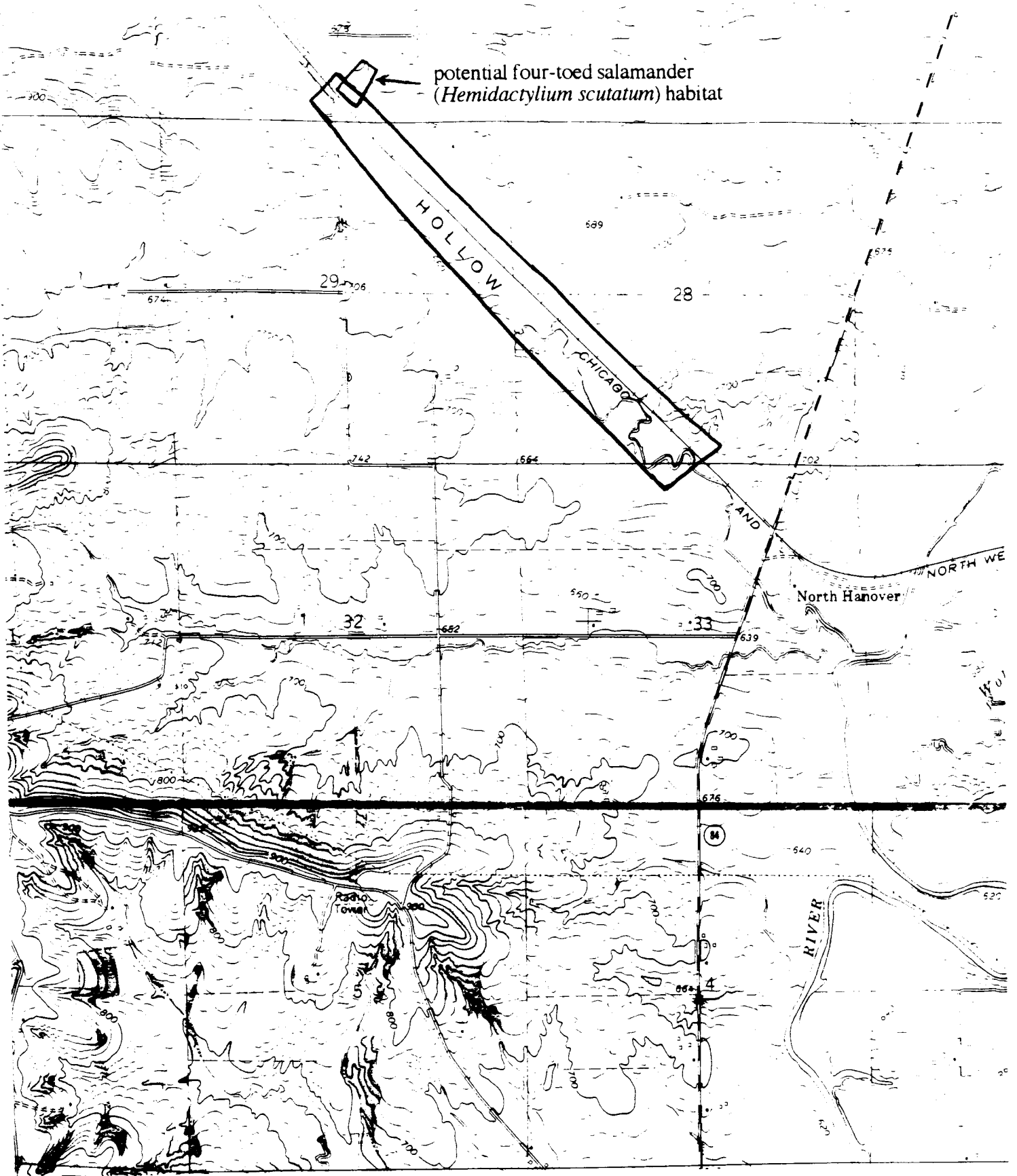
LITERATURE CITED

- Brandon, R.A. and S. Ballard. 1991. Inventories of amphibians and reptiles in Illinois. IDOC Report. 133 pp.
- Brandon, R.A., J.M. Rubinoff, D. Mauger, T.G. Anton, and B.J. Bielma. 1994. Timber Rattlesnake Status Survey, Final Report to Illinois Endangered Species Protection Board. 47 pp.
- Brown, W.S. 1993. Biology, status, and management of the timber rattlesnake (*Crotalus horridus*): A guide for conservation. Society for the Study of Reptiles and Amphibians Herpetological Circular No. 22. 78 pp.
- Conant, R. and J.T. Collins. 1991. Reptiles and Amphibians of Eastern/Central North America. Houghton Mifflin Company, Boston. 450 pp.
- Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L. C. Hayek, M.S. Foster, eds. 1994. Measuring and Monitoring Biodiversity: Standard Methods for Amphibians. Smithsonian Institution Press, Washington. 364 pp.
- Johnson, T.R. 1987. The Amphibians and Reptiles of Missouri. Missouri Department of Conservation. Jefferson City, Missouri. 368 pp.
- Maple, W.T. and L.P. Orr. 1968. Overwintering adaptations of *Sistrurus catenatus* in northeastern Ohio. Journal of Herpetology 2:179-180.
- Moriarity, J.J. 1986. A survey of the amphibians and reptiles in southeastern Minnesota. Occasional Paper, Minnesota Herpetological Society 1:66-80.
- Nickerson, M.A. and C.E. Mays. 1968. More aberrations in the color patterns of rattlesnakes (genus *Crotalus*). Wasmann Journal of Biology 26(1):125-131.
- Pfingsten, R.A. and F.L. Downs, eds. 1989. The Salamanders of Ohio. Bulletin of the Ohio Biological Survey, New Series Vol. 7, No. 2. 315 pp.
- Phillips, C.A. 1991. Geographic Distribution. *Hemidactylium scutatum* (four-toed salamander). Herpetological Review 22(4):133.
- Seigel, R.A. 1983. Final report on the ecology and management of the massasauga, *Sistrurus catenatus*, at the Squaw Creek National Wildlife Management Area, Holt, County, Missouri. Unpublished Report to the Missouri Department of Conservation. 14 pp.
- Smith, P.W. 1961. The Amphibians and Reptiles of Illinois. Illinois Natural History Survey Bulletin 28(1):1-298.
- Thurrow, G.R. 1981. Geographic Distribution. *Hemidactylium scutatum* (four-toed salamander). Herpetological Review 12(2):64.
- Vogt, R.C. 1981. Natural History of the Amphibians and Reptiles of Wisconsin. The Milwaukee Public Museum, Milwaukee, Wisconsin. 205 pp.

 Appendix 1. List of Museum Holdings Searched.

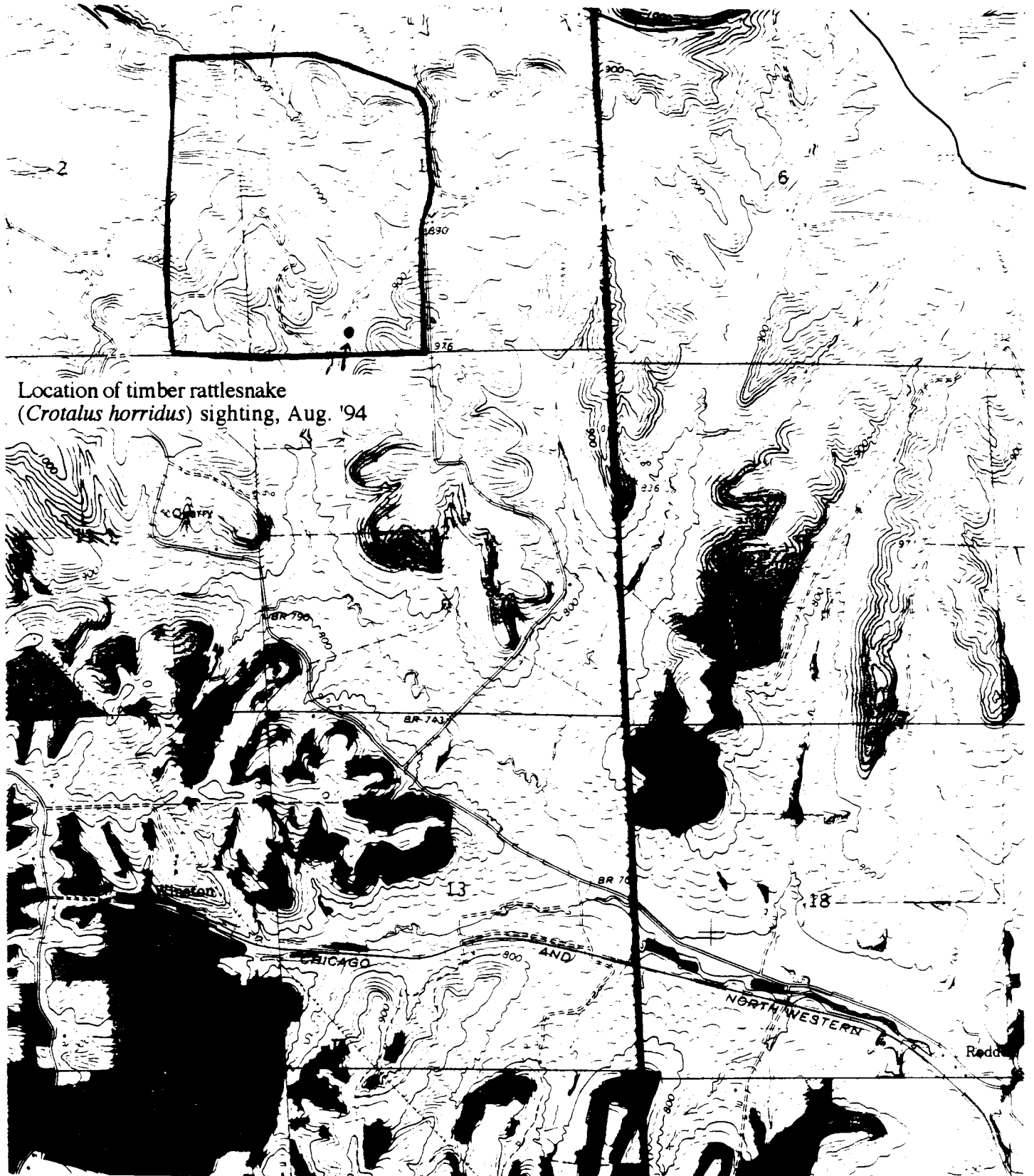
Collection	Acronym
Academy of Natural Sciences, Philadelphia	ANSP
American Museum of Natural History	AMNH
Auburn University Museum	AUM
Burpee Museum of Natural History	BMNH
California Academy of Sciences	CAS
Carnegie Museum	CM
Chicago Academy of Sciences	CA
Field Museum of Natural History	FMNH
Florida Museum of Natural History	UF
H.D. Walley Collection	HDW
Los Angeles County Museum of Natural History	LACM
Louisiana State University	LSUS
Milwaukee Public Museum	MPM
Museum of Comparative Zoology	MCZ
National Museum of Natural History	USNM
Nebraska State Museum	UN
Principia College	PC
S.A. Minton Collection	SAM
Southern Illinois University-Carbondale	SIUC
Texas Cooperative Wildlife Collection	TCWC
Tulane University Museum of Natural History	TU
University of Illinois Museum of Natural History	UIMNH
University of Kansas Museum of Natural History	KU
University of Michigan Museum of Zoology	UMMZ
University of Wisconsin-Stevens Point	UWSP

Appendix II. Map A



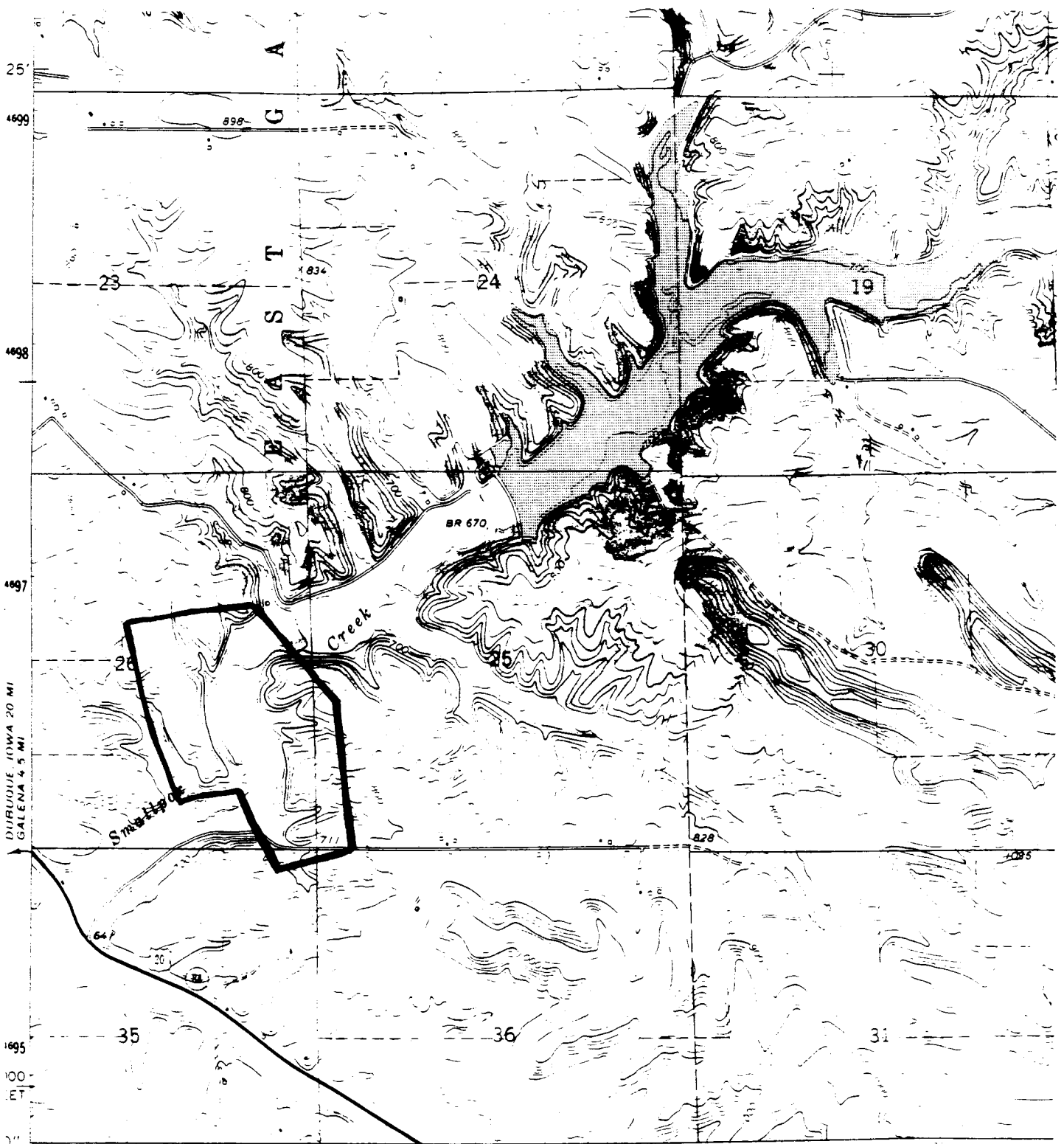
Map A. Location of Irish Hollow Wetlands, Herpetological Special Concern Site A. (Hanover 7.5' Quadrangle)

Appendix II. Map B



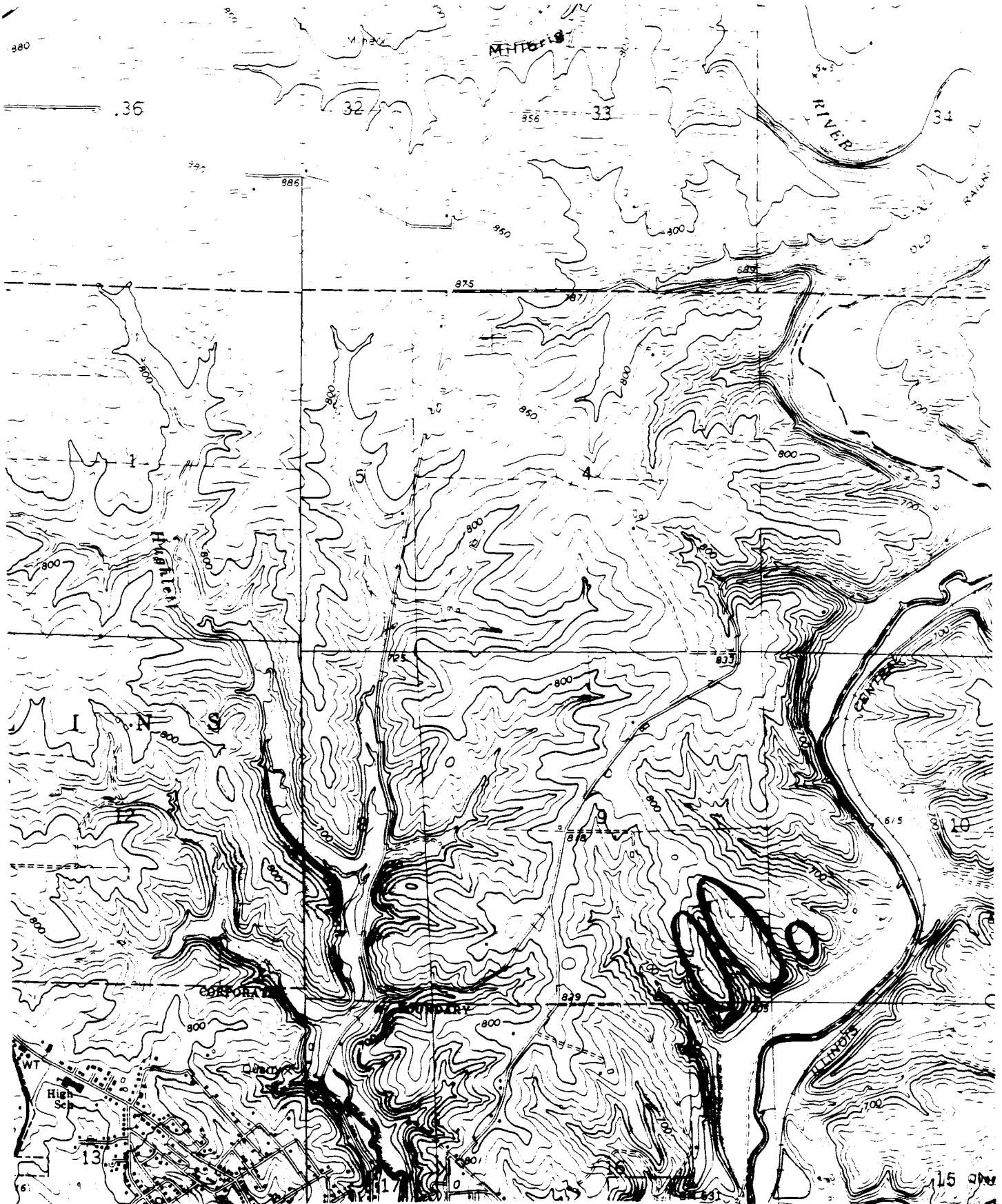
Map B. Location of Wooded Wonderland, Herpetological Special Concern Site B. (Hanover 7.5' Quadrangle)

Appendix II. Map C



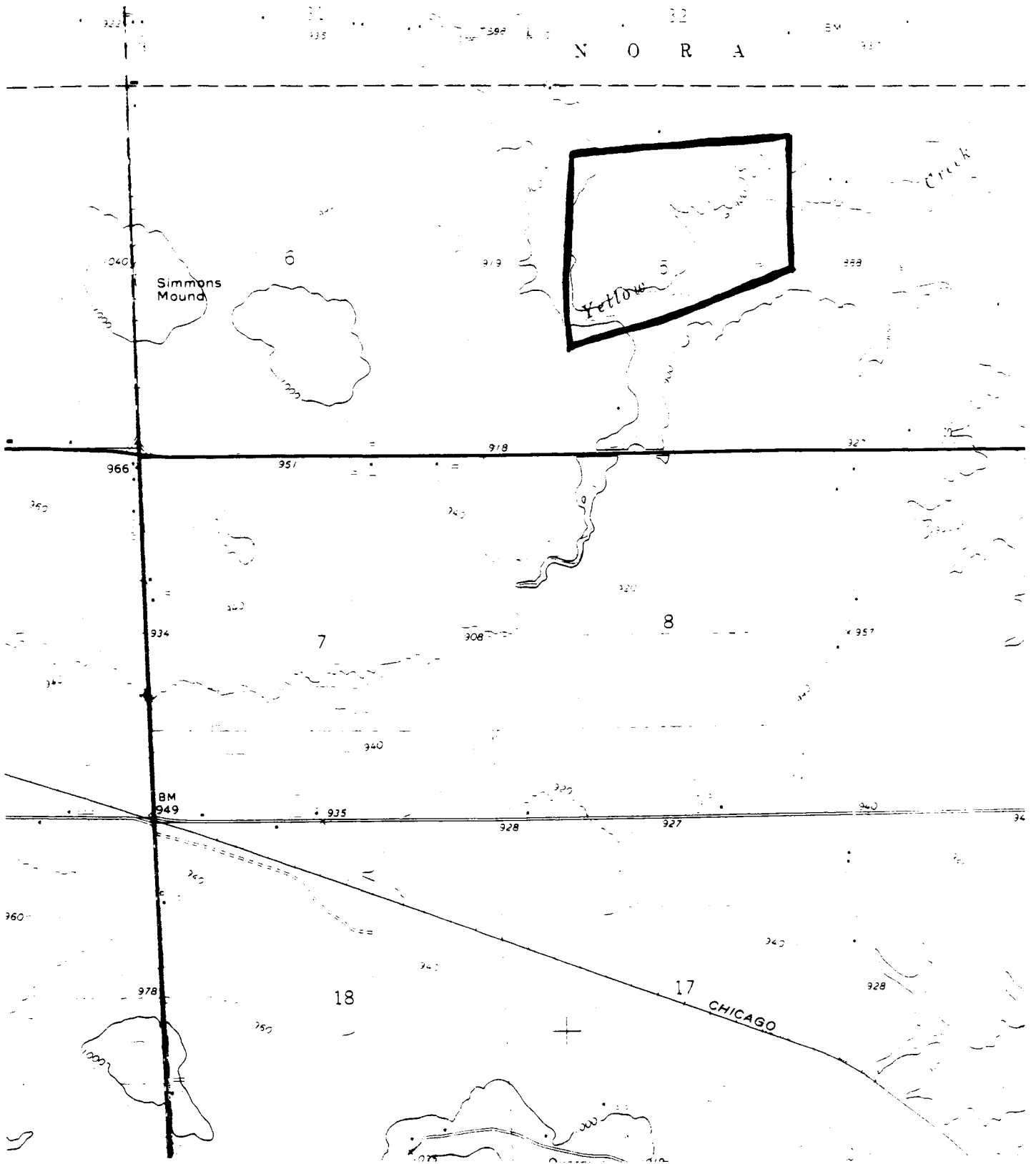
Map C. Location of Smallpox Creek Bluffs, Herpetological Special Concern Site C. (Scales Mound West 7.5' Quadrangle)

Appendix II. Map D



Map D. Location of Galena Hill Prairies (Galena 7.5' Quadrangle)

Appendix II. Map E



Map E. Location of Yellow Creek Timber (Kent 7.5' Quadrangle)