

Mussel Survey of Two Stream Segments in East-Central Illinois

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Center for Biodiversity
Technical Report 2003 (38)

Prepared for and funded by:

Illinois Wildlife Preservation Fund
Illinois Department of Natural Resources
524 South Second Street
Springfield, Illinois 62701

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ABSTRACT

The objective of this study was to provide current data on the mussel resources of two stream segments. The first was an approximately 2-mile long stretch of the Sangamon River (Illinois River Drainage) just southwest of Mahomet called Riverbend. The second was an approximately 1-mile long segment of Jordan Creek north of Fairmount, Vance Township, Vermilion County, Illinois. Twenty-one species of freshwater mussels were found in the Sangamon River at Riverbend in 2002-03, twelve of which were collected alive. The three most common species encountered were the pistolgrip (*Tritogonia verrucosa*), deertoe (*Truncilla truncata*), and pimpleback (*Quadrula pustulosa*). None of the twelve species found alive is currently listed as threatened or endangered in Illinois. Although mussel diversity was high at Riverbend, abundances were relatively low. At Riverbend, four collecting trips yielded only 74 mussels in about 13 man-hours of searching (nearly 6 mussels per hour). Thirteen species of freshwater mussels are known from Jordan Creek in Vermilion County, nine of which have been collected since 1988. Six species were found in Jordan Creek in 2002-03, only two of which were collected alive, including the wavyrayed lampmussel, *Lampsilis fasciola*, currently listed as endangered in Illinois. This was the first documented occurrence of the species alive in the creek and first specimens found since 1955. In addition to native mussels, the exotic Asian clam *Corbicula fluminea*, was found at both sites in very low numbers.

INTRODUCTION

The objective of this study was to provide current data on the mussel resources of two stream segments that are being considered for possible inclusion in the Illinois Land and Water Reserve. The Illinois Nature Preserves Commission contacted the Illinois Natural History Survey and proposed that a mussel survey be conducted at one stream segment in the Sangamon River near Mahomet in Champaign County and another in Jordan Creek (Salt Fork River Drainage) near Fairmount in Vermilion County. The primary objective was to determine if any state-listed mussels were present in the area. In addition, an inventory of the freshwater mussel fauna in both stream segments would be conducted.

STUDY SITES

The first site was an approximately 2-mile long segment of the Sangamon River (Illinois River Drainage) just southwest of Mahomet. This segment is part of the newly created Lakes at Riverbend Forest Preserve owned by the Champaign County Forest Preserve District. Located in Champaign County, Mahomet Township, T20N, R7E, sections 16, 17, 20, and 21 (Figure 1), this portion of the Sangamon River was protected as an Illinois Land and Water Reserve in February 2002, but no comprehensive mussel survey had been conducted at the site.

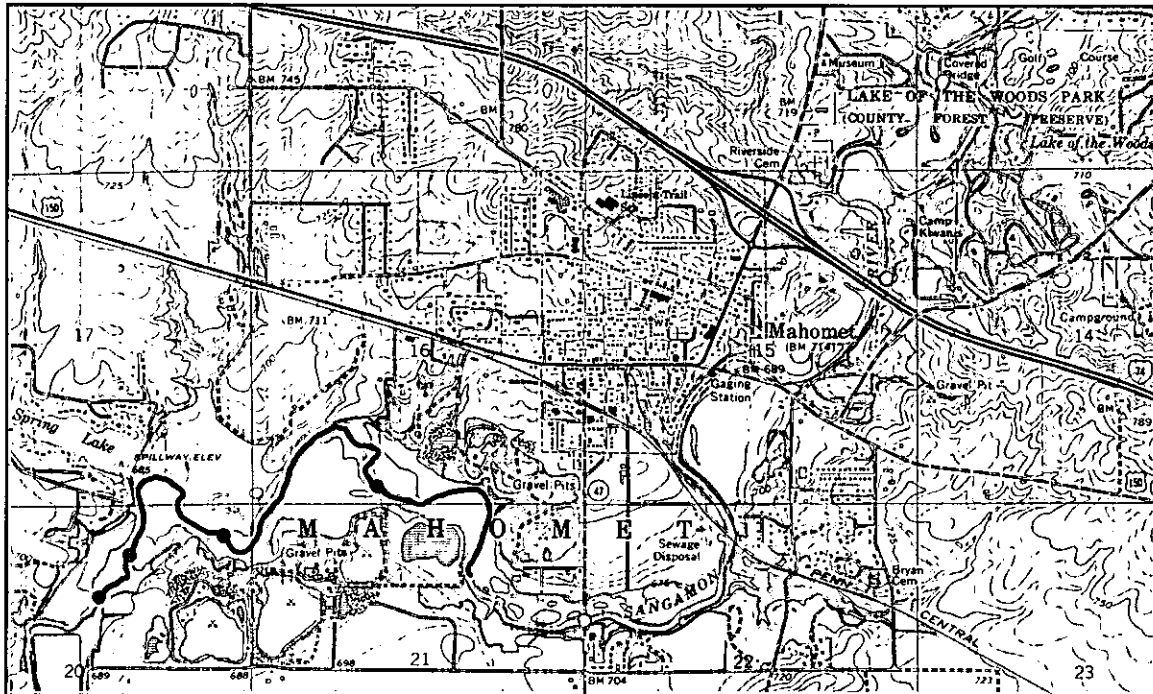


Figure 1. Sangamon River, near Mahomet, Champaign County, Illinois. Red dots indicate collections made in, 1987, 1991, and 2000. Blue dots and line indicate sites and area sampled in 2002 and 2003.

The second site was an approximately 1-mile long reach of Jordan Creek north of Fairmount, Vance Township, T19N, R13W, Section 27, Vermilion County, Illinois (Figure 2). This portion of Jordan Creek has been proposed as a Land and Water Reserve by local landowners. As with the Sangamon River, a survey was conducted to determine if there were any threatened or endangered mussels at the site. If threatened or endangered mussels were found in this stream segment, then it would qualify for Land and Water Reserve designation. If not, the stream segment would be too short to qualify by itself.

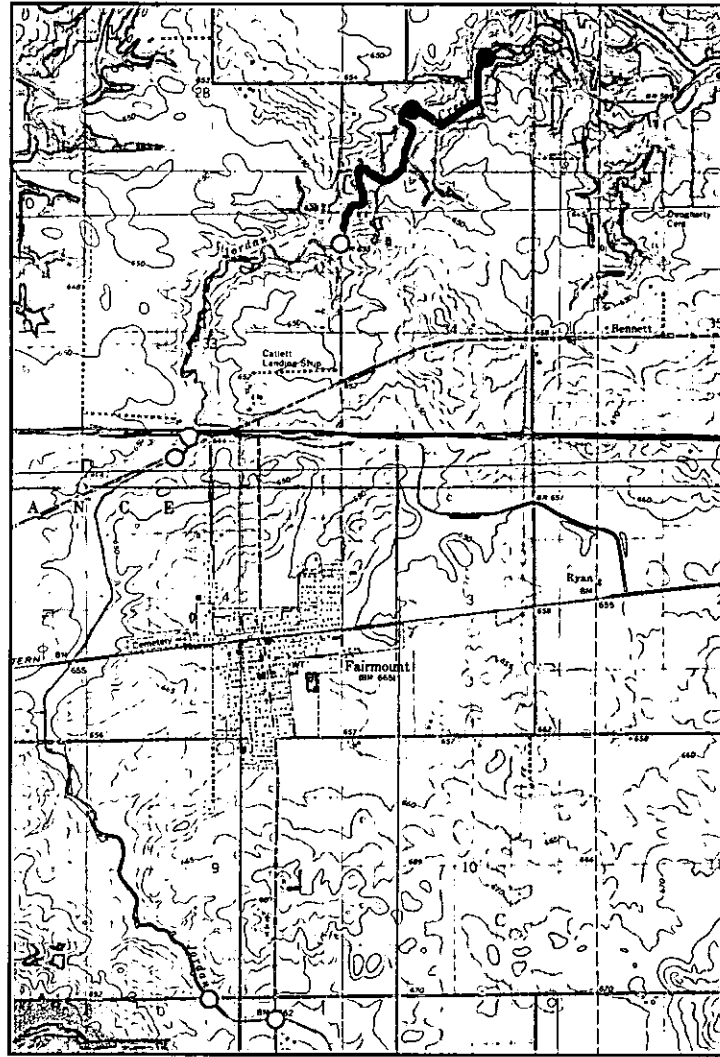


Figure 2. Jordan Creek, near Fairmount, Vermilion County, Illinois. Red dots indicate historical collection sites (1955-1999). Blue dots and line indicate sites and area sampled in 2002 and 2003.

SANGAMON RIVER

The Sangamon River basin drains 5419 square miles in central Illinois (Page et al., 1992). It is 240 miles long, averages 121 feet in width, and is the largest watershed of any of the tributaries of the Illinois River. The Sangamon River rises just north of Ellsworth in McLean County and follows a looping course to the Illinois River at Muscooten Bay. The substrate is coarse sand with considerable silt, gravel, and rubble. Brush piles, sand and gravel bars, and undercut banks are common. There are many floodplain and river bottom pools in the lower reaches of the river in Mason and Cass counties. The Sangamon is timbered throughout much of its course.

The river has been subject to numerous artificial changes (Page et al., 1992). Major reaches between Decatur and Springfield and between Petersburg and Beardstown have been channelized. The last five miles of the river have been diverted so that the Sangamon empties into Muscooten Bay instead of nine miles north at Browning. Removal of riparian vegetation, channelization, and agricultural runoff have led to the decline of the Sangamon River as an aquatic resource. The main problems in the basin are siltation, impoundments, and industrial, agricultural, and domestic pollution.

The Sangamon River from its source in McLean County to Piatt/Macon county line was identified as a Significant Stream by Page et al. (1992). Within this stretch the Sangamon River varies from a large creek (width 4-6 feet) to a small river (width 35-50 feet). Stream habitats include sand and mud bars, rapids, riffles, and fairly deep pools. Filamentous algae is the dominant aquatic vegetation. The substrate consists of sand, gravel, and cobble. In some areas silt is mixed with the sand and muck is found along the shore. Riparian vegetation varies from a narrow zone of dense weedy vegetation in the upper reaches to flood plain woodlands in Champaign and Piatt counties. Lodge Park, Lake of the Woods County Forest Preserve, and Allerton Park Natural Area are located along this stretch of the Sangamon. Mussel diversity is high and includes the state threatened slippershell, *Alasmidonta viridis*. The Biological Stream Characterization or BSC (Bertrand et al., 1996) ranked the Sangamon River near Mahomet as a "C" Stream (Moderate Aquatic Resource).

Sangamon River Mussels

Historical information on the freshwater mussels in the Sangamon River drainage is available primarily from Baker (1906; 1922), Wood (1910), Zetek (1918), Matteson (1956-60, unpublished, records in the INHS Mollusk Collection), Shier (1962), Van Camp Hall (1967) and Schanzle and Cummings (1991). Schanzle and Cummings (1991) found 2,083 live mussels representing 33 species from 57 sites in the Sangamon River system during 1987-1990. All of the species collected alive in the 1950s were also collected alive in the late 1980s or 1990. Schanzle and Cummings collected one additional species, the flat floater (*Anodonta suborbiculata*), not represented in previous collections.

Although the Sangamon River basin historically supported up to 13 state-listed mussels, only two have been collected alive since 1956: the slippershell and the spike, *Elliptio dilatata*. Slippershells are typically found in small streams or in the headwaters of larger rivers in sand, mud, or fine gravel (Cummings & Mayer 1997). The slippershell was found alive in Lone Tree Creek in 2002, from Dickerson Slough in Ford County in 2003, and from two sites in the headwaters of the Sangamon River in McLean County in 1987-88. The spike was found alive from the Sangamon River, 2 miles SW Mahomet, Champaign County in 1957, 1 mile E Fisher, Champaign County in 1957 and 1988, and 4 miles SSW Clinton, DeWitt County in 1991.

JORDAN CREEK

Jordan Creek is a small tributary to the Salt Fork Vermilion River located in Vermilion County, Illinois. It is approximately 11 miles long and averages about 13 feet in width (Page et al., 1992). The lower reaches of the stream have a bedrock and gravel substrate, with a few riffles and deep pools. The upper reaches have a cobble, bedrock, sand, and silt substrate with a few riffles and small, quiet pools. The riparian zone changes from a few feet of grass and row crop agriculture in the headwaters to a fairly wide zone of hardwood trees near the mouth. The upper half of the creek has been dredged.

Jordan Creek was considered a Significant Stream by Page et al. (1992) due to the presence of the Iowa darter, *Etheostoma exile*, which was known from the headwaters where it washes out of abandoned gravel quarries near Fairmount. Jordan Creek was considered an "A" Stream (Unique Aquatic Resource) by the BSC (Bertrand et al., 1996).

Jordan Creek Mussels

Although Jordan Creek has never been systematically sampled for mussels, data were available from six sites (shown in red in Figure 2) beginning upstream at Co. Rd. 580E downstream to the mouth. From these data the creek supported 13 freshwater mussel species, including one state threatened and two state endangered species (Table 2). Of the listed mussels known prior to our survey, only one had been collected alive since 1955: the little spectaclecase, *Villosa lienosa* which was found alive at Co. Rd. 580E bridge by IDNR biologist Robert E. Szafoni and INHS biologist Mark H. Sabaj in 1999. Shells of *V. lienosa* are known from three other sites in the drainage. The other two listed species (the slippershell, and wavyrayed lampmussel, *Lampsilis fasciola*) had not been collected since 1955.

METHODS

Nomenclature used for mussels discussed in this memorandum follows Cummings and Mayer (1997). The current status of threatened and endangered species of mussels discussed in this memorandum was taken from one or more of the following publications: Herkert (1992, 1994), Illinois Endangered Species Protection Board (IESPB) (1999), or U.S. Department of Interior, Fish and Wildlife Service (USDI, FWS) (1996, 1997). Historical records for mussels were obtained from the INHS Mollusk Collection and the U.S. National Museum, Smithsonian Institution, Washington, D.C.

All mussels found were identified, counted, and most of the live mussels returned to the stream. Shells and a few live individuals were retained as vouchers and deposited in the Mollusk Collection of the Illinois Natural History Survey, Champaign, Illinois. Maps indicating the location of any significant mussel beds or listed species if present were to be provided to the Illinois Department of Natural Resources (IDNR) and the Illinois Nature Preserves Commission. However, we did not find any large concentrations of mussels in either river and thus none were identified.

Sangamon River Methods

INHS malacologists Kevin S. Cummings and Christine A. Mayer with the assistance of biologists Jeremy Tiemann and Patrick Hubert searched for mussels at various points throughout proposed stretch of the Sangamon River on 6 & 24 September 2002 and again on 17 September and 9 October 2003. Additional specimens were collected by Patrick Hubert on 5 February and 6 September 2002. Stream width varied from about 30-70 feet, with depths ranging from 12 inches to 5 feet. Substrate was predominately mud, gravel, and sand with some areas of considerable silt. Both banks were tree-lined and most of the riparian corridor was forested. Surrounding land use was primarily forest and residential. Sampling proved somewhat difficult because of the lack of easily accessible points to the stream and because much of this stretch of the Sangamon is deep, has steep-sided banks, and is full of logjams or other woody debris (Figure 3). We selected several designated sampling stations (Figure 1) and pooled the data for the entire stretch.



Figure 3. Sangamon River, Riverbend, T20N, R7E, sec. 20, Champaign County, Illinois.
17 September 2003.

Jordan Creek Methods

INHS malacologists Kevin S. Cummings and Christine A. Mayer searched for mussels throughout a 1-mile stretch of Jordan Creek on 11 September 2002 and again on 30 July 2003 (Figure 2). Stream width varied from about 10-30 feet, with depths ranging from 12 inches to 3 feet. Substrate was predominately bedrock and cobble (Figure 4). Patches of gravel and areas of mud and sand were also present but scattered in this reach. Both banks were tree-lined and the entire riparian corridor was forested. Surrounding land use was primarily forest and agriculture. Throughout a large portion of the study site, the habitat consisted of long stretches of cobble and bedrock substrate that are unsuitable for mussels. We selected designated sampling stations (Figure 2) with more suitable habitat and pooled the data for the entire stretch.



Figure 4. Jordan Creek, 2 miles NNE Fairmount, T19N, R13W, sec. 27, Vermilion County, Illinois. 11 September 2002.

RESULTS & DISCUSSION

Sangamon River

Thirty species of freshwater mussels are known from the Sangamon River in Champaign County, 22 of which have been collected since 1987. Eight species – including the creek heelsplitter, *Lasmigona compressa* (1928); little spectaclecase (1929); monkeyface, *Quadrula metanevra*; lilliput, *Toxolasma parvus*; paper pondshell, *Utterbackia imbecillis*; ellipse, *Venustaconcha ellipsiformis* (all last found in 1957); salamander mussel, *Simpsonaias ambigua*; and rainbow *Villosa iris* (only shells found) – have not been collected in the Sangamon River in Champaign County since the 1950s or have never been documented as alive. Three (*Simpsonaias ambigua*, *Villosa iris*, *Villosa lienosa*) are state endangered.

Twenty-one species of freshwater mussels were found in the Sangamon River at Riverbend in 2002-03, twelve of which were collected alive. In addition to native mussels, the exotic Asian clam, *Corbicula fluminea*, was found, but in very low numbers. The three most common species encountered were the pistolgrip (*Tritogonia verrucosa*), deertoe (*Truncilla truncata*), and pimpleback (*Quadrula pustulosa*). None of the twelve species found alive is currently listed as threatened or endangered in Illinois. Relict shells of two state listed mussels (spike and rainbow) were found at Riverbend. The spike is listed as threatened in Illinois and was found alive in the Sangamon River, 1 mile E Fisher, in Champaign County in 1988. The state endangered rainbow was found by Joe Morrison of the U.S. National Museum in the Sangamon River at Springfield in 1921. The only other records for the species in the drainage were relict shells found at Sugar Creek near Hartsburg in Logan County in 1985, and the Sangamon River at Allerton Park in 1999, and Lake of the Woods, Mahomet in 2000. The finding of relict shells at Riverbend added another site in the basin.

We compared the data we collected from Riverbend to one site collected by Shanzle et al. in 1987 (Rt. 47 bridge) and two sites we collected in 1991 and 2000 (the I-74 bridge and Lake of the Woods Covered Bridge) (Figure 1; Table 1). All four sites had good to excellent mussel diversity ranging from nine species collected at Rt. 47 to 16 species at the I-74 bridge. Although mussel diversity was high at Riverbend (12 live species), abundances were relatively low. At Riverbend, four collecting trips yielded only 74 mussels in about 13 man-hours of searching (nearly 6 mussels per hour), compared to 226 mussels in four man-hours at Lake of the Woods (over 56 mussels per hour) and 315 mussels in eight man-hours at the I-74 bridge (over 39 mussels per hour) (Table 1). However, these data need to be considered in light of the difficult sampling conditions present at Riverbend. As stated above, much of that stretch of the river is deep and difficult to access and sample. Mussels may occur in areas inaccessible to the collection methods employed in this survey.

Jordan Creek

Thirteen species of freshwater mussels are known from Jordan Creek in Vermilion County, nine of which have been collected since 1988 (Table 2). Three species – including the slippershell; giant floater *Pyganodon grandis*; and the plain pocketbook *Lampsilis cardium* – have not been

collected in Jordan Creek since 1955 and have never been documented alive in the basin.

Six species were found in Jordan Creek in 2002-03, only two of which were collected alive. In addition to native mussels, the exotic Asian clam *Corbicula fluminea*, was also found, but in very low numbers. One of the two native mussels found alive is currently listed as endangered in Illinois. One individual of the wavyrayed lampmussel was found alive in Jordan Creek in 2002. This was the first documented occurrence of the species alive in the creek and the first specimens collected since 1955. There are five other recent records for the species in the Salt Fork drainage (three upstream of Jordan Creek and two downstream) all in Vermilion County. Another find of note was the state-endangered purple lilliput, *Toxolasma lividus*, which was previously unknown from the Jordan Creek system. The only other records of this species in the Salt Fork drainage are from near St. Joseph in Champaign County in 1908 and 1918, Homer Park in 1918 and 2001, and 2.5 miles NE Homer, W of Co. Rd. 130E in 2002. All recent collections of this species have been relict shells and it is likely extirpated from the Salt Fork basin. The only known extant populations of purple lilliput in Illinois are in the upper North Fork Vermilion River drainage in Vermilion County and Big Grand Pierre Creek in Pope County.

We compared the data we collected from Jordan Creek to historical sites in the drainage (Figure 2; Table 2). Overall mussel diversity was very low in the stream reach we examined. This was due to the relatively poor mussel habitat present in this stretch of the creek. Much of the area surveyed had a cobble or bedrock substrate that was unsuitable for mussels. Substrate improves upstream of the reach we sampled as does the mussel fauna. Eight of the 13 species from the Jordan Creek watershed are extant upstream of our study site, including the state endangered little spectaclecase.

Table 1. Freshwater bivalves (Family Unionidae) recorded from the Sangamon River at Riverbend in 2002 and 2003; Rt. 47 bridge, 1987; I-74, 1991 and 2000; and the Lake of the Woods in 2000 (sites are ordered downstream to upstream and shown in Figure 1). Numbers refer to live individuals found. D = Fresh Dead; R = Relict Shell; SE = Illinois Endangered Species; ST = Illinois Threatened Species.

Species	Riverbend 2002-2003	Mahomet Rt. 47 1987	Mahomet I-74 1991 & 2000	Lake of the Woods 2000
Anodontinae				
<i>Alasmidonta marginata</i>	R	-	R	-
<i>Anodonta suborbiculata</i>	-	-	-	D
<i>Anodontoides ferussacianus</i>	-	1	-	-
<i>Arcidens confragosus</i>	-	-	2	-
<i>Lasmigona complanata</i>	1	20	27	8
<i>Lasmigona costata</i>	R	-	R	-
<i>Pyganodon grandis</i>	1	-	3	1
<i>Simpsonaias ambigua</i> ^{SE}	-	-	R	D
<i>Strophitus undulatus</i>	R	-	2	1
Ambleminae				
<i>Amblema plicata</i>	R	R	5	1
<i>Elliptio dilatata</i> ST	R	-	R	R
<i>Fusconaia flava</i>	R	1	1	2
<i>Pleurobema sintoxia</i>	3	3	13	13
<i>Quadrula metanevra</i>	R	-	R	-
<i>Quadrula pustulosa</i>	11	R	47	53
<i>Tritogonia verrucosa</i>	21	R	38	5
Lampsilinae				
<i>Lampsilis cardium</i>	9	1	76	35
<i>Lampsilis siliquoidea</i>	1	R	8	1
<i>Leptodea fragilis</i>	9	7	47	19
<i>Potamilus alatus</i>	3	5	32	4
<i>Potamilus ohioensis</i>	1	1	1	8
<i>Truncilla donaciformis</i>	1	-	1	11
<i>Truncilla truncata</i>	13	4	12	64
<i>Venustaconcha ellipsiformis</i>	R	-	R	-
<i>Villosa iris</i> ^{SE}	R	-	-	R
Individuals Live	74	43	315	226
Native Species Live	12	9	16	15
Native Species Dead	9	4	6	4
Native Species Total	21	13	22	19

Table 2. Freshwater bivalves (Family Unionidae) recorded from Jordan Creek, Historic (with last date of collection), 2002 and 2003. Numbers refer to live individuals found. D = Fresh Dead; R = Relict Shell; SE = Illinois Endangered Species; ST = Illinois Threatened Species.

<i>Species</i>	<i>Jordan Creek 1955-2001</i>	<i>Jordan Creek 2002</i>	<i>Jordan Creek 2003</i>
Anodontinae			
<i>Alasmidonta viridis</i> ST	1955	-	-
<i>Anodontoides ferussacianus</i>	1996	D	R
<i>Lasmigona compressa</i>	1999	-	-
<i>Pyganodon grandis</i>	1955	-	-
<i>Strophitus undulatus</i>	1988	-	-
Ambleminae			
<i>Fusconaia flava</i>	1996	D	-
<i>Unio merus tetralasmus</i>	1999	-	-
Lampsilinae			
<i>Lampsilis cardium</i>	1955	-	-
<i>Lampsilis fasciola</i> ^{SE}	1955	1	-
<i>Lampsilis siliquoidea</i>	2001	3	D
<i>Toxolasma lividus</i> ^{SE}	-	R	-
<i>Toxolasma parvus</i>	1999	-	-
<i>Villosa lienosa</i> ^{SE}	1999	-	D
Individuals Live	-	4	0
Native Species Live	9	2	0
Native Species Dead	3	3	3
Native Species Total	12	5	3

ACKNOWLEDGEMENTS

This project was funded by a grant from the Illinois Wildlife Preservation Fund. We would like to thank Jeremy Tiemann (INHS) and Patrick Hubert (INHS/UI) for assistance in the field. We would also like to thank Kristina Hubert, Director of Natural Resources, and Dan Olsen, Assistant Director of Natural Resources, from the Champaign County Forest Preserve District for providing access to the Riverbend site.

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