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(Mississippi River),
Andalusia, Rock Island County, Illinois**

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ABSTRACT

The objective of this study is to provide current data on the mussel resources of a reach of the Mississippi River at Milan Bottoms near Andalusia, Illinois. Milan Bottoms is located adjacent to the Mississippi River between Milan and Andalusia in Rock Island County, Illinois. Thirty species of freshwater mussels were found in the Mississippi River at Milan Bottoms in 2003; 20 species were collected alive. The three most abundant species were the threeridge (*Amblema plicata*), threehorn wartyback (*Obliquaria reflexa*), and Wabash pigtoe (*Fusconaia flava*). Of the 20 species collected alive, the black sandshell (*Ligumia recta*) is currently listed as threatened in Illinois and the Higgins eye (*Lampsilis higginsii*) is federally endangered. Two exotic bivalves were also collected – the zebra mussel, *Dreissena polymorpha*, and Asian clam, *Corbicula fluminea*. Both were found in very low numbers.

INTRODUCTION

Milan Bottoms is located adjacent to the Mississippi River between Milan and Andalusia in Rock Island County, Illinois. Milan Bottoms is approximately 3500 acres of biologically rich bottomland forest and associated wetlands between Upper Mississippi river miles 475-478. Approximately 1525 acres are owned by the United States Army Corp of Engineers (COE) with the balance in private ownership. A cooperative management agreement has been established between the U.S. Fish and Wildlife Service (USFWS), COE, and the Illinois Department of Natural Resources (IDNR), whereby USFWS oversees all management, COE is responsible for managing the forest resources, and IDNR is responsible for managing other terrestrial resources. The area is known for several significant avian resources: an active rookery containing great egrets, black crowned night herons (Illinois State Endangered), and great blue herons; breeding yellow-crowned night herons (Illinois State Endangered) and red-shouldered hawks (Illinois State Threatened); a night roost and day-use habitat for wintering bald eagles (Illinois State Threatened); and a notably large breeding population of wood ducks. Part of Andalusia Slough, river miles 465-475, is considered a Biologically Significant Stream due to the presence of the state endangered spectaclecase (*Cumberlandia monodonta*) found, in 1979.

To date no surveys have been conducted for other faunal groups at Milan Bottoms. The objective of this study is to provide current data on the mussel fauna of the site using hand sampling and brailing. This study will complement previously funded Wildlife Preservation Fund projects and will be an important tool in future management planning for the area.

STUDY SITE

The study area is an approximately 4-mile long segment of the Mississippi River upstream of Andalusia and downstream of the I-280 bridge southeast of Rock Island. Six sites along this reach were selected to represent different habitats in the area (Figure 1). All sites are located in Rock Island County, T17N, R2W, sections 17 and 18 and T17N, R3W, sections 23 and 24. A list of the sampling sites can be found in Table 1 and photos of sites 2, 5, and 6 are given in figures 2-4.

Substrate varied somewhat between sites but was predominately mud, gravel, and sand with areas of silt. Maximum water depth varied from 10 to 15 feet. The Illinois bank is tree-lined and forested. Surrounding land use on the Illinois side is primarily bottomland forest. Gravel quarries and small towns are located across the river in Iowa.

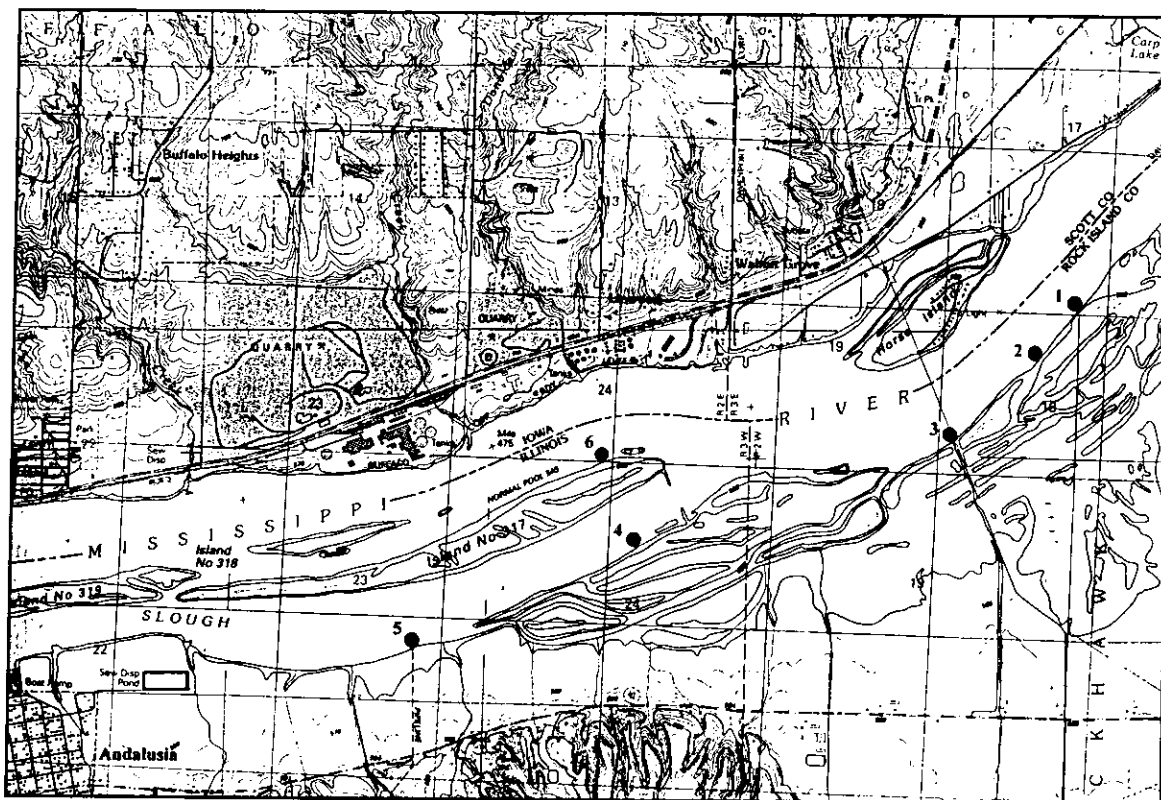


Figure 1. Mississippi River, Milan Bottoms, upstream of Andalusia, Rock Island County, Illinois, with sites sampled in 2003.

Table 1. Mississippi River sampling sites for Milan Bottoms, 2003.

1. 0.5 mile downstream Mill Creek, opposite NE end of Horse Island, rm 477.2.
41.4675°N, -90.6446°W
 2. 0.75 mile downstream Mill Creek, opposite Horse Island, rm 477.
41.4655° N, -90.6467°W
 3. Opposite Walnut Grove, Iowa, at the power line crossing, rm 476.6.
41.4615° N, -90.6525°W
 4. Andalusia Slough, opposite Turkey Hollow Slough, rm 475.3.
41.4539°N, -90.6783°W
 5. Andalusia Slough, 2 miles ENE Andalusia, rm 474.5.
41.4497°N, -90.6895°W
 6. Channel side of Island 317, opposite Linwood, Iowa, rm 475.3.
41.4599°N, -90.6786°W.
-

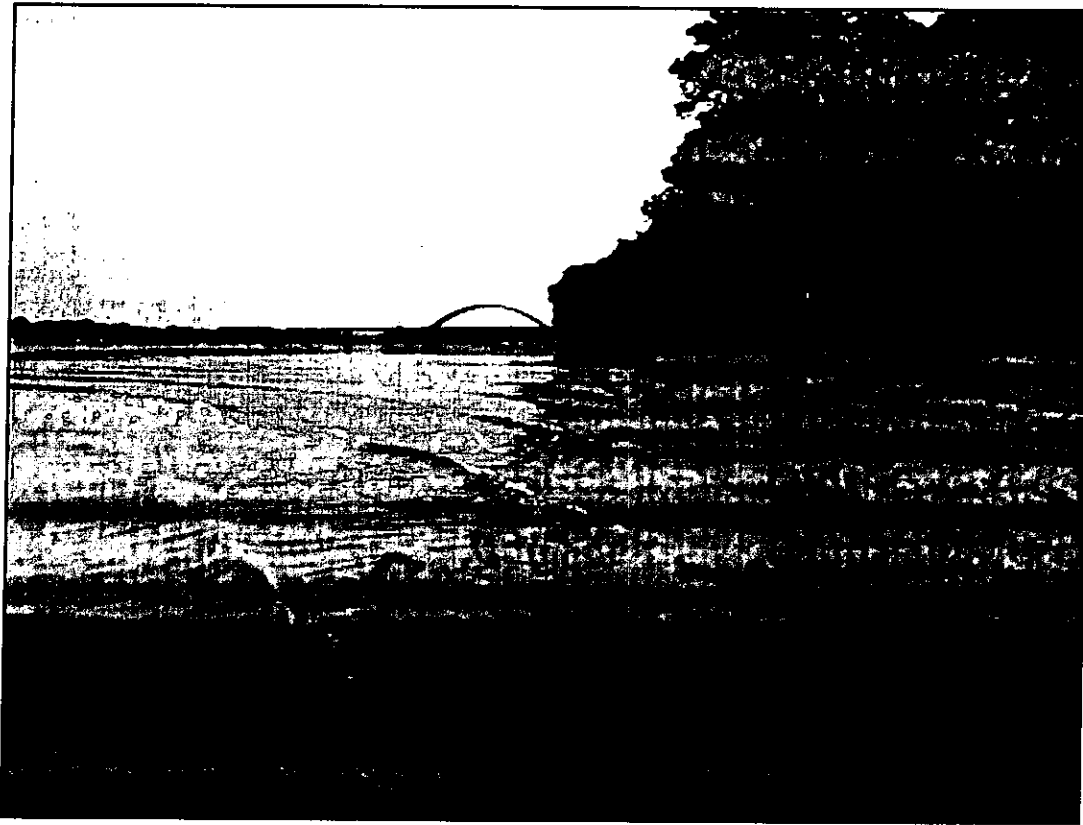


Figure 2. Mississippi River, Milan Bottoms, Site 2. 0.75 miles downstream Mill Creek, opposite Horse Island, river mile 477, 41.4655° N, -90.6467°W. The I-280 bridge is in the background.



Figure 3. Mississippi River, Milan Bottoms, Site 5. Andalusia Slough, 2 miles ENE Andalusia, river mile 474.5. 41.4497°N, -90.6895°W.



Figure 4. Mississippi River, Milan Bottoms, Site 6. Channel side of Island 317, opposite Linwood, Iowa, river mile 475.3, 41.4599°N, -90.6786°W.

METHODS

Nomenclature used for mussels discussed in this report follows Cummings and Mayer (1997). The current status of threatened and endangered species of mussels is 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 associated databases.

INHS malacologists Kevin S. Cummings and Christine A. Mayer, with the assistance of biologists Jeremy Tiemann and Christopher A. Phillips, searched for mussels at six sites in Milan Bottoms on 25-26 August and 8-10 September 2003. Sampling was conducted by hand and quantified by recording the man-hours expended searching. Sampling was confined to wadeable areas along the shoreline to a depth of about 3 feet. In addition to hand sampling, brail hauls were run in an effort locate concentrations of mussels. Brailing proved to be largely ineffective compared to hand-sampling and was used sparingly. 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 Illinois Natural History Survey Mollusk Collection, Champaign, Illinois.

RESULTS & DISCUSSION

The original Mississippi River consisted of a series of pools separated by islands, shoals, bars, rapids, and constantly changing channels. The Upper Mississippi in the early 1900's was the site for mussel fishing and the pearl button industry. One productive bed near New Boston, Mercer County, Illinois, was 1.5 miles long and 1000 feet wide, and in three years yielded approximately 100 million individuals (Sparks, 1991). Overfishing of the clam beds, an increase in pollution and siltation, and the introduction of the plastic button brought about the closure of the pearl button industry on the Mississippi River (Parmalee, 1967).

Historical information on the freshwater mussels in the Mississippi River is available from hundreds of papers published from 1855 to present. A compendium of information on the mussel fauna of the Mississippi was published in 1980 (Kindschi, 1980). Fifty-one species of mussels have been reported from the Mississippi River in Illinois and border counties, 32 species have been collected alive since 1970 (Cummings and Mayer 1997).

Forty-six species of mussels have been found in the Mississippi River in Rock Island County, Illinois, including seven state threatened, eight state endangered, and three – *Lampsilis higginsii*, *Potamilus capax*, and *Quadrula fragosa* – federally endangered. Since 1970, thirty-one of those species have been collected alive in the county, including seven listed species (INHS Mollusk Collection Records) (Table 2).

Table 2. Freshwater mussels recorded from the Mississippi River mainstem in Rock Island County, Illinois. Data from the Illinois Natural History Survey Mollusk Collection and other museum collections. FE = Federally Endangered; SE = Illinois State Endangered; ST = Illinois State Threatened; X = Extirpated from Illinois; L = Collected alive in the county since 1970.

Margaritiferidae (1)	
<i>Cumberlandia monodonta</i> - spectaclecase ^{SE (L)}	<i>Quadrula nodulata</i> - wartyback
	<i>Quadrula pustulosa</i> - pimpleback
	<i>Quadrula quadrula</i> - mapleleaf
	<i>Tritogonia verrucosa</i> - pistolgrip
Anodontinae (10)	
<i>Alasmidonta marginata</i> - elktoe	
<i>Alasmidonta viridis</i> - slippershell mussel ST	
<i>Anodonta suborbiculata</i> - flat floater	
<i>Arcidens confragosus</i> - rock pocketbook	
<i>Lasmigona complanata</i> - white heelsplitter	
<i>Lasmigona costata</i> - flutedshell	
<i>Pyganodon grandis</i> - giant floater	
<i>Simpsonaias ambigua</i> - salamander mussel ^{SE}	
<i>Strophitus undulatus</i> - creeper	
<i>Utterbackia imbecillis</i> - paper pondshell	
Ambleminae (15)	
<i>Amblema plicata</i> - threeridge	
<i>Cyclonaias tuberculata</i> - purple wartyback ST	
<i>Elliptio crassidens</i> - elephantear ^{ST (L)}	
<i>Elliptio dilatata</i> - spike ST	
<i>Fusconaia ebena</i> - ebonyshell ^{ST (L)}	
<i>Fusconaia flava</i> - Wabash pigtoe	
<i>Megalonaias nervosa</i> - washboard	
<i>Plethobasus cyphus</i> - sheepnose ^{SE (L)}	
<i>Pleurobema sintoxia</i> - round pigtoe	
<i>Quadrula fragosa</i> - winged mapleleaf ^{SE FE X}	
<i>Quadrula metanevra</i> - monkeyface	
	Lampsilinae (20)
	<i>Actinonaias ligamentina</i> - mucket
	<i>Ellipsaria lineolata</i> - butterfly ^{ST (L)}
	<i>Epioblasma triquetra</i> - snuffbox ^{SE}
	<i>Lampsilis cardium</i> plain pocketbook
	<i>Lampsilis higginsii</i> - Higgins eye ^{SE FE (L)}
	<i>Lampsilis siliquoidea</i> - fatmucket
	<i>Lampsilis teres</i> - yellow sandshell
	<i>Leptodea fragilis</i> - fragile papershell
	<i>Leptodea leptodon</i> - scaleshell ^{SE FE X}
	<i>Ligumia recta</i> - black sandshell ^{ST (L)}
	<i>Ligumia subrostrata</i> - pondmussel
	<i>Obliquaria reflexa</i> - threehorn wartyback
	<i>Obovaria olivaria</i> - hickorynut
	<i>Potamilus alatus</i> - pink heelsplitter
	<i>Potamilus capax</i> - fat pocketbook ^{SE FE}
	<i>Potamilus ohioensis</i> - pink papershell
	<i>Toxolasma parvus</i> - lilliput
	<i>Truncilla donaciformis</i> - fawnsfoot
	<i>Truncilla truncata</i> - deertoe
	<i>Venustaconcha ellipsiformis</i> - ellipse

Total number of species = 46

Thirty species of freshwater mussels were found in the Mississippi River at Milan Bottoms in this study and 20 species were collected alive (Table 3). In addition to native mussels, the exotic Asian clam, *Corbicula fluminea*, and zebra mussel, *Dreissena polymorpha*, were found alive but in very low numbers. Eleven species, including the spectaclecase, *Cumberlandia monodonta*; flat floater *Anodonta suborbiculata*; creeper, *Strophitus undulatus*; spike, *Elliptio dilatata*; sheepnose, *Plethobasus cyphus*; round pigtoe, *Pleurobema sintoxia*; monkeyface, *Quadrula metanevra*; mucket, *Actinonaias ligamentina*; butterfly, *Ellipsaria lineolata*; yellow sandshell, *Lampsilis teres*; and lilliput, *Toxolasma parvus*, were not found alive at Milan Bottoms in 2003. Four of the above species (spectaclecase, spike, sheepnose, butterfly) are state threatened or endangered and are known to occur near Milan Bottoms (downstream at river miles 467, 470; upstream at river miles 486, 490, 504).

Table 3. Freshwater bivalves (Family Unionidae) recorded from the Mississippi River at Milan Bottoms in 2003 (sites are ordered upstream to downstream and shown in Figure 1). Numbers refer to live individuals found. D = Fresh Dead; R = Relict Shell; FE = Federally Endangered Species; ST = Illinois Threatened Species.

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Man-hours:	0.75	1	1	1	1.5	1
Anodontinae						
<i>Arcidens confragosus</i>	D	-	-	-	2	-
<i>Lasmigona complanata</i>	-	1	-	1	3	-
<i>Pyganodon grandis</i>	-	D	-	2	4	1
<i>Strophitus undulatus</i>	-	-	D	-	D	-
<i>Utterbackia imbecillis</i>	-	-	-	-	D	1
Ambleminae						
<i>Amblema plicata</i>	24	50	26	6	55	159
<i>Cyclonaias tuberculata</i> ST	R	-	-	-	-	-
<i>Elliptio crassidens</i> ST	R	-	-	-	-	-
<i>Elliptio dilatata</i> ST	R	-	-	-	-	-
<i>Fusconaia flava</i>	5	5	2	1	3	24
<i>Megaloniais nervosa</i>	7	7	1	-	2	-
<i>Quadrula metanevra</i>	R	-	-	R	R	R
<i>Quadrula nodulata</i>	-	D	-	D	2	-
<i>Quadrula pustulosa</i>	19	-	3	-	7	5
<i>Quadrula quadrula</i>	7	3	-	3	16	5
<i>Tritogonia verrucosa</i>	R	-	-	R	-	-
Lampsilinae						
<i>Actinonaias ligamentina</i>	-	-	R	-	D	-
<i>Ellipsaria lineolata</i> ST	D	D	D	-	D	-
<i>Lampsilis cardium</i>	2	5	3	-	R	1
<i>Lampsilis higginsii</i> ^{FE}	1	-	-	-	-	R
<i>Lampsilis teres</i>	-	R	-	-	R	-
<i>Leptodea fragilis</i>	25	2	-	D	D	D
<i>Ligumia recta</i> ST	4	3	1	-	1	D
<i>Obliquaria reflexa</i>	28	34	22	4	21	4
<i>Obovaria olivaria</i>	3	D	R	-	2	D
<i>Potamilus alatus</i>	1	R	-	R	R	-
<i>Potamilus ohioensis</i>	D	1	4	5	2	1
<i>Toxolasma parvus</i>	-	-	-	-	-	D
<i>Truncilla donaciformis</i>	2	D	-	-	2	-
<i>Truncilla truncata</i>	6	30	-	D	1	-
Individuals Live	134	141	62	22	123	201
Native Species Live (20)	14	11	8	7	15	9
Native Species Dead (10)	8	7	4	6	9	6
Native Species Total (30)	22	18	12	13	24	15
Mussels per man-hr	178	141	62	22	82	201

The three most abundant species found were the threeridge (*Amblema plicata*), threehorn wartyback (*Obliquaria reflexa*), and Wabash pigtoe (*Fusconaia flava*). Two listed species were collected alive: black sandshell, *Ligumia recta* (state threatened) and Higgins eye, *Lampsilis higginsii* (state and federally endangered). Fresh dead shells of the butterfly, *Ellipsaria lineolata*, were found, suggesting that they are likely extant in the area. Relict shells were collected of three state listed mussels: purple wartyback, *Cyclonaias tuberculata*; elephantear, *Elliptio crassidens* and spike, *Elliptio dilatata*. Overall diversity was outstanding with 20 species found alive and 7 to 15 live species per site. Mussel abundance was high but also quite variable, ranging from 22 to 201 mussels per man-hour sampling.

Of particular note was finding the federally endangered Higgins eye, *Lampsilis higginsii*, at Site 1 – an old female, 199 mm in length (Figure 5). The Higgins eye has historically been found at 24 sites in the Mississippi River in Rock Island or adjacent counties and was previously found at six sites (one in 1997) near Milan Bottoms:

1. Andalusia Island, near Wildcat Den State Park, rm 467, T77N, R1E, sec. 22 Muscatine County, Iowa, 10 September 1997. D. Kelner, H. Dunn & L. Applegate.
2. OSUM 42625. Andalusia Slough, 4.2 miles W Andalusia, rm 468.9, T17N, R4W, sec. 26, Rock Island County, Illinois, October 1978. T. Frietag.
3. CM 61.8829. Andalusia, [rm 473], [T17N, R4W, sec. 27], Rock Island County, Illinois, 25 July 1913. U.S. Biological Station, Fairport.
4. UMMZ uncat. Buffalo, [rm 473], [T17N, R3W, sec. 22], Scott County, Iowa, [pre-1958]. ex. Walter F. Webb Collection.
5. OSUM 42626. Andalusia Slough, 0.7 miles NE Andalusia, rm 473.5, T17N, R3W, sec. 22, Rock Island County, Illinois October 1978. T. Frietag.
6. USUM 49136. I-280 bridge, rm 478.3, [T17N, R2W, sec. 17], Scott County, Iowa, 19 July 1979. T. Frietag.

The other listed species we encountered was the black sandshell, *Ligumia recta*. We collected nine individuals at four sites (1, 2, 3, and 5) (Table 3). This species has been collected at various sites in Rock Island County since 1980. The last remaining populations of the black sandshell are confined to the Mississippi and Ohio rivers, the Rock, Kankakee, and Apple river drainages, and one site in the Fox River.

Although the methods were different (hand sampling along shore vs. diving defined transects), we compared the data we collected from Milan Bottoms in 2003 to that collected by Ecological Specialists at Mississippi River Mile 467.4 near Montpelier, Iowa in 1997. Both surveys had similar results. We collected 20 live species (30 total) compared to 18 live species (24 total). Five species found alive at Milan Bottoms were not found at Montpelier, including the federally listed Higgins eye (Table 4). Four species were found by Ecological Specialists that we did not encounter, the most notable was the state threatened butterfly (*Ellipsaria lineolata*). They

collected 24 butterflies whereas we only found fresh dead shells. The presence of the fresh dead shells does suggest that *Ellipsaria lineolata* is likely still present at Milan Bottoms.

The most abundant species found in both surveys was the threeridge (*Amblema plicata*). The threehorn wartyback (*Obliquaria reflexa*), ranked second in our study and third by Ecological Specialists. Our third most abundant species was the Wabash pigtoe (*Fusconaia flava*) whereas their second was the washboard (*Megaloniais nervosa*).

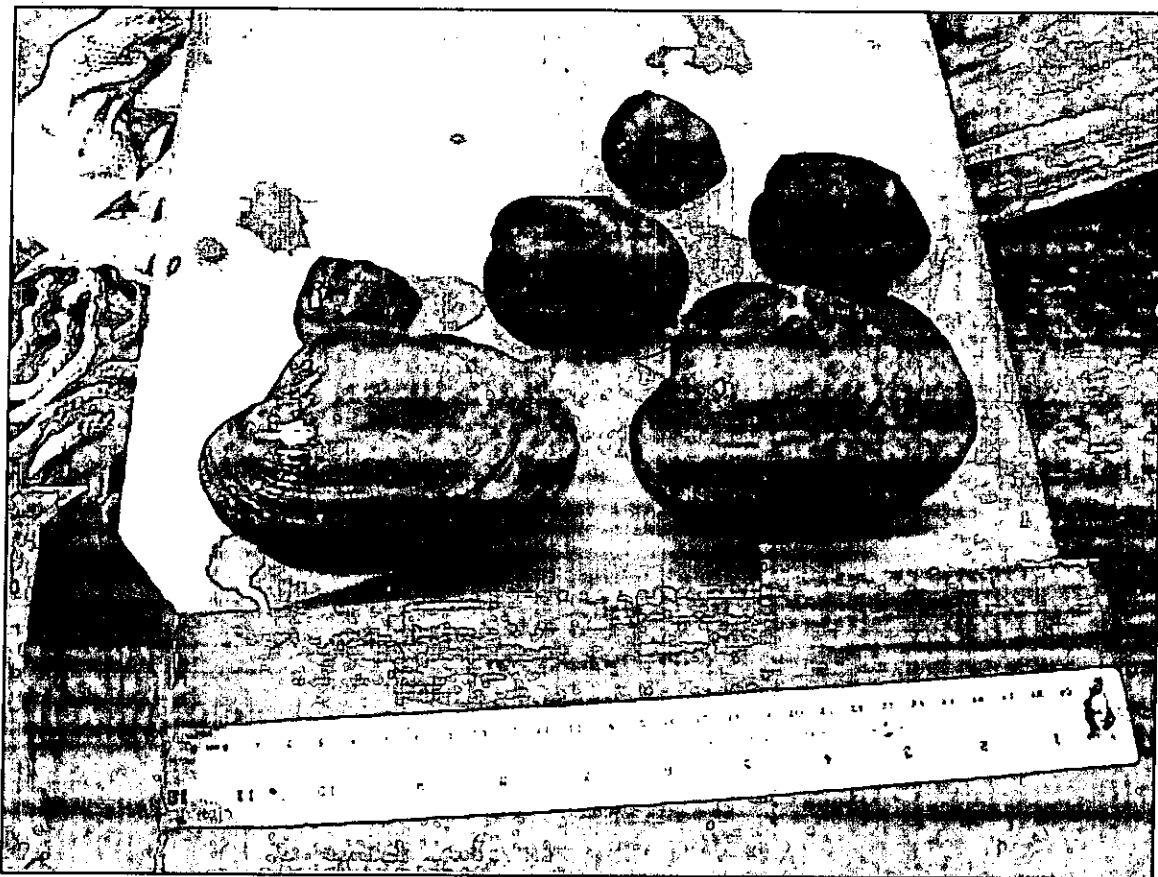


Figure 5. Specimen of the Higgins eye (*Lampsilis higginsii*) found at Site 1 during this study. Front row *Lampsilis cardium* and *L. higginsii*. Second row *Obliquaria reflexa*, *Obovaria olivaria*, *O. reflexa*. Back row *O. reflexa*.

Table 4. Freshwater bivalves (Family Unionidae) recorded from the Mississippi River at Milan Bottoms in 2003 (this study) and at river mile 467.4, just downstream Montpelier, Iowa, in 1997 (Ecological Specialists, Inc., 1997). Numbers refer to live individuals found; D = Fresh Dead; R = Relict Shell; FE = Federally Endangered Species; SE = Illinois Endangered Species; ST = Illinois Threatened Species.

	Milan Bottoms 2003	River Mile 467.4 1997
Anodontinae		
<i>Arcidens confragosus</i>	D	23
<i>Lasmigona complanata</i>	5	8
<i>Pyganodon grandis</i>	7	4
<i>Strophitus undulatus</i>	D	-
<i>Utterbackia imbecillis</i>	1	-
Ambleminae		
<i>Amblema plicata</i>	320	546
<i>Cumberlandia monodonta</i> ^{SE}	-	D
<i>Cyclonaias tuberculata</i> ST	R	-
<i>Elliptio crassidens</i> ST	R	-
<i>Elliptio dilatata</i> ST	R	-
<i>Fusconaia ebena</i> ST	-	R
<i>Fusconaia flava</i>	40	47
<i>Megalonaias nervosa</i>	17	195
<i>Quadrula metanevra</i>	R	3
<i>Quadrula nodulata</i>	2	3
<i>Quadrula pustulosa</i>	34	38
<i>Quadrula quadrula</i>	34	66
<i>Tritogonia verrucosa</i>	R	R
Lampsilinae		
<i>Actinonaias ligamentina</i>	D	5
<i>Ellipsaria lineolata</i> ST	D	24
<i>Lampsilis cardium</i>	11	8
<i>Lampsilis higginsii</i> ^{FE}	1	-
<i>Lampsilis teres</i>	R	-
<i>Leptodea fragilis</i>	27	3
<i>Ligumia recta</i> ST	9	5
<i>Obliquaria reflexa</i>	113	29
<i>Obovaria olivaria</i>	5	4
<i>Potamilus alatus</i>	1	D
<i>Potamilus ohiensis</i>	13	R
<i>Toxolasma parvus</i>	D	-
<i>Truncilla donaciformis</i>	4	R
<i>Truncilla truncata</i>	37	4
Individuals Live	683	1015
Native Species Live	20	18
Native Species Dead	10	6
Native Species Total	30	24

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