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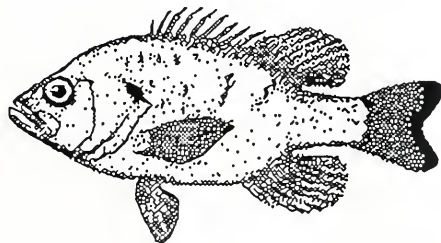
ILLINOIS NATURAL HISTORY SURVEY

A Summary of Freshwater Mussel Sampling in
Mississippi River Pool 15 during June 1987
by the Illinois Natural History Survey and
the Illinois Department of Conservation

Aquatic Biology Section
Technical Report

K. D. Blodgett and R. E. Sparks

Aquatic Biology Technical Report 87/16




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October 1987



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INTRODUCTION

Two sites in Mississippi River Pool 15 (near Moline, Illinois) were quantitatively sampled for mussels in June 1987 through the cooperative efforts of the Illinois Natural History Survey (INHS) River Research Laboratory (RRL) and biologists from the Illinois Department of Conservation (DOC). This report summarizes those results and briefly compares them with previous INHS/DOC collections and other recent mussel surveys of Mississippi River Pool 15.

METHODS

Quantitative mussel samples were collected using procedures normally employed by INHS RRL (Sparks and Blodgett 1983, Blodgett and Sparks 1987). Biologists using surface-supply diving techniques placed all mussels and loose substrate from within 1.0-m² sampling frames into canvas collecting bags and sent them to the surface, where mussels were sorted to species, measured, and categorized based on the following criteria:

Live - soft parts intact and, if the valves gaped, they closed when prodded.

Recently Dead - if soft parts were present, unable to close valves when prodded; if soft parts were gone, the periostracum was intact, valves were firmly joined by the hinge ligament, and the interior nacre was shiny and not the least bit chalky.

Voucher specimens for species collected were deposited in the INHS mollusk collection at Champaign, Illinois.

During June 1987, eight 1-m² samples were taken from each of two sites in Pool 15. The first site was approximately 50 m from the left bank (Illinois shore) near river mile (RM) 486.0, just upstream of Arsenal Island at the entrance to Sylvan Slough. This same site was sampled by INHS biologists in 1983 and by INHS/DOC

biologists in 1985. Sylvan Slough has been designated as "essential habitat" for Lampsilis higginsi (the Higgins' eye pearly mussel) by the Higgins' Eye Mussel Recovery Team (Stern 1982). The second site sampled was near RM 488.6 about 200 m from the left bank; this site was sampled in 1985 by INHS/DOC biologists. Locations of both sites were determined by triangulation using a Motorola Mini-Ranger III system.

RESULTS AND DISCUSSION

River Mile 486.0

At RM 486.0, 923 live mussels ($\bar{x} = 115.4/m^2$, SD = 17.2) and 42 recently dead mussels ($\bar{x} = 5.3/m^2$, SD = 3.9) representing 22 species (21 live species) were collected from eight 1-m² samples (Table 1). Quadrula pustulosa was the numerically dominant species (24.6% of live mussels, $\bar{x} = 28.4/m^2$) as it had been during the previous two collections (Tables 1 and 2). Other abundant species included Truncilla truncata (17.1%, $\bar{x} = 19.8/m^2$) and Megalonaias gigantea (12.6%, $\bar{x} = 14.5/m^2$). Live mussel density and diversity were similar to those found in 1983 and 1985 (Table 1). The percentage of recently dead mussels in 1987 (4.4%) was considerably lower than it was in 1983 (30.4%) and 1985 (17.9%).

Oblad (1979) reported SCUBA diving collections in Sylvan Slough near RM 485.8 by NUS Corporation in 1978 produced 25 live mussel species and a mean density of 13.6/m² in two 12.2 x 21.4 m plots (522.2 m² sampled) (Table 3). Ecological Analysts, Inc. (EA) (1981) reported using SCUBA diving and brailing to collect 26 mussel species from Sylvan Slough near RM 485.5 in 1980 (1981). The maximum density EA reported from quantitative samples by

diving was 210/m². They did not report a mean density nor the number of 1-m² quantitative samples taken.

The INHS/DOC quantitative sampling at the mouth of Sylvan Slough (RM 486.0) in 1983, 1985, and 1987 produced higher densities but fewer species than those reported by NUS and EA (Table 3). Both EA and NUS divers collected only mussels and not substrate, so they probably missed many small mussels. INHS divers collected cobble and substrate, which was then searched for small mussels by surface personnel. EA reported collecting 7,392 mussels by diving, and of those, only one Truncilla truncata (a relatively small mussel abundant in most INHS collections there) was collected, possibly indicating small shells were overlooked. In addition, small mussels NUS divers found may have dropped through the 1.5- to 2.0-inch mesh collection containers they used to lift mussels out of the water. Adding to differences in densities is the normally patchy distribution of freshwater mussels.

The lower total number of species collected by INHS is probably due in part to the fact that INHS sampled significantly smaller areas and collections within each area were localized possibly limiting the number of habitat types sampled. Also, NUS differentiated between grandis and corpulenta subspecies of Anodonta grandis.

River Mile 488.6

At RM 488.6, 2,354 live mussels (\bar{x} = 294.3/m², SD = 94.3) and 45 recently dead mussels (\bar{x} = 5.6, SD = 2.0) representing 23 species were collected from eight 1-m² samples (Table 4). One

1-m² frame contained 515 live mussels, the highest density of mussels we have ever observed.

Numerically, Truncilla truncata was the most abundant species (23.7%, \bar{x} = 69.9/m²) followed by Quadrula pustulosa (20.8%, \bar{x} = 61.1/m²) (Tables 2 and 4). The 1986 survey by EA Science and Technology (EAST) (1986) near RM 488.6 reported fewer species and lower densities (Table 5). Again, differences between collection methods (EAST collecting mussels only versus INHS/DOC collecting mussels and substrate) may be partially responsible for differences in densities and composition.

While sampling near RM 488.6 on 18 June, we only had a two-man surface crew and were unable to sort, identify, and measure mussels as rapidly as they were sent to the surface by the diver. Mussels were placed in buckets of water and kept in the shade of the diving boat canopy. We began processing mussels at approximately 1:30 p.m., but, due to the large number of shells and boat motor problems, mussels from the last three 1-m² samples were taken to our motel for processing that evening. A single living specimen of the federally endangered Lampsilis higginsii was discovered around 9 p.m. that evening. It had been in a bucket full of mussels for over 10 hours but was still able to hold its valves closed when prodded. The mussel was wrapped in a moist towel and kept on ice and it appeared to be alive the next morning. Dr. Richard Sparks (INHS) notified Mr. William Bertrand (Streams Program Coordinator, DOC) of the collection on 19 June. After further consultation with Ms. Sue Lauzon, Endangered Species Coordinator for the State of Illinois, the decision was made to keep the mussel as a voucher specimen under the provisions of the DOC's collection permit because it was collected within 800 m of

areas directly impacted by navigation channel widening (blasting) and rock disposal being conducted by the U.S. Army Corps of Engineers. The following parameters were determined for the L. higginsi specimen, which was deposited in the INHS mussel collection in Champaign, Illinois:

length	88.6 mm
height	62.8 mm
width	43.5 mm
sex	male
age	6 years

The 1-m² sample which included the L. higginsi contained 250 live mussels representing 17 species. No recently dead specimens of L. higginsi were collected from Pool 15 by INHS/DOC in 1987.

ACKNOWLEDGMENTS

The Illinois Department of Conservation provided field assistance and some funds to offset travel expenses incurred by INHS personnel during the 1987 collections. The Motorola MiniRanger III system is on loan to the INHS RRL from the Upper Mississippi River Basin Association. This report was edited by Jana Waite and Mildred Watson.

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Table 1. Live and recently dead mussels collected from Mississippi River Pool 15, river mile 486.0, near Moline, Illinois by INHS, 1983-1987.

Species	1983 (4 1-m ² samples)				1985 (8 1-m ² samples)				1987 (8 1-m ² samples)												
	Live		Recently dead		Live		Recently dead		Live		Recently dead										
	Sum	\bar{x}/m^2	SD	\bar{x}/m^2	SD	%	Sum	\bar{x}/m^2	SD	\bar{x}/m^2	SD	%	Sum	\bar{x}/m^2	SD	\bar{x}/m^2	SD	%			
<u>Actinonaias ligamentina</u>	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	1	0.1	0.3	100.0%		
<u>Amblera plicata</u>	41	10.2	1.1	22	5.5	4.0	34.9%	78	9.8	2.6	23	2.9	2.8	22.8%	52	6.5	2.6	0	0.0	0.0%	
<u>Anodonta grandis</u>	5	1.2	1.3	0	0.0	0.0	0.0%	7	0.9	0.6	0	0.0	0.0	0.0%	1	0.1	0.3	0	0.0	0.0%	
<u>Anodonta imbecillis</u>	12	3.0	1.0	1	0.2	0.4	7.7%	33	4.1	1.8	4	0.5	0.7	10.8%	4	0.5	1.0	8	1.0	1.1	66.7%
<u>Accidens confregosus</u>	1	0.2	0.4	0	0.0	0.0	0.0%	2	0.2	0.4	0	0.0	0.0	0.0%	0	0.0	0.0	0	0.0	0.0%	
<u>Cumberlandia monodonta</u>	1	0.2	0.4	0	0.0	0.0	0.0%	0	0.0	0.0	0	0.0	0.0	0.0%	0	0.0	0.0	0	0.0	0.0%	
<u>Ellipsaria lineolata</u>	29	7.2	3.1	7	1.8	0.8	19.4%	42	5.2	2.8	3	0.4	0.7	6.7%	49	6.1	1.1	2	0.3	0.4	3.9%
<u>Elliptio dilatata</u>	0	0.0	0.0	1	0.2	0.4	100.0%	0	0.0	0.0	0	0.0	0.0	0.0%	0	0.0	0.0	0	0.0	0.0%	
<u>Fusconia flava</u>	5	1.2	0.4	2	0.5	0.5	28.6%	4	0.5	0.5	1	0.1	0.3	20.0%	2	0.3	0.4	0	0.0	0.0%	
<u>Lampsilis ovata</u>	5	1.2	1.1	1	0.2	0.4	16.7%	7	0.9	0.9	0	0.0	0.0	0.0%	5	0.6	0.5	0	0.0	0.0%	
<u>Leptodea fragilis</u>	37	9.2	0.8	4	1.0	1.2	9.8%	81	10.1	2.9	10	1.2	1.0	11.0%	82	10.3	3.2	5	0.6	0.5	5.7%
<u>Ligumia recta</u>	3	0.8	1.3	0	0.0	0.0	0.0%	2	0.2	0.4	1	0.1	0.3	33.3%	1	0.1	0.3	0	0.0	0.0%	
<u>Megalonaias gigantea</u>	33	8.2	3.2	27	6.8	3.4	45.0%	107	13.4	4.7	30	3.8	4.2	21.9%	116	14.5	3.8	2	0.3	0.7	1.7%
<u>Obliniquaria reflexa</u>	15	3.8	2.4	7	1.8	0.4	31.8%	33	4.1	2.0	8	1.0	1.1	19.5%	39	4.9	2.0	1	0.1	0.3	2.5%
<u>Obovaria olivaria</u>	0	0.0	0.0	0	0.0	0.0	0.0%	1	0.1	0.3	1	0.1	0.3	50.0%	1	0.1	0.3	0	0.0	0.0%	
<u>Plethobasus cyphus</u>	0	0.0	0.0	0	0.0	0.0	0.0%	1	0.1	0.3	0	0.0	0.0	0.0%	1	0.1	0.3	0	0.0	0.0%	
<u>Potamilus elatus</u>	16	4.0	3.2	2	0.5	0.9	11.1%	18	2.2	0.7	1	0.1	0.3	5.3%	39	4.9	1.6	0	0.0	0.0%	
<u>Potamilus laevis</u>	0	0.0	0.0	0	0.0	0.0	0.0%	6	0.8	0.7	0	0.0	0.0	0.0%	7	0.9	0.9	0	0.0	0.0%	
<u>Quadrula metanevra</u>	8	2.0	1.2	3	0.8	0.8	27.3%	53	6.6	4.1	1	0.1	0.3	1.8%	72	9.0	3.2	1	0.1	0.3	1.4%
<u>Quadrula nodulata</u>	0	0.0	0.0	2	0.5	0.5	100.0%	1	0.1	0.3	0	0.0	0.0	0.0%	4	0.5	0.7	0	0.0	0.0%	
<u>Quadrula pustulosa</u>	83	20.8	5.5	50	12.5	4.7	37.6%	158	19.8	6.2	55	6.9	4.1	25.8%	227	28.4	4.4	4	0.5	1.0	1.7%
<u>Quadrula quadrula</u>	11	2.8	1.5	2	0.5	0.9	15.4%	14	1.8	0.8	3	0.4	0.7	17.6%	10	1.3	1.0	0	0.0	0.0%	
<u>Strophitus undulatus</u>	0	0.0	0.0	0	0.0	0.0	0.0%	0	0.0	0.0	0	0.0	0.0	0.0%	1	0.1	0.3	0	0.0	0.0%	
<u>Truncilla donaciformis</u>	13	3.2	3.3	5	1.2	1.1	27.8%	52	6.5	4.7	21	2.6	1.2	28.8%	51	6.4	3.0	6	0.8	0.8	10.5%
<u>Truncilla truncata</u>	40	10.0	2.3	20	5.0	3.5	33.3%	101	12.6	4.3	13	1.6	1.6	11.4%	158	19.8	7.2	13	1.6	1.2	7.6%
Total	358	89.5	13.5	156	39.0	14.2	30.4%	801	100.1	21.6	175	21.9	7.8	17.9%	923	115.4	17.2	42	5.3	3.9	4.4%

Table 2. Percentage composition of numerically dominant (> 1.0%) live mussel species collected by INHS personnel from Mississippi River Pool 15 near Moline, IL, 1983-1987.

River mile	486.0			488.6	
	1983	1985	1987	1985	1987
<u>Amblema plicata</u>	11.5%	9.7%	5.6%	11.7%	13.8%
<u>Anodonta grandis</u>	1.4%	<	<	<	<
<u>Anodonta imbecillis</u>	3.4%	4.1%	<	1.9%	<
<u>Ellipsaria lineolata</u>	8.1%	5.2%	5.3%	11.1%	11.1%
<u>Fusconaia flava</u>	1.4%	<	<	<	1.0%
<u>Lampsilis ovata</u>	1.4%	<	<	<	<
<u>Leptodea fragilis</u>	10.3%	10.1%	8.9%	14.5%	11.3%
<u>Megalonaias gigantea</u>	9.2%	13.4%	12.6%	1.9%	<
<u>Obliquaria reflexa</u>	4.2%	4.1%	4.2%	3.0%	4.9%
<u>Potamilus alatus</u>	4.5%	2.2%	4.2%	4.4%	4.5%
<u>Quadrula metanevra</u>	2.2%	6.6%	7.8%	<	<
<u>Quadrula nodulata</u>	<	<	<	<	1.0%
<u>Quadrula pustulosa</u>	23.2%	19.7%	24.6%	16.3%	20.8%
<u>Quadrula quadrula</u>	3.1%	1.7%	1.1%	2.0%	1.9%
<u>Truncilla donaciformis</u>	3.6%	6.5%	5.5%	5.3%	2.8%
<u>Truncilla truncata</u>	11.2%	12.6%	17.1%	24.6%	23.7%

< = less than 1.0%

Table 3. Number of species and mean densities of live mussels collected from Sylvan Slough, Pool 15, Mississippi River, near river mile 485.5 by Ecological Analysts, Inc. (EA) (1981), river mile 485.8 by NUS Corporation (Oblad 1981) and river mile 486.0 by INHS.

Organization	Year	No. live species	Area sampled (m ²)	Mean density (no./m ²)	Maximum density (no./m ²)
NUS	1978	25	322.2	13.6	?
EA	1980	26	?	?	210
INHS	1983	18	4	89.5	109
INHS	1985	21	8	100.1	132
INHS	1987	22	8	115.4	149

? = not reported

Table 4. Live and recently dead mussels collected from Mississippi River Pool 15, river mile 488-6, near Moline, Illinois by INHS, 1985 and 1987.

Species	1985 (6 1-m ² samples)				1987 (8 1-m ² samples)			
	Live		Recently dead		Live		Recently dead	
	Sum	\bar{x}/m^2 SD	Sum	\bar{x}/m^2 SD	Sum	\bar{x}/m^2 SD	Sum	\bar{x}/m^2 SD
<u>Actinonaias ligamentina</u>	0	0.0 0.0	0	0.0 0.0	1	0.1 0.3	0	0.0 0.0
<u>Amblema plicata</u>	98	16.3 7.3	17	2.8 1.9	325	40.6 13.8	5	0.6 0.7
<u>Anodonta grandis</u>	0	0.0 0.0	0	0.0 0.0	1	0.1 0.3	0	0.0 0.0
<u>Anodonta imbecillis</u>	16	2.7 4.0	0	0.0 0.0	1	0.1 0.3	1	0.1 0.3
<u>Arcidens confregosus</u>	2	0.3 0.5	0	0.0 0.0	2	0.3 0.4	0	0.0 0.0
<u>Ellipsaria lineolata</u>	93	15.5 8.0	1	0.2 0.4	262	32.8 11.9	3	0.4 0.5
<u>Fusconaia flava</u>	4	0.7 0.8	0	0.0 0.0	24	3.0 1.7	0	0.0 0.0
<u>Lampsilis higginsi</u>	0	0.0 0.0	0	0.0 0.0	1	0.1 0.3	0	0.0 0.0
<u>Lampsilis ovata</u>	7	1.2 1.1	0	0.0 0.0	11	1.4 1.4	0	0.0 0.0
<u>Lasmigona complanata</u>	0	0.0 0.0	0	0.0 0.0	1	0.1 0.3	0	0.0 0.0
<u>Leptodea fragilis</u>	121	20.2 10.8	6	1.0 1.2	267	33.4 15.4	11	1.4 1.9
<u>Ligumia recta</u>	2	0.3 0.5	0	0.0 0.0	8	1.0 0.7	0	0.0 0.0
<u>Meatonaia gigantea</u>	16	2.7 2.2	6	1.0 1.8	15	1.9 1.5	0	0.0 0.0
<u>Obliguaria reflexa</u>	25	4.2 2.0	1	0.2 0.4	115	14.4 6.1	0	0.0 0.0
<u>Obovaria olivaria</u>	2	0.3 0.5	0	0.0 0.0	9	1.1 1.3	0	0.0 0.0
<u>Plethobasus cyphus</u>	0	0.0 0.0	0	0.0 0.0	0	0.0 0.0	0	0.0 0.0
<u>Potamilus alatus</u>	37	6.2 4.7	0	0.0 0.0	105	13.1 6.6	1	0.1 0.3
<u>Potamilus levisima</u>	4	0.7 1.1	0	0.0 0.0	16	2.0 1.9	2	0.3 0.4
<u>Quadrula metanevra</u>	2	0.3 0.5	0	0.0 0.0	7	0.9 0.9	0	0.0 0.0
<u>Quadrula nodulata</u>	3	0.5 0.5	0	0.0 0.0	24	3.0 2.2	1	0.1 0.3
<u>Quadrula pustulosa</u>	136	22.7 14.8	11	1.8 1.7	489	61.1 26.1	5	0.6 0.9
<u>Quadrula quadrula</u>	17	2.8 2.0	1	0.2 0.4	44	5.5 2.4	0	0.0 0.0
<u>Truncilla donaciformis</u>	44	7.3 4.3	12	2.0 2.9	67	8.4 9.1	6	0.8 0.8
<u>Truncilla truncata</u>	206	34.3 15.2	1	0.2 0.4	559	69.9 43.3	10	1.3 0.8
Unidentified	0	0.0 0.0	0	0.0 0.0	1	0.2 0.4	0	0.0 0.0
Total	836	139.3 62.1	56	9.3 6.8	2354	294.3 94.3	45	5.6 2.0

Table 5. Number of species and mean and maximum densities of live mussels collected from Pool 15, Mississippi River, River Mile (RM) 487.0-489.0 by EA Science and Technology (EAST) (1986) and RM 488.6 by the Illinois Natural History Survey (INHS).

Organization	Year	No. live species	Area sampled (m ²)	Mean density (no./m ²)	Maximum density (no./m ²)
INHS	1985	19	6	139.3	216
EAST	1986	20 ^a	≥291.5 ^a	74.7 ^b	136 ^b
INHS	1987	23	8	294.3	515

^a = 29 qualitative (approximately 10 min and 10 m² each) and 3 quantitative (0.5 m² each) collections.

^b = 3 0.5-m² quantitative collections

