

Mussel Fauna Associated with Wing Dams in Pool 7 of the Mississippi River

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ABSTRACT

Twenty-three species of freshwater mussels (Mollusca: Unionidae) were collected by divers in May, 1987, at 32 sites on and between wing dams in Pool 7 of the upper Mississippi River. Five species (Amblema plicata, Obliquaria reflexa, Obovaria olivaria, Lampsilis ventricosa and Quadrula pustulosa) comprised 90% of the fauna and were found at 88 - 100% of the sites. Specimens of Actinonaias ligamentina, Plethobasus cyphus, and Strophitus undulatus, last reported in 1930, and the endangered Lampsilis higginsii, last reported in 1966, were collected alive.

INTRODUCTION

In large alluvial rivers wing dams are a source of coarse-grained substrate used by macroinvertebrates and fishes (Conner et al. 1983, Pennington et al. 1983, Shields 1983). Wing dams provide suitable habitat for freshwater mussels because they attract fishes which are hosts for most species of mussels (Fuller 1974). Wing dams affect sediment deposition and erosion and create quiescent areas that are similar to naturally occurring lentic habitats during normal and low flow (Beckett et al. 1983).

This paper reports on a survey for freshwater mussels (Mollusca: Unionidae) near and on wing dams in the upper Mississippi River near Winter's Landing. The purpose of the study was to characterize the existing fauna and determine if live specimens of the endangered Higgins' Eye Mussel, Lampsilis higginsii, were present.

STUDY AREA

The study area is between RM 707.8 and 709.4 in Pool 7 of the upper Mississippi River, about 2 km north of Dakota, Minnesota. Pool 7 extends from Lock and Dam 7 (RM 702.5) at Dresbach, Minnesota, to Lock and Dam 6 (RM 714.3), near Trempealeau, Wisconsin. This pool is characterized by numerous sloughs, islands, and backwater lakes. Sample sites were located on wing dams (2 sites); between wing dams within 200 m of the Wisconsin shore (16 sites); farther offshore and unprotected by wing dams (9 sites); and 50 - 600 m from the Wisconsin shore and unprotected by wing dams (5 sites).

METHODS

Mussels were collected on 19-21 May, 1987, by a four-man diving crew equipped with surface air supply. At each of 30 sites, a single diver spent 20 min collecting live mussels. Sites on wing dams were searched for 40 min because of difficulty in maneuvering. Since water visibility was poor, collecting was done by feel. Live mussels were identified and total shell length measured (nearest 0.1 mm). All Lampsilis higginsi, and mussels not needed for voucher specimens, were returned to the river. This work was conducted under authority of Endangered Species Permit No. PRT2-697830 of the U. S. Army Engineer District, St. Paul (NCS).

RESULTS AND DISCUSSION

A total of 2,087 live mussels, representing 23 species, was collected at 32 sites (Table 1). Five species (Amblema plicata, Obliquaria reflexa, Obovaria olivaria, Lampsilis ventricosa and Quadrula pustulosa) comprised 90% of the mussels and were collected at 88 - 100% of the sites. Two species, Fusconaia flava and Leptodea fragilis, comprised about 2%, whereas 16 species made up less than 1% of the fauna. Although this collection method was biased toward large mussels, seven species were represented by individuals less than 30 mm total shell length. From 3 to 141 mussels representing 2 to 15 species, were collected at each site. Average total mussel density and species richness were: 95.5 and 10 (on wing dams); 89.5 and 9.1 (protected by wing dams and within 200 m of the Minnesota shore); 38.5 and 5.7 (unprotected and farther offshore); and 23.2 and 4.4 (unprotected and 50 to 600 m from the Wisconsin shore). Depositional areas with reduced velocity provided stable sediments which enabled development of a dense and rich mussel assemblage.

Amblema plicata dominates the mussel fauna in the upper Mississippi River (Thiel 1981, Havlik 1983, Miller and Payne unpublished data). This species has 15 or more species of host fishes (Fuller 1974) and tolerates both lotic and lentic habitats. The correlation between number of A. plicata and total mussels was significant ($R = 0.85$, $p < 0.01$), whereas the relationship between number of Obliquaria reflexa and total mussels was not significant ($R = 0.38$, $p > 0.01$). Obliquaria reflexa does not appear to require a host (Fuller 1974); unlike most other mussel species its presence may be independent of fish distribution. Correlations between total mussels and numbers of Obovaria olivaria ($R = 0.62$), and Lampsilis ventricosa ($R = 0.52$), other species which require host fishes, were significant ($p < 0.01$).

Twenty-five species of freshwater mussels were identified in Pool 7 between 1969 and 1981 (Havlik 1983). Our list includes Actinonaias ligamentina, Plethobasus cyphus, and Strophitus undulatus, not reported since 1930 (van der Schalie and van der Schalie 1950), and two specimens of the endangered Lampsilis higginsi, last collected in 1966 (Finke 1966). Uncommon mussels were collected within 200 m of the Minnesota shoreline, in areas protected by wing dams.

Intensive collecting is required to obtain rare mussel species (Fuller 1980, Kovalak et al. 1986). The cumulative number of species obtained on this survey increased at a uniform rate, which was a consequence of low density and extreme rarity of some species. The 23rd species was found after 10 hours of sampling and 1800 individuals had been collected. These data illustrate that investigators should thoroughly search a site before assuming that rare mussels have been extirpated.

Table 1. Freshwater mu
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Species

Amblema plicata (Say,
Obliquaria reflexa Raf
Obovaria olivaria (Ra
Lampsilis ventricosa (L
Quadrula pustulosa (Le
Fusconaia flava (Rafin
Leptodea fragilis (Raf
Potamilus laevis (L
Potamilus alatus (Say,
Truncilla truncata Raf
Ligumia recta (Lamarck,
Quadrula metanevra (Raf
Ellipsaria lineolata (F
Lasmigona complanata (F
Plethobasus cyphus (Raf
Quadrula quadrula (Raf
Truncilla donaciformis
Lampsilis higginsi (Lea
Pleurobema sintoxia (F
Actinonaias ligamentina
Anodonta grandis Say,
Lampsilis radiata (Gmel
Strophitus undulatus (S

Total Individuals

Data presented here:
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Table 1. Freshwater mussels collected at 32 sites at Winter's Landing, upper Mississippi River, 19-21 May, 1987.

Species	No. Collected	Percent Present	No. of Sites	Size Range (mm)
<u>Amblema plicata</u> (Say, 1817)	601	28.80	29	23.0 - 118.2
<u>Obliquaria reflexa</u> Rafinesque, 1820	420	20.12	32	24.7 - 67.0
<u>Obovaria olivaria</u> (Rafinesque, 1820)	383	18.35	31	61.8 - 71.9
<u>Lampsilis ventricosa</u> (Barnes, 1823)	312	14.95	31	24.4 - 134.8
<u>Quadrula pustulosa</u> (Lea, 1831)	172	8.24	28	23.7 - 89.5
<u>Fusconaia flava</u> (Rafinesque, 1820)	57	2.73	18	11.3 - 95.5
<u>Leptodea fragilis</u> (Rafinesque, 1820)	50	2.40	19	41.7 - 114.2
<u>Potamilus laevis</u> (Lea, 1830)	18	0.86	4	22.1 - 108.8
<u>Potamilus alatus</u> (Say, 1817)	17	0.81	8	89.9 - 155.0
<u>Truncilla truncata</u> Rafinesque, 1920	16	0.77	6	30.3 - 54.1
<u>Ligumia recta</u> (Lamarck, 1819)	7	0.34	5	105.0 - 138.2
<u>Quadrula metanevra</u> (Rafinesque, 1820)	7	0.34	6	32.8 - 80.4
<u>Ellipsaria lineolata</u> (Rafinesque, 1820)	3	0.14	3	43.0 - 55.8
<u>Lasmigona complanata</u> (Barnes, 1823)	5	0.24	2	90.8 - 154.0
<u>Plethobasus cyphus</u> (Rafinesque, 1820)	4	0.19	3	61.8 - 71.9
<u>Quadrula quadrula</u> (Rafinesque, 1820)	4	0.19	4	23.7 - 89.5
<u>Truncilla donaciformis</u> (Lea, 1828)	3	0.14	3	13.9 - 32.0
<u>Lampsilis higginsii</u> (Lea, 1857)	2	0.10	2	67.8 - 89.6
<u>Pleurobema sintoxia</u> (Rafinesque, 1820)	2	0.10	1	36.9 - 40.2
<u>Actinonaias ligamentina</u> (Lamarck, 1819)	1	0.05	1	-
<u>Anodonta grandis</u> Say, 1829	1	0.05	1	-
<u>Lampsilis radiata</u> (Gmelin, 1791)	1	0.05	1	-
<u>Strophitus undulatus</u> (Say, 1817)	1	0.05	1	-
Total Individuals	2087			

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