Minnesota Scaleshell Mussel (*Leptodea leptodon)* Survey

Final Report for Federal Aid Project E-6-R

Submitted to

U. S. Fish and Wildlife Service

by

Minnesota Department of Natural Resources
Division of Ecological Services
Natural Heritage and Nongame Research Program

January 2004

Abstract

A survey was conducted for the scaleshell mussel (*Leptodea leptodon*) in the Minnesota River Drainage during summer 2003. A total of 67 sites in 17 streams were sampled, and 1,895 live mussels of 16 species were found. No live or dead specimens of scaleshell mussel were found during the survey, and only one record of the scaleshell exists from Minnesota waters. Given the extensive sampling efforts in southern Minnesota over the last five years and the lack of any additional scaleshell records, it is highly unlikely that this species is extant in the state. The lack of even dead shells suggests that it was historically very uncommon in Minnesota and can now be considered extirpated from the state.

Acknowledgements

This project was partially funded by a grant from U.S. Fish and Wildlife Service to the Minnesota Department of Natural Resources under Section 6 of the U.S. Endangered Species Act. A field crew supervised by Bernard Sietman conducted the fieldwork.

Introduction

The scaleshell (*Leptodea leptodon*) was listed as Endangered by the U.S. Fish and Wildlife Service (FWS) on October 9, 2001. In Minnesota, the scaleshell has no state status because it was assumed extirpated when Minnesota's List of Endangered, Threatened, and Special Concern Species was last updated in 1996. Neither Dawley (1945, 1947) nor Graf (1997) list *L. leptodon* among unionids known to occur in Minnesota. However, the specimen that was collected from Minnesota River at Mendota in the late 1800s (Sietman 2003), and held in the collection of The Ohio State Museum of Natural History (OSUM 56849), was recently identified by Dr. David H. Stansbery as *Leptodea leptodon*.

In 1999, the Minnesota Department of Natural Resources (DNR) initiated a statewide mussel survey to further develop the knowledge base necessary for effective mussel conservation in the state. Recent surveys within the Minnesota River watershed conducted under this project have revealed that a few tributaries still support their historic complement of mussel species. The Minnesota Scaleshell Survey was initiated to determine whether unsurveyed tributaries might still harbor this species.

Project Objective

The objective of this project was to determine the current distribution and abundance of the scaleshell (*Leptodea leptodon*) in Minnesota.

Methods

Job 1: *Prioritize rivers and streams for scaleshell surveys*

Sites considered for prioritization were limited to rivers and streams of the Minnesota River watershed. Only one record of the scaleshell exists from Minnesota — a single specimen from the Minnesota River at Mendota. A portion of the lower Minnesota River, including the area near Mendota, was sampled in 2001 (Kelner and Davis 2002), and Bright et. al. (1990) sampled the entire length of the Minnesota River. No evidence of the scaleshell was found in either study.

The glochidial host for scaleshell is unknown (Watters 1994). Its only congener, *Leptodea fragilis*, a common and often abundant species, uses freshwater drum (*Aplodinotus grunniens*) as a host, which is also common in the Minnesota River Drainage (K. Schmidt, Minnesota DNR, pers. comm.). Thus, the reproductive biology of this species did not provide any insights into the prioritization of sampling sites.

Where the scaleshell is still extant, it inhabits high quality streams with intact mussel communities (Szymanski 1998). Habitat in the mainstem of the Minnesota River has generally been severely degraded, and about 50% of the mussel species that historically lived there are extirpated. It is therefore unlikely that suitable habitat for the scaleshell still exists in the mainstem of the Minnesota River. Additionally, several of the tributaries of the Minnesota River have been completely or partially sampled in previous years of the Minnesota Statewide Mussel Survey and by other projects (e.g., Bright et. al. 1995). Therefore, the highest priority streams for the survey under the current project were those in the Minnesota River Drainage that had not been sampled in previous studies.

Job 2: *Conduct scaleshell surveys*

Field Surveys for the scaleshell were conducted at sites where habitat in rivers and streams appeared comparable to known scaleshell habitat. Sample sites were typically located at bridges and other access points near roads. At each site, two or four biologists hand collected all live and dead mussels by wading and crawling along the river bottom while sweeping hands back and forth on the substrate surface, and by probing the substrate to find buried mussels. Riverbanks and sand and gravel bars were also searched for empty shells. An effort was made to search all microhabitats at a particular site with the intent of locating high mussel densities and collecting as many live mussel specimens and species as possible. All live mussels collected were held temporarily *in situ* in mesh bags until identified to species, counted, and aged by an external annuli count. Dead mussels of species that were not found alive were identified and shell condition was noted. Voucher specimens of live or dead mussels were retained at most sites and donated to the University of Minnesota's James Ford Bell Museum of Natural History Mollusk Collection. All other live mussels were returned to the approximate location of collection. For each site, a record was made of time spent searching and general habitat conditions (e.g., min. depth, max. depth, substrate, and general riparian zone comments). A GPS coordinate was recorded at each site to mark the site's general location.

Results and Discussion

In the course of the Minnesota Scaleshell Survey, a total of 67 sites in 17 streams of the Minnesota River Drainage were sampled from 3 June to 6 October 2003 (Figure 1, Table 1). Most of the stream sites sampled were in tributaries to the Minnesota River. Given that the mainstem of the Minnesota River has been extensively sampled in previous projects (Bright 1990, Kelner and Davis 2002), only one site in the Minnesota River mainstem was sampled. To date, a total of 316 sites in the Minnesota River Drainage have been surveyed by this project or the Minnesota Statewide Mussel Survey.

During the Minnesota Scaleshell Survey, 1,895 live mussels of 16 species were found, and an

additional 18 species were found as empty shells (Table 2). No live or dead specimens of scaleshell were found during the survey. Relic shells of five state endangered mussels, seven state threatened mussels, and the federally endangered *Quadrula fragosa* were found during this study. Other than *Actinonaias ligamentina* and *Pleurobema sintoxia,* which were found dead at six sites each, the remaining dead endangered or threatened species were all found at one site on the lower Minnesota River at Carver. The only live mussels found at this site were two specimens of *Leptodea fragilis*.

Five state special concern species were found in the Minnesota River Drainage, two of which were found live — a single individual each of *Lasmigona compressa* and *Ligumia recta* (Table 2). Of the species with no official status, *Lampsilis cardium*, *Leptodea fragilis*, *Lasmigona complanata*, *Potamilus alatus*, *Potamilus ohiensis*, *Pyganodon grandis*, *Strophitus undulatus*, and *Truncilla truncata* were the most widespread, and in most cases, abundant species found during the survey (Table 2).

Assuming the locality information is correct, the specimen housed at Ohio State University is the only documented record for scaleshell in Minnesota. Apparently, the last live specimen of scaleshell from the Upper Mississippi River system was collected in 1927 (Havlik and Sauer 2000). Baker (1928), who reported a single specimen from the Mississippi River near McGregor, Iowa, approximately 159 river miles from the Minnesota border, noted "This is apparently a rare species in most places". This is the closest known record to the Minnesota River specimen. As part of the Minnesota Statewide Mussel Survey, 185 sites were also sampled in the Mississippi River below St. Anthony Falls to the Iowa border between 1999 and 2003. These efforts also produced no specimens of the scaleshell.

There is little hope that the scaleshell is extant in the interior or bordering waters of Minnesota. The only known location for the species in Minnesota, the Minnesota River system, has experienced extensive degradation of its mussel fauna, not only in the mainstem, but in several of its principal tributaries as well. The lack of any evidence of this species during extensive survey efforts in southern Minnesota over the last five years, and the meager evidence of its historic presence suggests that it was historically very uncommon in Minnesota and can now be considered extirpated from the state.

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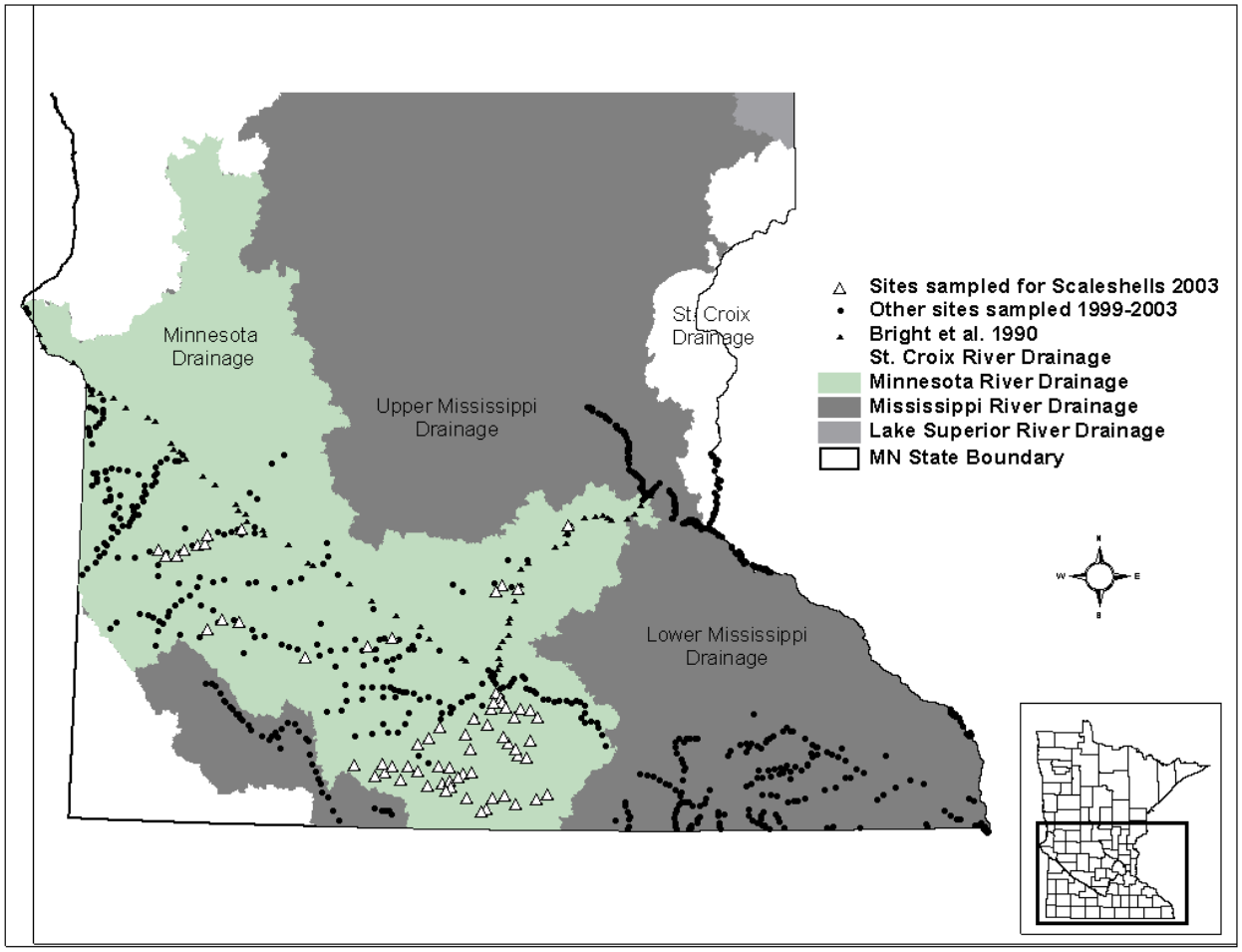

Figure 1. Mussel Sampling Sites in the Minnesota River and Lower Mississippi River drainages as of January 2004.

Table 1. Species and number of individuals of freshwater mussels found in the Minnesota River Drainage, 2003. Data are the result of 67 sites sampled.

SPECIES	No. of sites found a live	No. of sites found dead only	No. of sites present (live + dead)	No. of live individuals
ENDANGERED				
Arcidens confragosus	0	1	1	0
Fusconaia ebena	0	1	1	0
Lampsilis teres	0	1	1	0
Plethobasus cyphyus	0	1	1	0
Quadrula fragosa	0	1	1	0
THREATENED				
Actinonaias ligamentina	0	6	6	0
Alasmidonta marginata	0	1	1	0
Ellipsaria lineolata	0	1	1	0
Megalonaias nervosa	0	1	1	0
Pleurobema sintoxia	0	6	6	0
Quadrula metanerva	0	1	1	0
Tritogonia verrucosa	0	1	1	0
SPECIAL CONCERN				
Elliptio dilatata	0	2	2	0
Lasmigona compressa	1	3	4	1
Lasmigona costata	0	4	4	0
Ligumia recta	1	7	8	1
Obovaria olivaria	0	1	1	0
NON-LISTED				
Amblema plicata	1	14	15	4
Anodontoides ferussacianus	10	17	27	28
Fusconaia flava	1	11	12	1
Lampsilis cardium	28	5	33	307
Lampsilis siliquoidea	6	19	25	72
Lasmigona complanata	38	6	44	439
Leptodea fragilis	48	7	55	271
Ligumia subrostrata	0	3	3	0
Obliquaria reflexa	0	1	1	0
Potamilus alatus	14	2	16	28
Potamilus ohiensis	23	6	29	100
Pyganodon grandis	30	14	44	380
Quadrula pustulosa	0	3	3	0
Quadrula quadrula	8	8	16	29
Strophitus undulatus	17	13	30	91
Toxolasma parvus	10	5	15	40
Truncilla truncata	15	5	20	103
TOTAL NO. INDIVIDUALS				1,895
TOTAL NO. LIVE SPECIES				16
TOTAL NO. SPECIES				34

Table 2. Streams and number of sites sampled in the Minnesota River Drainage, 2003

RIVER	# of sites per river
Blue Earth River Drainage	
Big Cobb River	5
Blue Earth River	10
Cedar Creek	1
Center Creek	5
Coon Creek	1
South Creek	2
Elm Creek	7
High Lake Outlet/Martin Lake Inlet	1
Lily Creek	1
Perch Creek	3
Little Badger Creek	1
Little Cobb River	3
Maple River	9
Cottonwood River	6
Minnesota River	1
Rush River	3
Yellow Medicine River	8
TOTAL NO. OF SITES	**67**