

**Recovery Plan  
for  
Four Freshwater Mussels in Southeast Kansas:**

NEOSHO MUCKET—*Lampsilis rafinesqueana*  
OUACHITA KIDNEYSHELL—*Ptychobranthus occidentalis*  
RABBITSFOOT—*Quadrula cylindrica cylindrica*  
WESTERN FANSHELL—*Cyprogenia aberti*



© B. K. Obermeyer

Upper left to right: Neosho mucket, Ouachita kidneyshell, and western fanshell mussels collected from the Verdigris River, KS.

*Prepared by*  
**Brian K. Obermeyer**  
**Stream & Prairie Research**  
*for*  
**Kansas Department of Wildlife & Parks**

**Four Freshwater Mussels in Southeast Kansas**  
**Neosho Mucket (*Lampsilis rafinesqueana*)**  
**Ouachita Kidneyshell (*Ptychobranthus occidentalis*)**  
**Rabbitsfoot (*Quadrula cylindrica*)**  
**Western Fanshell (*Cyprogenia aberti*)**

Introduction:

The recovery plan for Four Freshwater Mussels in Southeast Kansas was completed in November 2000. The original recovery plan was prepared by B. K. Obermeyer. This review examines the recommended strategies in the recovery plan and how they have been addressed in the 5 years since it was originally prepared.

**Priority Level 1. Utilize existing state and federal legislation and regulations to protect species and habitats.**

Kansas Department of Wildlife and Parks (KDWP) has authority to review and assess potential impacts towards state endangered or threatened species for all publicly funded or permit-required projects. Between 2000-2005, the Environmental Services Section of KDWP reviewed and commented on 131 projects regarding the Rabbitsfoot mussel, 169 projects concerning the Neosho mucket, 194 projects regarding the Ouachita kidneyshell, and 49 projects regarding the Western fanshell. These reviews offered comments aimed at reducing potential impacts for all proposed projects while protecting threatened and endangered freshwater mussels and their associated habitat. Of the projects reviewed, 125 Action Permits were required to further protect these specific species from additional deleterious activities occurring before, during, or after project completion.

**Priority Level 1. Reevaluate commercial mussel harvesting in southeast Kansas.**

In 2003, a ten-year moratorium was enacted which ended the commercial harvest of mussel shells in Kansas. During this time surveys were conducted on the Fall, Verdigris, Walnut, Neosho, Cottonwood, and Marais des Cygnes rivers and Grouse and Pottawattamie creeks. In addition, a trend survey (completed in 2003) evaluating the mussel refuge in the Verdigris River was conducted. This survey repeated earlier surveys at 8 sites that were completed in 1991 and 1997. The study's conclusions indicate a mussel refuge does not protect commercial shell species and that harvest is probably the reason that threeridge mussels are much less common than findings published in prior reports. The report also indicates a significant increase in density for many other species. These mussel trend data were published in the Southeastern Naturalist. Another peer-reviewed paper regarding threeridge trends and commercial harvest is currently in preparation.

**Priority Level 1. Assess population genetic structure and diversity of the four target mussel species.**

This task is currently being addressed for two of the species in this recovery plan. A current Section 6 Grant regarding the rabbitsfoot will assess genetics between Kansas and Black River, Arkansas specimens. The Western fanshell is being assessed by USFWS. Mantle tissue from 5 fanshells was provided to researchers from a Verdigris River site.

**Priority Level 1. Conduct a life history study of the rabbitsfoot mussel.**

Kansas was awarded a Section 6 grant from the USFWS to contract a study on the Rabbitsfoot. This work is being performed by Dr. Chris Barnhart of Missouri State University and is scheduled for completion in 2006. The study objectives are to identify

suitable fish hosts and to compare genetic identity of the rabbitsfoot in Kansas with a population in the Black River, Arkansas.

**Priority Level 1. Initiate a pilot reintroduction project using juvenile mussels.**

A pilot project was completed on propagating the Neosho mucket. Suitable fish host for this mussel are largemouth, smallmouth, and spotted bass. Because these fish are easily produced and maintained in hatchery conditions, the propagation of this mussel species became a logical choice. Adult gravid females were found in the Fall, Verdigris, and Spring rivers. Glochidia were stripped in the lab, applied to the host fish in a hatchery, and allowed to transform. After the juveniles were successfully sloughed from the gill filaments, they were collected and subsequently deposited at suitable sites in the 3 rivers. Within a year juveniles Neosho muckets were found at all deposit sites. These results show that juveniles can survive and grow when returned to the rivers. This also reinforces that propagation may prove to be a suitable method for population augmentation so species could reach a sufficient density to successfully reproduce on their own. Efforts have begun to construct a pilot propagation facility on the grounds of the Pratt Fish Hatchery and Operations Office of the Kansas Department of Wildlife and Parks at Pratt. Intentions are to focus efforts on species in most need and eventually expand operations.

**Priority Level 1. Incorporate mussel distributional data as a resource element coverage in GIS.**

The KDWP stream survey crews collect mussel data at each site. To date over 1200 surveys have been completed across Kansas. The rare mussel sighting data from past years has been updated and converted from legal descriptions to lat-long coordinates to help facilitate mapping. In addition, the Kansas Department of Health and Environment has mussel data from water quality sites that contributes to the mussel distribution data. These sources are used to map mussel distributions as well as provide an excellent view the natural range of these species in Kansas waters.

**Priority Level 2. Update distributional data with additional sampling in unsurveyed stream reaches.**

A State Wildlife Grant (SWG) funded additional survey work. Sites were sampled on Grouse Creek, Pottawatomie Creek, Cottonwood River, Marmaton River, Verdigris River, Marais des Cygnes River, Fall River, and Elk River. Additional mussel data was also provided for the Wakarusa River from a volunteer. As previously mentioned, the Kansas Stream Survey Program has information within a reliable database for mapping distributional extent of all Kansas freshwater mussel species.

**Priority Level 2. Evaluate the fate of the Neosho River cutoff channel in Neosho County.**

The KDWP funded a thesis study through Emporia State University to assess the mussels and provide alternative management strategies for populations within the Neosho River cutoff channel.

**Priority Level 2. Reevaluate streams for mussels at no less than 10-year intervals.**

Eight survey sites on the Verdigris River were resurveyed on a 6-year interval. These reevaluation data suggest an increase in mussel density for this stretch of river since 1991, to be published in the Southeastern Naturalist journal. Baseline data were collected in other sites on the Fall, Verdigris, Neosho, Marmaton, Marais des Cygnes and Grouse and Pottawattomie Creek as funded per a State Wildlife Grant. It is recommended that these mussel sites also be resurveyed at 5-7 year intervals to document significant trend changes in these populations.

**Priority Level 2. Establish quantitative sampling sites on the Fall and Spring River.**

Quantitative sampling using 1-m<sup>2</sup> quadrat frame was conducted at sites formerly completed by Obermeyer in 1994. These data will help indicate mussel population trends for these sites within these two rivers. A State Wildlife Grant funded the survey work on the Fall River sites. Meanwhile, the Spring River sites were completed with KDWP personnel.

**Priority Level 3. Provide input to the Nonindigenous Species Task Force to educate public about zebra mussels and provide input to develop predictive model for the spread and impact of zebra mussels in Kansas.**

Since 2000, zebra mussels have been discovered in Kansas at El Dorado Reservoir. Lake water level management has been implemented to reduce zebra mussel concentrations. Surveys on the Walnut River have also been initiated. The KDWP has hired a Nonindigenous Species Program Coordinator. This position has a primary emphasis of limiting the spread of the zebra mussels and to provide input to the national task force. Monitoring is ongoing at numerous sites including all federal reservoirs in Kansas.

**Priority Level 3. Establish educational stream sites, using tax credit incentives.**

Although the tax incentive for threatened and endangered species was not renewed by the legislature, there have been some willing landowners who allow access to streams for educational purposes. One large mussel bed on the Verdigris River and another on the Spring River are available for this purpose when visits are coordinated with the landowners.

**Priority Level 3. Develop and publish a web site that informs the public about the mussel recovery plan and state and federal watershed stewardship assistance programs.**

All completed recovery plans for Kansas listed species can be found on the Kansas Department of Wildlife & Parks webpage. The Kansas Alliance of Wetlands and Streams (KAWS) also has a webpage that focuses attention on conservation programs that enhance watershed health.

**Priority Level 3. Host meetings or workshops to educate and train resource managers and other interested parties about Kansas mussels and efforts to recover them.**

Each year, KDWP sponsors a 1-day workshop in July regarding freshwater mussels. Typically, it is attended by research and educators from conservation agencies and universities. However, it is open to anyone with an interest in freshwater mussels or natural resources of Kansas. These workshops are one-half day in the field sampling a site and one-half day listening to research and survey papers. Also, each year, a one-day mussel life-history and identification training session is held for the KDWP Stream Survey crews. This session is also open to all who express interest in attendance, but is not a publicized event.

**Near Future Plans for Recovery of Freshwater Mussels in Kansas**

**Population Augmentation:**

The feasibility of propagating juvenile mussels of rare species at one of the Kansas fish hatcheries is being investigated. The majority of funding for this could come from a State Wildlife Grant.

**Landowner Incentive:**

The feasibility of incentive payment to landowners who adapt a conservation plan for conserving declining species will be assessed.

**Age and Growth Study:**

Age and growth parameters of threeridge and monkeyface mussels will be examined to provide vital management recommendations concerning future commercial harvest strategies while the moratorium on commercial harvest is in effect. This data is needed because these two species were the most regularly harvested shells from southeast Kansas rivers in the 1990s. This study is being conducted by the Biological Sciences Department at Pittsburg State University through funding from the Kansas Academy of Sciences and the KDWP.

**Educational Materials:**

- 1) Develop a freshwater mussel poster of Kansas species.
- 2) Complete a Kansas School Naturalist publication that focuses on freshwater mussel reproduction
- 3) Prepare a pocket guide for Kansas freshwater mussels.

**Delisting recommendations (possible amendment):**

One of the recommendations for delisting is to establish mussel populations of these species in the Spring River below Empire Lake and Shoal Creek. Recent studies suggest that this may not be a feasible option due to the high concentrations of lead and zinc that occur as a result of high rainfall events. An ongoing study will help assess whether juvenile mussels can survive and grow in this environment. The delisting criteria for this area may have to be revisited once this study is completed.

Prepared by: Edwin J. Miller, KS Dept. of Wildlife & Parks

**Recovery oversight committee:**

Dr. Chris Barnhart  
Missouri State University  
901 S. National  
Springfield, MO 65804

Ron Betzen  
Kansas Farm Bureau District Administrator  
Parsons, KS

Rex Naanes (landowner: Neosho River Basin)  
8720 Meade Road  
Erie, KS 66757

Beth Small (landowner/farm operator: Verdigris River Basin)  
Rt. 1, Box 215-1  
Neodesha, KS 66757

Edward Sramek  
Director of Wastewater/Water Distribution  
City Offices: 120 North 6<sup>th</sup>  
Independence, KS 67301