

Kansas PEARLY MUSSEL Newsline

Kansas Dept. Wildlife & Parks
Editor: Edwin J. Miller

Summer 1999



The First Kansas Threatened and Endangered Recovery Plan Addresses Mussels

The Kansas Department of Wildlife and Parks (KDWP) is required to develop recovery plans for all state-listed species. The state's first such recovery plan is currently being developed for four freshwater mussel species native to the Neosho, Spring, and Verdigris river basins (Arkansas River system) in southeast Kansas. These mussels are the Neosho mucket (*Lampsilis rafinesqueana*), Ouachita kidneyshell (*Ptychobranchus occidentalis*), rabbitsfoot (*Quadrula cylindrica cylindrica*), and western fanshell (*Cyprogenia aberti*). Besides outlining strategies and methods to recover and eventually delist these four species, the recovery plan will provide a process of conserving (through proposed watershed enhancements on the three target basins) 15 additional state-listed mussels: the ellipse and elktoe (state-endangered); butterfly and fluted-shell (state-threatened); and deertoe, fat mucket, fawnsfoot, pistolgrip, round pigtoe, spike, squawfoot, Wabash pigtoe, washboard, wartyback, and yellow sandshell (species in need of conservation-SINC).

The four targeted mussel species historically occurred in the Neosho, Spring, and Verdigris river basins; none is believed to have occurred elsewhere in the state. The rabbitsfoot mussel is considered extirpated from the Verdigris River basin, and is dangerously close to extirpation in the Neosho River basin. It has recently been collected alive in only the Spring and Neosho rivers. The Ouachita kidneyshell remains in only three Kansas streams (at scattered locales in the Fall, Verdigris, and Spring rivers) from a historic total of ten. The western fanshell remains at sporadic locations in the Fall, Verdigris, and Spring rivers; it is believed to be extirpated from the Neosho River basin. Although the Neosho mucket still occurs in all three river basins, it apparently is extirpated from seven southeastern Kansas streams. The species is presently found in the Neosho, Verdigris, Fall, and Spring rivers. At sites where these four species still occur, they are typically found in stable, shallow riffle/run habitats with a predominantly gravel/sand substratum.

The recovery plan will be organized into two approaches: species-level and ecosystem. The species-level approach will cover individual species accounts and recovery strategies for each of the four targeted species. This will include species description and taxonomy, distribution, life history, ecological requirements, possible causes for decline, threats to survival, identification of critical habitat, and individual recovery needs and strategies. The ecosystem approach will examine watersheds pertinent to all state-listed mussel species that occur in the three stream basins, and will propose practices that may help reverse a trend of watershed degradation that has occurred since Euro-American settlement. Species conservation through the ecosystem approach would also benefit non-target species associated with riverine habitats.###
(B. K. Obermeyer)



Three aquatic invertebrates petitioned for Kansas List of Threatened and Endangered species



SHARP HORNSNAIL (*Pleurocera acuta*)

Federal Status: none

Kansas Status: none (petitioned to be endangered)

Description: The shell of the sharp hornsnail is thick and heavy, somewhat conical in shape and much elongated. The shell has 9 to 11 rather flat to slightly convex whorls. The color of the shell varies from pale brownish to dark chestnut with some specimens showing variable banding.

Size: On the average, the adult is about 1-1/8 inches long and has a width at the widest point of 3/8 inch.

Range/Habitat: A few specimens of the sharp hornsnail were collected from the Walnut River below Augusta in 1955, representing the only documented occurrence of this snail in the Kansas portion of the Arkansas River drainage. Historical records for the Marais des Cygnes River date from the 1940s. Colonies of this snail were documented near LaCygne, Rantoul, and Ottawa. The colony near Ottawa was reportedly "flourishing" as late as 1956 but was deemed extirpated only two years later. It was not documented again in Kansas until 1992 when a living specimen was collected from the Marais des Cygnes River near Ottawa. In 1998, a few recently deceased specimens were also collected from this location. This snail inhabits shallow, sheltered reaches of larger lakes and streams from a few inches depth up to three feet. They are generally regarded as benthic dwellers since they like to burrow under the sand. They may also burrow under layers of decaying leaves and other organic material.

Reproduction: The sexes in the snail are separate, with copulation taking place in the fall.

Females lay eggs from April to June in batches of varying sizes and shapes. Sexual maturity is attained at approximately two years of age. The maximum life span is about four years.

Food: The sharp hornsnail feeds on algae, diatoms, and detritus.

NEOSHO MIDGET CRAYFISH (*Orconectes macrus*)

Federal Status: none

State Status: none (petitioned to be endangered)

Description: The Neosho midget crayfish is a small, olive-tan crayfish with a prominent black saddle mark across the junction of the carapace and abdomen. Pincers are short, broad and powerful. Carapace nearly equal in length to abdomen.

Size: Adults are a maximum of 2 inches in length.

Range/Habitat: The Neosho midget crayfish is currently known from only one locality on the Spring River and is likely restricted to that basin in Cherokee County. This crayfish inhabits clear, permanent-flowing Ozarkian streams over a firm gravel substrate in swift, shallow water. This crayfish burrows short tunnels in areas of small gravel and beneath rubble and boulders.

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Neosho midget crayfish (continued)

Reproduction: The Neosho midget crayfish most likely breeds in fall and early winter. The females have young during late March through April. Sexual maturity is reached during the first year of life.

Food: Little is known about the food habits of the Neosho midget crayfish, but most crayfish species are considered omnivores, feeding opportunistically on a wide variety of plant and animal materials.

MUCKET (*Actinonaias ligamentina*)

Federal Status: none

Kansas Status: none (petitioned to be endangered)

Description: The shell of the mucket is oblong and generally compressed to moderately inflated. The anterior end is rounded, whereas the posterior end is bluntly pointed. Shell thickness ranges from moderate to very thick, especially in older specimens. The shell is colored yellowish-brown with green rays.

Size: Maximum length is about eight inches.

Range/Habitat: Historically, the mucket was never widespread in Kansas, occurring along the Marais Des Cygnes River from Osage county to the Missouri State line. The species is currently known from only two locales along the Marais Des Cygnes River in Franklin and Miami counties. The species is generally found in large creeks and small to medium rivers with gravel, gravel-sand, and gravel-silt substrates with moderate to swift currents.

Reproduction: The mucket carries glochidia from July until the following June. Fish hosts include the American eel, smallmouth bass, largemouth bass, green sunfish, bluegill, white and black crappie, white bass, rock bass, sauger, and tadpole madtom.

Food: The mucket feeds by filtering detritus and plankton from the water.

(G. Horak, KDWP)



MUSSELS AND ANTHROPOLOGY MEETING

The State Historical Society of North Dakota and the University of North Dakota hosted the 56th Annual Plains Anthropological Conference October 14-17, 1998, in Bismarck, North Dakota. Kerry Lippincott (Casper, Wyoming) organized a special symposium entitled, "Freshwater Mussels: Ecology and Utilization". The Missouri River drainage was the focus of the symposium, and it offered a diverse blend of the archaeological aspects and biological considerations of mussels. The schedule was full, and proceeded from south (Kansas) to north (Montana and North Dakota). Presenters from Kansas included Donald J. Blakeslee and Ron Dorsey, both from the Department of Anthropology, Wichita State University, and Karen J. Couch of Olathe, Kansas. Don's presentation, "Mussels, Bison Kills, and Pots: Clarity in the Archaeological Record", and Ron's paper, "Archaeological Interpretation of Freshwater Mussel Assemblages in the Central Plains", covered the anthropological/archaeological angle of mussels, while Karen's paper, "The Unionid Mussels of the Osage River System in Kansas: Past and Present", was slanted more in the biological direction. Ellet Hoke (Museum of Biological Diversity, Ohio State University, Columbus, Ohio), gave an eye-opening program on the Nebraska mussels' problems of shifting sand and stream dewatering. Other presenters were: Doug Backlund, Alan M. Cvancara, Michael M. Gangloff, K. Kris Hirst, Paul R. Picha, and Robert E. Warren. ### (Karen J. Couch)

The 100th Meridian Initiative to Prevent the Western Spread of Zebra Mussels

Congress recently recognized the rapidly expanding threat by Zebra mussels to the Nation's economy and our natural resources by reauthorizing and strengthening the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. The Act has been revised to include language that recognizes the importance of preventing the westward spread of Zebra mussels. Coordinated activities will be concentrated along the 100th Meridian to slow or stop the westward spread of zebra mussels and other aquatic nuisance species. A large area of the country and many federal and other water projects are at risk by zebra mussels. The 100th Meridian crosses the western sections of Texas, Oklahoma, Kansas, Nebraska, South & North Dakota and the Canadian Province of Manitoba.

The 100th Meridian Initiative is intended to be a major partnership effort. Cooperation among Federal, Provincial and State agencies, tribal governments, municipalities, non-governmental organizations, businesses, and industries is essential for a successful partnership to function effectively.

A principle component of the Initiative focuses on voluntary inspections and cleaning of boats and trailers being towed westward through 100th Meridian states which will be supported and facilitated by a comprehensive information and education campaign. During the summer season of 1998, voluntary boater education sites were manned at strategic locations along interstate highways in all 100th Meridian states. In Kansas, a site was located at Belle Plain Service Center on I-35. The information collected at this and other sites is generating data that will help determine the extent of westward transport of aquatic nuisance species and the risk of their becoming established in the West. Researchers at the University of Texas are currently analyzing these data. High-risk waters throughout the West will be monitored for new infestations and a rapid response capability to eradicate or contain new colonies will be developed and put in place. Funding has been provided by the U.S. Fish and Wildlife Service to conduct the voluntary inspection stations in 1998 and 1999. ### (L. Drees, USFWS)

ZEBRA MUSSEL DISTRIBUTION UPDATE 1998

To date, the zebra mussels has not been reported in Kansas. However, the species was found in the Missouri River for the first time in April of 1999. It was collected from an intake structure 15 miles south of Sioux City, IA. The likely source for the range expansion of the zebra mussel into the Missouri River is barge traffic, which passes the area on a regular basis.

On 29 January 1999, the Colorado Division of Wildlife (CDOW) received a report from Colorado Springs regarding zebra mussels. While doing maintenance work, a boat dealer found several zebra mussels attached to a boat. A follow up visit by CDOW confirmed dead zebra mussels, ranging from approximately 7mm to 14mm in length, attached to the boat where the inboard motor drive shaft exits the hull. According to the owner, the boat was brought into Colorado from Ohio about three to four years earlier. The boat had been in storage for some time after being hauled to Colorado.

This report indicates the effectiveness of public education. The boat dealer recognized the mussels as zebra mussels and contacted the CDOW for a confirmation. This permitted CDOW to track the travel of the boat and determine that Colorado waters had not been infested.### (L. Drees, USFWS)



Methods of Mussel Shell Preservation

Everyone who works with mussels appreciates the value of having a reference collection of shells. However, keeping these shells "intact" year after year presents a challenge. Many feel compelled to "put something" on the shell, particularly the exterior, to preserve it. Usually, the fresh-dead shells do not present as much a problem as do the long-dead shells that have been exposed to the drying conditions common to the Kansas gravel bar.

To keep the attractive brown, perpetually flaking periostracum from making a mess, and equally important, to prevent shells from cracking and splitting, a few substances have been tried. Mineral oil (baby oil) improves the appearance of shells, but does not prevent cracking; it also has to be re-applied every so often. Vaseline can soften periostracum some, but it's sticky and attracts dirt. Xylene/paraffin combinations work reasonably well, but the shells have to be absolutely clean before this mixture is applied; any remaining dirt is permanent. Xylene is a chemical that must be handled with caution.

Glycerine mixed with water or ethanol alcohol works well, particularly if the posterior and/or ventral edges of the mussel shell are allowed extra soaking, since these areas are the most prone to cracking. Marine chitons treated in this manner resist drying for several years.

Mink oil is another that has been tried; it gives the shells a natural looking appearance without too much gloss. Neatsfoot oil, though not yet tried officially, is another possibility. Shells that are flaking badly from overdrying and exposure can be "painted" with a mixture of Elmer's glue and water - several coats will often do the trick.

With reluctance, varnish or shellac is mentioned. These are of use for shells that will be handled extensively and with little care, but for a scientific reference collection, it cannot be recommended for several reasons. It looks worse with time, and certain details of the shell can be obscured.

This is a subject that is open to discussion and suggestions. Everyone probably has tried something, and this article only offers suggestions; comments are welcome. --- KJC

SUMMER 1999 MUSSEL WORKSHOP: August 25 & 26

The dates for a 1999 mussel workshop have been set. They are Wednesday and Thursday Aug 25 and 26. The first day will be inside and includes presentations and conclude with an identification review session. If weather and water levels cooperate, small group excursions to survey river sites are planned on the second day.

If you have a presentation you'd like to share concerning mollusks or riverine life or you know of a good site for a field trip, e-mail or call Ed Miller at edm@wp.state.ks.us or 316/331-6820. Tentative plans are to hold the workshop in Chanute or Emporia. More details and agenda will be sent out in mid-July.###



QUANTITATIVE SAMPLING: HOW MUCH IS ENOUGH?

In 1998, a previously unsampled site in the Verdigris River was sampled using 120 randomly-placed square meter quadrats. Over 2900 unionid mussels were found in 120 quadrats (24.5 unionids/meter²). The monkeyface (*Quadrula metanevra*) was the most common (51.1%) mussel at the site, followed by pimpleback (*Quadrula pustulosa*, 19.6%), and *Wabash pigtoe* (*Fusconaia flava*, 13.5%). Juveniles of the western fanshell (*Cyprogenia aberti*) and Ouachita kidneyshell (*Ptychobranhus occidentalis*) were also found. However, the Neosho mucket (*Lampsilis rafinesqueana*) and butterfly (*Ellipsaria lineolata*) were not collected.

This shallow run site is approximately 300m X 30m wide and is located within the boundaries of the Verdigris River mussel refuge. It is a site where mussel poachers created a half-mile road over a bean field in 1997 to gain access. Since then, access has been restricted by the placement of a gate, which was funded by the USFWS Partners for Fish and Wildlife program. The interested and grateful landowners grant access for monitoring and educational programs.

The site is estimated to contain between 128,000 to 313,000 unionids. It appears that (Table 1) the coefficient of variation (sd/mean x 100) levels off at about 40 quadrats, and thereby, the sampling of approximately 4% of the habitat was adequate in estimating unionid density. This level of sampling also recorded 95% of the species that were found when triple this effort was used.### (E. J. Miller, KDWP)

Table 1. Parameters resulting from increasing search effort for unionid mussels using randomly placed square-meter quadrats at one site on the Verdigris River, Montgomery County, KS.

Number of Quadrats	Mean Unionids/quadrat	Standard Deviation	Coefficient of Variation	Number of Species
5	22.2	7.82	35.2	9
10	24.8	9.33	37.6	13
20	25.9	9.67	37.3	15
30	26.1	9.44	36.2	17
40	24.0	9.96	41.5	18
50	24.8	10.53	42.5	18
60	24.6	10.48	42.6	19
70	24.3	10.87	44.7	19
80	24.7	10.84	43.9	19
90	24.4	10.68	43.8	19
100	24.4	10.63	43.6	19
110	24.4	10.34	42.4	19
120	24.5	10.32	42.1	19



KANSAS COMMERCIAL MUSSEL HARVEST:1998

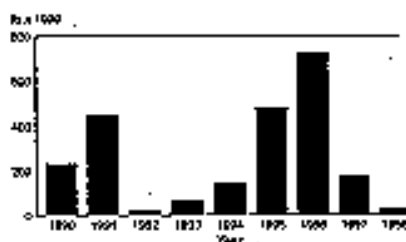
Shellers harvested approximately 25,100 lbs of mussels in Kansas in 1998. This represents a 86% decline over the estimated harvest of 1997 and a 96% reduction from 1996.

Reported harvest declined for all species. The harvest of threeridge (*Ambelma plicata*), mapleleaf (*Quadrula quadrula*), and monkeyface (*Quadrula metanevra*) declined 81%, 89%, and 90%, respectively from 1997 totals.

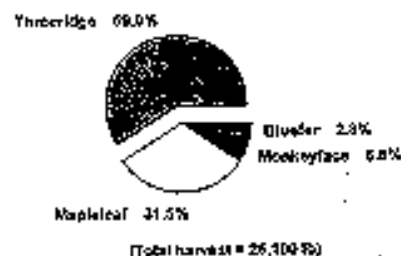
Threeridge made up the majority (59%) of the 1998 harvest. Nearly all (99%) of the threeridge harvest was from rivers. Mapleleaf were primarily taken from reservoirs (90%) and made up 31% of the total. Monkeyface and blewter made up just 7% and 3% of the 1998 harvest, respectively.

Demand dropped sharply for river shells. The American Shell Company stopped buying shells in June of 1998. This was likely due to a combination of low market demand in Japan, disease within the cultured pearl oyster population, and the Asian monetary crisis of 1998. Potential value, paid to shellers, of harvested shells in 1998 was approximately \$26,000. This amounted to 12% of the harvest value in 1997, and 4% of that harvested in 1996.### (T. D. Mosher, KDWP)

Kansas mussel harvest since 1990



1998 Mussel Harvest



MOLLUSK NOTES

- The first symposium of the Freshwater Mollusk Conservation Society, Musseling in on Biodiversity was held in Chattanooga, TN in March of 1999. There were 290 registrants and 138 presentations (87 oral and 51 poster). Topics covered a wide-range of mollusk conservation from gastropod status to mussel population restoration. Three Kansans were in attendance: K. J. Couch, L. Drees, and E. J. Miller.
- The common name of *Strophitus undulatus* has been changed. Evidently, the name squawfoot is not a politically correct. Its new name is now "creeper." Reference is: Turgeon et al. 1998. Mollusks (2nd ed.). American Fisheries Society Special Publication 26.
- Paul Hartfield, USFWS, called a separate meeting regarding the status of the Neosho mucket (*Lampsilis rafinesqueana*) at the Freshwater Mollusk Conservation Society symposium in Chattanooga, TN. Individuals from Missouri, Arkansas, Oklahoma, and Kansas with knowledge of the Neosho mucket were assembled to discuss this species. Apparently, only two remaining reproducing populations of this species remain, one in the Spring River of Kansas and the other in the Illinois River of Oklahoma. The process to federally list this species will probably be initiated soon.

SPECIES PROFILE

Black sandshell - missing, but not forgotten

At least five species of unionids have apparently been extirpated in Kansas in historic times. Among these, *Ligumia recta* is a particular loss. This spectacular mussel formerly occurred commonly in the rivers of SE Kansas, but has not been reported alive in KS since 1912. The black sandshell is one of the most beautiful of all unionids. The shell is elegantly slim in shape and up to eight inches in length. The periostracum is dark green to black in color with broad rays visible on young individuals. The naere is typically rose pink to deep purple in color and highly iridescent. But, what lies within the shell is even more spectacular.

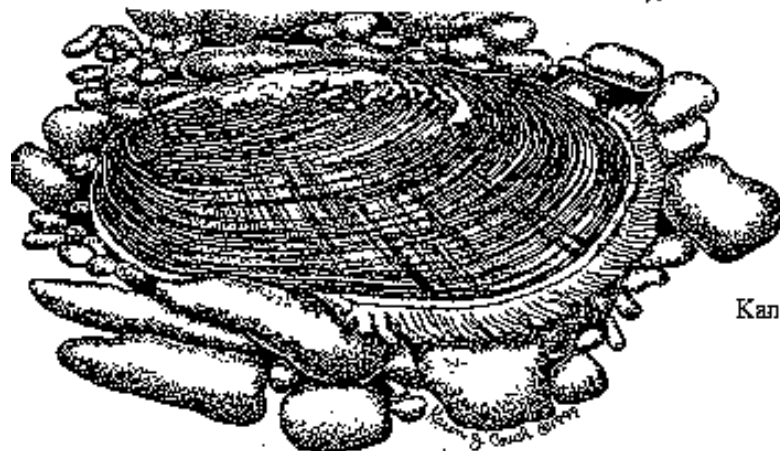
Like many related mussels, female black sandshells display a lure to attract fish hosts for their glochidia larvae. During the summer of 1996, students and I were able to observe the amazing lure and behavior of a gravid female black sandshell in an aquarium at SMSU for several weeks. The mussel emerges from the substrate and lies on her side. The posterior third of the ventral mantle edge is fringed with papillae that inflate to nearly an inch in length. Waves of movement run quickly along the mantle, spreading and closing these fringes, and exposing the gravid marsupial gills within. The edges of the marsupial gills are beaded and snow white in color, appearing like two rows of pearls just inside the waving fringes (eds. note: see illustration by K. Couch below).

A large lure on a large mussel suggests a large, predatory host fish for the glochidia. Dr. James Layzer at Tennessee Tech recently investigated the fish hosts of black sandshell. Largemouth bass, bluegill, and white and black crappie all produced a few juveniles. However, high transformation success was seen only on sauger, which produced means of 881 and 3157 juveniles per fish in two different trials. Walleye were not tested, but that species (*Stizostedion vitreum*) is also a likely host, based on its close genetic relationship with sauger (*Stizostedion canadense*).

Is the black sandshell gone from Kansas forever? Not necessarily. The loss of this species from Kansas streams may be directly related to the loss of host fish populations. According to Cross & Collins: "Walleye were recorded from Kansas as early as 1865 and may have occurred naturally in rivers of eastern Kansas at that time. If so, they soon disappeared. Efforts were made to establish the species by reintroduction at least as early as the 1880s, but all attempts were unsuccessful until the 1960s." Cross and Collins do not list sauger in southeast Kansas, but a single nineteenth century record suggests that it may also have occurred in the Neosho basin at the time of Euro-American settlement.

Sauger and sauger have been stocked in several reservoirs and lakes in the last decade and should be more common in the streams than in the past. Unfortunately, a KDWP stream survey of the Neosho basin during the summers of 1995-1997 failed to locate walleye or sauger at any site. Restoring black sandshell requires restoration of its host. Few fishermen would argue against enhancing walleye or sauger populations in streams. The stocking of black sandshell and its host fish in selected areas could bring a spectacular shellfish back to Kansas and restore an amazing symbiosis.###

(C. Barnhart, Southwest Missouri State University)



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