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THE CURRENT AND HISTORICAL MUSSEL FAUNA OF THE KIAMICHI RIVER, OKLAHOMA

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The Kiamichi River is a major tributary of the Red River in southeastern Oklahoma. The river flows for a total of 180 km through a 4,800 km² drainage area across the Ridge and Valley Belt of the Ouachita Mountain geologic province and the Dissected Coastal Plain province (Curtis and Han, 1972). The average gradient of the river is 0.47 m/km. Two reservoirs influence the river. Sardis Reservoir is an impoundment of Jackfork Creek, a tributary of the Kiamichi River. Hugo Reservoir is a mainstream impoundment of the lower Kiamichi River. The vegetation cover in the watershed can be described as a patchwork of forest made up of short-leaf and loblolly pine, mesic oak forests, and diverse bottomland habitats in various stages of maturity. Another large component of the watershed coverage is made up of pasture and other agricultural lands.

Frederick Benjamin Isely (1924) collected mussels in 1911 from the Kiamichi River. Isely was funded by an appointment as a scientific assistant with the U.S. Bureau of Fisheries during the summers of 1910–1913 (Gordon, 1988). In addition to his distributional surveys, Isely studied growth, migration, and ecology of unionid mussels in eastern Oklahoma (Isely 1914). Isely collected 27 species of mussels from three sites on the Kiamichi River (Table 1). His site near Tuskahoma still exists, but his two sites in the lower Kiamichi River were destroyed by the construction of Hugo Reservoir. Some of Isely's mussel collections are at the Oklahoma Museum of Natural History (OMNH), University of Oklahoma, Norman (Shepard 1982). Other specimens are housed at the museum of Trinity University, San Antonio, Texas (Gordon, 1988). Isely's collection provides a historical comparison for recent collections. Valentine and Stansbery

(1971) collected mussels from one site on the lower Kiamichi River in 1968 (Table 1). This site has since been inundated by Hugo Reservoir. A pre-impoundment study performed by the Oklahoma Biological Survey for Lake Hugo lists mussel collections from the early 1970's.

Twenty-nine living species of mussels (not including the exotic non-unionid bivalve, *Corbicula fluminea*) have been found recently in the Kiamichi River (Table 2). Most of these were found during surveys for the Ouachita rock-pocketbook mussel, *Arkansia wheeleri* (A. H. Clarke, 1987, unpublished report no. 14-16-0004-86-057 to the U.S. Fish & Wildlife Service, Jackson, MS; Mather, Mehlhop and Miller, unpublished data; Vaughn and Pyron, 1995).

Three species that were found by Isely in 1911 (Isely, 1924) were not found during recent surveys: *Elliptio dilatata*, *Pleurobema coccineum*, and *Potamilus capax* (Table 1). These three species were also not found by Valentine and Stansbery in their 1968 survey (Valentine and Stansbery, 1971). One species, *Potamilus ohioensis*, was reported only by Valentine and Stansbery (1971) (Table 1).

Elliptio dilatata is listed as a species of Special Concern by the American Fisheries Society (Williams et al., 1993). This widespread species is at the edge of its range in Oklahoma. We do not know if it once occurred in the Kiamichi River and has been extirpated from the system, or if Isely's record is a misidentification.

There are considerable differences of opinion about the number of valid species of *Pleurobema* and there is considerable morphological variation within species of *Pleurobema* in Oklahoma (Branson, 1983). *Pleurobema* found recently in the river have been called *P. pyramidatum* (Table

TABLE 1—Mussels collected by Isely (1924) and Valentine and Stansbery (1971) in the Kiamichi River with historical and current name. T = Mussels collected at the Tuskahoma site in the upper Kiamichi River. L = Mussels collected at sites in the lower Kiamichi River which were later inundated by the construction of Hugo Reservoir.

Historical name	Current name	Isely	Valentine & Stansbery
<i>Quadrula obliqua</i>	<i>Pleurobema pyramidatum</i>	L	
<i>Quadrula undata</i>	<i>Pleurobema coccineum</i>	T	
<i>Quadrula rubiginosa</i>	<i>Fusconaia flava</i>	L	L
<i>Quadrula pustulosa</i>	<i>Quadrula pustulosa</i>	T, L	
<i>Quadrula forsheyi</i>	<i>Quadrula quadrula/apiculata</i>	T, L	L
<i>Tritogonia nobilis</i>	<i>Tritogonia verrucosa</i>	L	
<i>Tritogonia tuberculata</i>	<i>Tritogonia verrucosa</i>	T, L	L
<i>Quadrula heros</i>	<i>Megaloniais nervosa</i>	L	L
<i>Quadrula undulata</i>	<i>Amblyma plicata</i>	T, L	
<i>Unio gibbosus</i>	<i>Elliptio dilatata</i>	T	
<i>Arkansia wheeleri</i>	<i>Arkansia (Arcidens) wheeleri</i>	T	
<i>Anodonta grandis</i>	<i>Pyganodon grandis</i>	T	
<i>Anodonta imbecillis</i>	<i>Utterbackia imbecillis</i>	T, L	
<i>Strophitus edentulus</i>	<i>Strophitus undulatus</i>	T	
<i>Ptychobranthus phaseolus</i>	<i>Ptychobranthus occidentalis</i>	T	L
<i>Obliquaria reflexa</i>	<i>Obliquaria reflexa</i>	T, L	L
<i>Plagiola donaciformis</i>	<i>Truncilla donaciformis</i>	L	
<i>Plagiola elegans</i>	<i>Truncilla truncata</i>	T, L	L
<i>Plagiola securis</i>	<i>Ellipsaria lineolata</i>	T	L
<i>Obovaria castanea</i>	<i>Obovaria jacksoniana</i>	T	L
<i>Lampsilis leptodon</i>	<i>Leptodea leptodon</i>	T	L
<i>Lampsilis gracilis</i>	<i>Leptodea fragilis</i>	L	L
<i>Lampsilis purpurata</i>	<i>Potamilus purpuratus</i>	T, L	
<i>Lampsilis parva</i>	<i>Toxolasma parvus</i>	T, L	
<i>Lampsilis fallaciosa</i>	<i>Lampsilis teres</i>	T, L	L
<i>Lampsilis ligamentina gibba</i>	<i>Actinoniais ligamentina</i>	T	L
<i>Lampsilis hydiana</i>	<i>Lampsilis siliquoidea/hydiana</i>	T	
<i>Lampsilis capax</i>	<i>Potamilus capax</i>	L	
<i>Lampsilis ventricosa</i>	<i>Lampsilis cardium</i>	L	L
<i>Lampsilis ventricosa satura</i>	<i>Lampsilis satura</i>	T	
	<i>Villosa lienosa</i>		L
<i>Potamilus laevisissima</i>	<i>Potamilus ohiensis</i>		L

2). *Pleurobema coccineum* and *P. pyramidatum* are considered to be eco-phenotypes of *P. cordatum* by Branson (1983). However, Turgeon et al. (1988) and Williams et al. (1993) maintain both as valid species.

Both species of *Potamilus* were reported from areas of the lower Kiamichi River that have since been inundated by Hugo Reservoir. *Potamilus ohiensis* occurs throughout the central U.S. However, this species is easily confused with *Leptodea fragilis*, which also occurs in the Kiamichi River, and the single record for this species may be a misidentification. *Potamilus capax* is a federal endangered species (Williams et al., 1993). There

are no records of this species in southeastern Oklahoma beyond Isley's, which is probably a misidentification.

Several species of mussels from the Kiamichi River are endemic to rivers in the Ouachita Mountains. These include *Arkansia wheeleri* (see below), *Ptychobranthus occidentalis*, and *Villosa arkansasensis*. *Ptychobranthus occidentalis*, the Ouachita kidneyshell, is a category 2 candidate for federal listing. This species occurs throughout the Kiamichi River, but is never abundant (C. Vaughn, pers. obs.). *Villosa arkansasensis*, the Ouachita creekshell, is very easily confused with *Obovaria jacksoniana*, the Southern hickorynut.

TABLE 2—Mussels currently known from the Kiamichi River.

Species	Common name
<i>Actinonaias ligamentina</i>	mucket
<i>Amblema plicata plicata</i>	threeridge
<i>Arkansia wheeleri</i>	Ouachita rock-pocketbook
<i>Corbicula fluminea</i>	Asian clam
<i>Ellipsaria lineolata</i>	butterfly
<i>Fusconaia flava</i>	pigtoe
<i>Lampsilis cardium</i>	pocketbook
<i>Lampsilis siliquoidea/ hydiana</i>	fatmucket
<i>Lampsilis teres</i>	yellow sandshell
<i>Leptodea fragilis</i>	fragile papershell
<i>Leptodea leptodon</i>	scaleshell
<i>Ligumia subrostrata</i>	pond mussel
<i>Megalonaias nervosa</i>	washboard
<i>Obliquaria reflexa</i>	threehorned wartyback
<i>Obovaria jacksoniana</i>	southern hickorynut
<i>Pleurobema pyramidatum</i>	pyramid pigtoe
<i>Plectomerus dombeyanus</i>	bankclimber
<i>Potamilus purpuratus</i>	bleufer
<i>Pyganodon grandis</i>	stout floater
<i>Ptychobranthus occidentalis</i>	Ouachita kidneyshell
<i>Quadrula quadrula/ apiculata</i>	mapleleaf
<i>Quadrula pustulosa</i>	pimpleback
<i>Strophitus undulatus</i>	squawfoot
<i>Toxolasma parvus</i>	lilliput
<i>Toxolasma texasensis</i>	Texas lilliput
<i>Tritogonia verrucosa</i>	pistolgrip
<i>Truncilla truncata</i>	deertoe
<i>Utterbackia imbecillis</i>	paper pondshell
<i>Villosa arkansasensis</i>	Ouachita creekshell
<i>Villosa lienosa</i>	little spectaclecase

Obovaria jacksoniana, although globally rare, is doing well in the Kiamichi River (C. Vaughn, pers. obs.). Because of this identification problem, we are unsure of the status of *V. arkansasensis* in the Kiamichi River.

Arkansia wheeleri, the Ouachita rock-pocketbook, is a federal and state endangered species. The historical distribution of *A. wheeleri* was in the Ouachita and Little Rivers in Arkansas and the Kiamichi River in Oklahoma, all south-flowing rivers out of the Ouachita Mountains. Recently, a very small population of this species was found in the Little River, McCurtain County, Oklahoma (Vaughn, unpublished data). Also, recently dead shells have been collected in Red River tributaries in northeastern Texas by Mather (unpublished data). However, the only

known remaining viable population of *A. wheeleri* in the world occurs within the Kiamichi River above Hugo Reservoir. Forty-three percent of the historically known subpopulations of *A. wheeleri* below where inflow from Sardis Reservoir enters the Kiamichi River have apparently been extirpated, and no new subpopulations have been located. *Arkansia wheeleri* survives at 75% of the historically known locations above the impounded tributary and five new subpopulations have been located (Vaughn and Pyron, 1995).

There have been major declines of mussel populations and species diversity in North America over the last century. Of the 297 species and subspecies of native North American mussels, 19 are presumed extinct, 44 are listed as federally endangered or threatened, and 69 have been proposed as candidates for federal listing (Bogan, 1993; Neves, 1993). Over half of the species of mussels from North Carolina and Ohio are either endangered, threatened, extirpated, or extinct (J. A. Alderman, pers. comm., G. T. Watters, pers. comm.). In contrast, the Kiamichi River contains an abundant, diverse assemblage of mussel species with a high proportion of rare species (Vaughn and Pyron, 1995). The fauna has changed little since originally described seventy years ago (Isely, 1924). Fifty-five species of mussels are known from Oklahoma (Williams et al., 1993), and twenty-nine of these currently occur in the Kiamichi River. The fact that the Kiamichi River retains its original mussel fauna makes it highly unique among North American rivers (Williams et al., 1993) and worthy of significant conservation attention.

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