

## MUSSELS OF THE MOUNTAIN FORK RIVER, ARKANSAS AND OKLAHOMA

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**ABSTRACT.**— We surveyed the freshwater mussel fauna (Bivalvia: Unionidae) of the Mountain Fork River, a major tributary of the Little River in eastern Oklahoma and western Arkansas. We found 22 species of unionids as well as the exotic Asian clam (*Corbicula fluminea*). Total mussel abundance (mussels found/hour) ranged from 0 to 312 with a mean of 40 +/- 84 individuals per site. Mussel species richness per site ranged from 0 to 13, with a mean of 6 (+/- 4). The mussel fauna in the Mountain Fork River is dominated by the Interior Highlands endemic the Ouachita kidneyshell, *Ptychobranchus occidentalis*, the three-ridge, *Amblema plicata*, the pistolgrip, *Tritogonia verrucosa*, the plain pocketbook, *Lampsilis cardium*, and the pigtoe, *Fusconaia flava*. Rarer species include the Ouachita endemic mussels, the Ouachita creekshell, *Villosa arkansensis*, and the Southern hickorynut, *Obovaria jacksoniana*.

### INTRODUCTION

The Mountain Fork River is a major tributary of the Little River system in eastern Oklahoma and western Arkansas. This pristine river drains 2240 km<sup>2</sup> of ridge and valley topography in the Ouachita Uplands, a center of speciation for both terrestrial and aquatic organisms (Mayden 1985, Allen 1990, Matthews et al. 2005). Streams in this area are relatively unimpacted compared to other areas of North America and Europe. The Mountain Fork River was identified by The Nature Conservancy as one of the most important watersheds in the U.S. for protecting fish and mussel diversity (Master et al. 1998) and is designated one of Oklahoma's six scenic rivers by the Oklahoma State Legislature (OWRB 1990). Despite the known significance of this river, the freshwater mussel fauna (family Unionidae) had never been surveyed except for at a few easily accessible sites (Gordon 1980). The objective of this study was to describe the distribution and abundance of mussels in the Mountain Fork River.

### METHODS

We traversed the majority of the Mountain Fork River by canoe, from the upper reaches (Camp Pioneer, Arkansas) to directly above where the river enters Broken Bow Reservoir (The Narrows, Oklahoma) (Fig. 1). We did not survey below the impoundment because cold-water releases have rendered that portion of the river uninhabitable by mussels (Vaughn and Taylor 1999). Reconnaissance snorkel searches were performed in areas where dead shell material was

observed and/or where habitat appeared favorable for mussels. When live mussels were found, we used snorkeling, assisted by SCUBA where necessary, to determine the boundaries of the mussel bed, and then performed a timed search. Timed searches were conducted by systematically snorkeling over the mussel bed for a minimum of an hour and locating mussels both visually and by feel. When a patch of mussels was detected, the surveyor also dug into the substratum for any buried mussels. A timed search is the most common technique for collecting information on mussel abundance, and is the only technique that can reliably be used to obtain estimates of total species richness and locate rare species (Vaughn et al. 1997, Strayer and Smith 2003). SCUBA was used in areas deeper than 75 cm. Mussels were placed in bags and brought to shore where they were identified. Mussels were returned to the mussel bed alive after all sampling was completed. Voucher specimens for representative species were col-

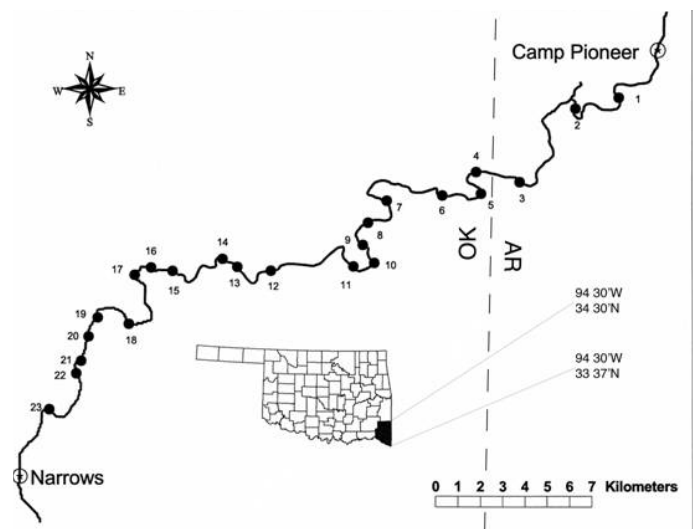


Figure 1. Sample sites on the Mountain Fork River.

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lected and deposited in the Oklahoma Biological Survey mussel collection.

**RESULTS AND DISCUSSION**

Mussels occurred throughout the Mountain Fork River where appropriate habitat was available. We systematically surveyed 23 sites (Fig. 1) and found live mussels at 18 sites (Fig. 2). Twentytwo species of freshwater mussels (family Unionidae) were found, as well as the exotic Asian clam (*Corbicula fluminea*, family Corbiculidae) (Table 1); this species tally includes twentyone species of mussels found in the timed searches (Figs. 2 - 5) as well as one species (*Toxolasma texasensis*) that was picked up haphazardly as we canoed the river. Total mussel abundance (mussels found/hour) ranged from 0 to 312 with a mean of 40 (+/- 84 S.D.) individuals per site (Fig. 3). Mussel species richness per site ranged from 0 to 13 (Fig. 2), with a mean of 6 (+/- 4). Overall mussel species richness and abundance are lower in the Mountain Fork River than in larger, lower gradient rivers in the region such as the Kiamichi River (Vaughn and Pyron 1995, Vaughn et al. 1996) or the lower Little River (Vaughn and Taylor 1999). This would be expected because mussels prefer stable sand-gravel mixtures (Strayer 1999, McMahon and Bogan 2001) and the substrate in the Mountain Fork River is dominated by large cobble and boulders. At most sites containing mussels, the mussels occurred in pockets of sand and gravel wedged between the boulders. Where extensive areas of gravel were available, such as at sites 9 and 4 (Fig. 1), mussels were abundant and species richness was high. This distribution and abundance pattern is very similar to that found for mussels in the Glover River (Vaughn 2003) which has a similar gradient and dominant substrate type.

The mussel fauna in the Mountain Fork River is dominated by the Interior Highlands endemic the Ouachita kidneyshell, *Ptychobranchnus occidentalis*, (Figs. 4 and 5). This species is also very abundant in the Glover River (Vaughn 2003), which is physically very similar to the Mountain Fork River. Other common species in the river include species typical of the Mississippi River drainage, the three-ridge, *Amblema plicata*, the pistolgrip, *Tritogonia verrucosa*, the plain pocketbook, *Lampsilis cardium*, and the pigtoe, *Fusconaia flava* (Figs. 4 and 5) (Parmalee and Bogan 1998, Vaughn 2000, Vaughn and Spooner 2004). The Ouachita endemic mussels, the Ouachita creekshell, *Villosa arkansasensis*, and the Southern hickorynut, *Obovaria jacksoniana*, are also fairly abundant in the Mountain Fork River. *Villosa arkansasensis* is classified

as a species of special concern by the American Fisheries Society because of its narrow range (Williams et al. 1993). The abundance of an edge-of-range species, the fluted shell, *Lasmigona costata* is higher than most Oklahoma rivers and on par with the Glover River (Vaughn 2003). Another edge-of-range species, the rainbow, *Villosa iris* occurred at three sites (Fig. 5). No federally endangered or threatened mussel species were found in the Mountain Fork River. The river does not contain appropriate habitat for the Ouachita Rock Pocketbook, *Arkansia wheeleri* (Vaughn and Pyron 1995).

Freshwater mussel populations are declining globally as a result of habitat degradation and fragmentation (Bogan 1993, Williams et al. 1993, Brim Box and Mossa 1999), and these declines have been observed in the Little River system (Vaughn and Taylor 1999). The major threats to mussel populations in the Mountain Fork River above Lake Broken Bow include siltation from timber harvest and runoff from agricultural activities and second homes. If these activities are managed, the Mountain Fork River should maintain a healthy and diverse mussel fauna in the future.

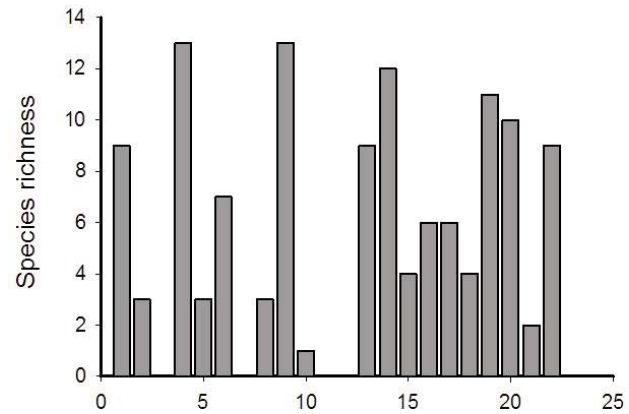


Figure 2. Species richness by site in the Mountain Fork River.

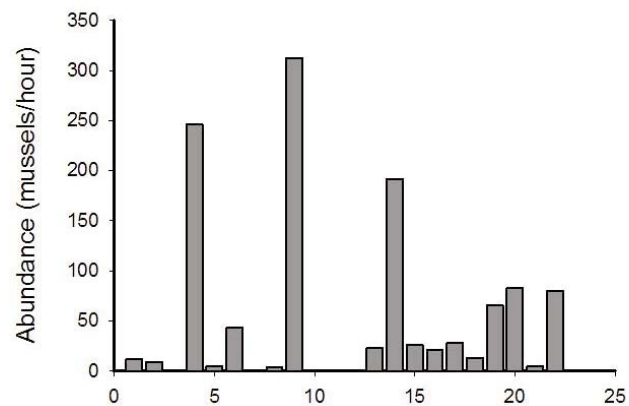


Figure 3. Abundance (mussels/hour) by site in the Mountain Fork River.

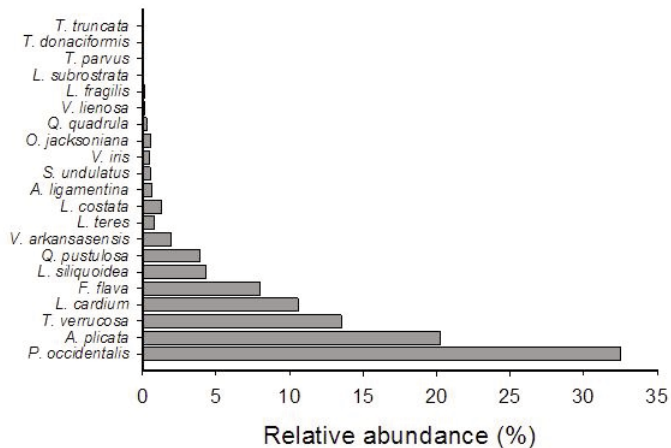


Figure 4. Relative abundance of mussels in the Mountain Fork River.

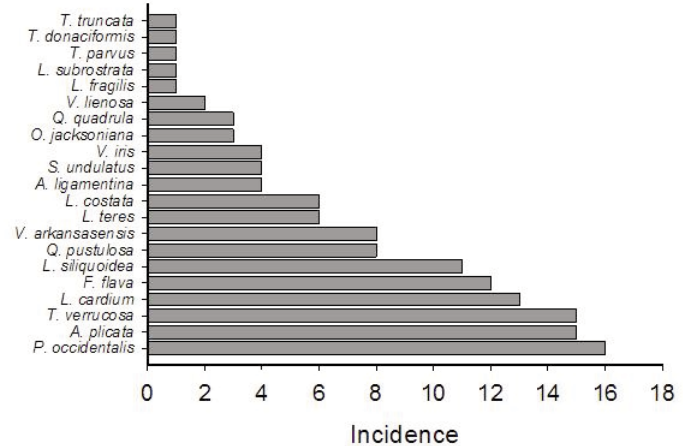


Figure 5. Incidence (number of sites occupied) of mussels in the Mountain Fork River.

Table 1. Mussel species found alive in the Mountain Fork River.

Current species name	Historical name	Common name
<i>Actinonaias ligamentina</i> (Lamarck, 1819)		Mucket
<i>Amblema plicata plicata</i> (Say, 1817)	<i>Quadrula plicata</i>	Three ridge
<i>Fusconaia flava</i> (Rafinesque, 1820)	<i>Quadrula undulata</i> <i>Quadrula rubiginosa</i>	Pigtoe
<i>Lampsilis cardium</i> (Rafinesque, 1820)	<i>Lampsilis ventricosa</i>	Plain Pocketbook
<i>Lampsilis siloquioidea</i> (Barnes, 1827)	<i>Lampsilis radiata</i>	Fatmucket
<i>Lampsilis teres</i> (Rafinesque, 1820)	<i>Elliptio teres</i>	Yellow sandshell
<i>Lasmigona costata</i> (Rafinesque, 1820)	<i>Alasmidonta costata</i>	Flutedshell
<i>Leptodea fragilis</i> (Rafinesque, 1820)	<i>Unio fragilis</i>	Fragile papershell
<i>Ligumia subrostrata</i> (Say, 1831)	<i>Unio subrostrata</i>	Pondmussel
<i>Obovaria jacksoniana</i> (Frierson, 1812)	<i>Unio castaneus</i>	Southern Hickorynut
<i>Ptychobranthus occidentalis</i> (Conrad, 1836)	<i>Ptychobranthus clientonense</i>	Ouachita kidneyshell
<i>Quadrula pustulosa pustulosa</i> (Conrad, 1835)	<i>Quadrula pustulosa</i>	Pimpleback
<i>Quadrula quadrula</i> (Rafinesque, 1820)	<i>Unio quadrulus</i>	Mapleleaf
<i>Strophitus undulatus</i> (Say, 1817)	<i>Strophitus edentulus</i>	Creeper
<i>Toxolasma parvus</i> (Barnes, 1823)	<i>Unio parvus</i>	Lilliput

Table 1. Continued.

Current species name	Historical name	Common name
<i>Toxolasma texasensis</i> (Lea, 1857)	<i>Unio texiensis</i>	Texas lilliput
<i>Tritogonia verrucosa</i> (Rafinesque, 1820)	<i>Tritogonia tuberculata</i>	Pistolgrip
<i>Truncilla donaciformis</i> (Lea, 1828)	<i>Unio donaciformis</i>	Fawnsfoot
<i>Truncilla truncata</i> (Rafinesque, 1819)	<i>Unio truncatus</i>	Deertoe
<i>Villosa arkansasensis</i> (Lea, 1862)		Ouachita creekshell
<i>Villosa iris</i> (Lea, 1829)	<i>Unio iris</i>	Rainbow
<i>Villosa lienosa</i> (Conrad, 1834)	<i>Lampsilis lienosa</i>	Little spectaclecase

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