

FRESHWATER MUSSELS (UNIONIDAE) OF BIG MOCCASIN CREEK, SOUTHWESTERN VIRGINIA

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ABSTRACT

A survey of the mussel fauna of Big Moccasin Creek, an 88-km tributary of the North Fork of the Holston River, was conducted during 1979 and 1980. Eight species were collected, in comparison with fourteen taken during an earlier survey in 1915. The endangered fine-rayed pigtoe, Fusconaia cuneolus, has seemingly been extirpated from this stream.

The Upper Tennessee River drainage historically contained one of the most diverse naiad faunas in the world. Ortmann's (1918) summary of early mussel surveys recorded an abundant and diverse fauna in major headwater tributaries, which included the Clinch, Powell, and Holston Rivers, Virginia. Recent mussel surveys in these rivers (Stansbery 1972; Hill et al. 1974; Stansbery and Clench 1973, 1974; Bates and Dennis 1978; Ahlstedt and Brown 1979; Neves et al. 1980) have demonstrated a significant decline in species diversity and abundance, due largely to habitat alteration and water quality degradation.

The loss of mussel populations in Virginia has been greatest in the North Fork of the Holston River between Saltville and the Virginia-Tennessee state line (120 km of river). The 38 mussel species that once occurred in this section of river (Ortmann 1918) were eradicated by chemical waste inputs from a now defunct chem-

ical plant at Saltville. Big Moccasin Creek (BMC), the largest tributary of the North Fork, was not affected by these chemical wastes. Ortmann (1918) reported 14 mussel species from two sites on BMC, including the now endangered fine-rayed pigtoe, *Fusconaia cuneolus*. Because the naiad fauna of this creek had not been examined for more than 60 years, we surveyed several sites on BMC during 1979 and 1980 to determine what changes in species composition had taken place and whether *F. cuneolus* still occurred in the stream.

Study Area

Big Moccasin Creek, an 88-km tributary of the North Fork Holston River, flows through Russell and Scott counties in southwestern Virginia (Fig. 1). The creek has a mean discharge of 0.37 m³/s, mean gradient of 3 m/km and drains 247 km² of Valley and Ridge Province, which is characterized by sedimentary strata of limestones, dolomites, shales, and sandstones. Roughly 58% of the watershed is forested; most of the remaining land is used for grazing of livestock and cultivation of tobacco. Upstream water chemistry measurements during low flow in October 1979 were as follows: temperature,

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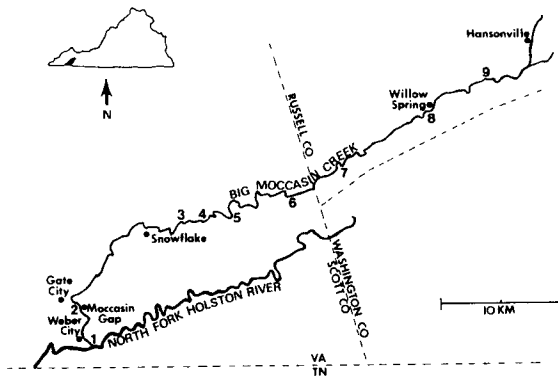


FIG. 1. Stations (1-9) surveyed for mussels in Big Moccasin Creek, Virginia.

14°C; pH, 8.2; dissolved oxygen, 9 mg/l; conductivity, 250 μ mhos; and hardness, 175 mg/l.

Methods

Seven sites on Big Moccasin Creek were surveyed by at least three biologists with waterscopes during low water flows in 1979 and 1980. Two of these sites were at locations surveyed earlier in this century by Ortmann (1918). Live specimens or recently dead (lustered) shells were recorded at each station, which included about 0.4 km of stream bottom. Collections at two additional sites (stations 3 and 7) sampled during summer 1977 (Steve Ahlstedt, TVA, personal communication) are included with our survey results. Reference material is housed at Virginia Polytechnic Institute and State University.

Collecting Stations

1. Above confluence with the North Fork of the Holston River on state route 614, 2.2 km east of route 23 at Wilhelm (river kilometer 0.0; lat. 36°36'32"N long. 82°32'40"W; Scott County). Mussels were uncommon.
2. Adjacent to a state picnic area on state route 23, Moccasin Gap (river kilometer 4.0; lat. 36°38'00"N, long. 82°33'10"W; Scott County). No mussels were collected.
3. Adjacent to state route 613 north of Snowflake (river kilometer 28.8; lat. 36°41'17"N, long. 82°27'56"W; Scott County). Mussels were uncommon.
4. McConnell Mill at intersection of state routes 613 and 687 (river kilometer 32.8; lat. 36°41'43"N, long. 82°26'56"W, Scott County). Mussels were uncommon.
5. Bridge on state route 613, 100 m east of state route 891 intersection (river kilometer 45.1; lat. 36°42'30"N, long. 82°23'55"W; Scott County). Mussels were uncommon.
6. Dean's Farm on state route 613, 1.9 km west of Russell-Scott county line (river kilometer 52.6; lat. 36°43'00"N, long. 82°21'15"W; Scott County). Mussels were abundant.
7. Adjacent to state route 613 just south of Collinwood (river kilometer 58.4; lat. 36°44'00"N, long. 82°19'15"W; Russell County). Mussels were uncommon.
8. Fugate's Farm on state route 613, 0.4 km south of Willow Spring (river kilometer 75.6; lat. 36°46'30"N, long. 82°14'18"W; Russell County). Mussels were common.
9. Owen's Farm at the intersection of state routes 676 and 677 (river kilometer 82.6; lat. 36°47'30"N, long. 82°11'50"W; Russell County). Mussels were abundant at this site, having an average density of 18.7 mussels/m² (Zale and Neves 1982).

Results and Discussion

A total of eight species of freshwater mussels were collected in Big Moccasin Creek (Table 1). Ortmann (1918) reported 14 mussel species at Moccasin Gap (our station 2) and two species at Willow spring (our station 8). We collected two species from Moccasin Gap and six species near Willow Spring. Based on the earlier and current collection records, the following species have apparently been extirpated from the creek: *Ptychobranhus subtentum*, *Lampsilis ovata*, *Dysnomia capsaeformis*, *Quadrula cylindrica*, *Pegias fabula*, *Alasmidonta marginata*, and *Fusconaia cuneolus*. *Lexingtonia dolabelloides* was not reported by Ortmann (1918), but we collected this species at three stations. No recent or relic shells of the endangered *F. cuneolus* were found.

Results of this survey and water quality data from the U.S. Geological Survey and the Virginia State Water Control Board (1976) indicate that the lower 10 km of Big Moccasin Creek has been subjected to water quality degradation from urban development. At Moccasin Gap, stream alterations resulting from road construction, housing development, and channelization were readily apparent. The State Water Control Board (1976) reported that treated sewage discharge at Gate City and raw sewage discharge from Weber City created severe pollution with fecal coliform bacteria and high biological oxygen demand in BMC, particularly during summer. This degradation in water quality surely has adversely affected all downstream biota.

The diverse mussel fauna that once occurred

Table 1. Checklist of mussel species collected (X) from Big Moccasin Creek, 1977-1980.

Mussel Species	Station No.								
	1	2	3	4	5	6	7	8	9
Anodontinae									
<u>Alasmidonta minor</u> (Lea, 1845)							X		X
Lampsilinae									
<u>Lampsilis fasciola</u> (Rafinesque, 1820)			X	X	X	X	X	X	X
<u>Medionidus conradicus</u> (Lea, 1834)		X	X	X	X	X	X	X	X
<u>Villosa nebulosa</u> (Conrad, 1834)	X		X	X	X	X	X	X	X
<u>Villosa vanuxemi</u> (Lea, 1838)	X	X	X	X	X		X	X	X
Unioninae									
<u>Fusconaia barnesiana</u> (Lea, 1838)	X		X	X	X	X	X	X	X
<u>Lexingtonia dolabelloides</u> (Lea, 1840)			X			X	X		
<u>Pleurobema oviforme</u> (Conrad, 1834)	X		X	X	X	X	X	X	X

in lower Big Moccasin Creek has been eliminated. In contrast the upper watershed has remained rural, and the water quality and biota have apparently remained essentially unchanged over the past 70 years. Recent improvements in water quality below Moccasin Gap may allow the gradual recolonization by mussels either from upstream areas or from the North Fork of the Holston River.

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