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Freshwater Mussel Surveys of the Fish Creek System in Ohio and Indiana

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Introduction

Fish Creek in Ohio and Indiana is one of the most diverse and biologically important mussel streams in North America. In all, thirty species have been recorded from the Fish Creek drainage, including three Federal endangered species, six Ohio endangered species, and five Indiana endangered species (Watters, 1988; 1996). The Federal endangered White Catspaw (*Epioblasma obliquata perobliqua*) may occur nowhere else.

Fish Creek was last surveyed, system-wide, in 1988. Since that time, the watershed has changed in several ways. Tree plantings and other bank-stabilization activities have reduced runoff potential to the stream. Changes in land usage, both improvements and detriments, are continually occurring. Finally, the lowest, most diverse reach of the stream was the site of a diesel fuel spill. The status of the mussel fauna of Fish Creek was unknown following these changes. It was not known if the overall health of the mussel populations had become better or worse since 1988.

Methods

Mussels were collected by hand picking during low-water conditions in 1996. All 30 sites studied in the 1988 survey in the Fish Creek system were resurveyed (Figure 1). All specimens were counted and identified. No live individuals were collected, but shells were vouchered at The Ohio State University Museum of Biological Diversity as allowed by permit.

Results and Discussion

Twenty-five species were found in this survey, slightly fewer than the 28 species found in 1988 (Table 1). Five listed species were encountered.

Salamander Mussel, *Simpsonaias ambigua*, an Indiana special concern and Ohio special interest species, and former Federal Category 2 species, was found as a freshly dead shell at a single site (79). This species has been found in most Fish Creek surveys, but never is common. Its only known host, the Mudpuppy, was not encountered in 1996.

Rayed Bean, *Villosa fabalis*, an Ohio endangered species, and former Federal Category 2 species, was found as freshly dead shells at four sites on the Ohio side. It has been extirpated from most of its range nationwide. Its hosts are unknown.

Rabbitsfoot, *Quadrula cylindrica cylindrica*, an Indiana and Ohio endangered species, was found living or freshly dead at five Ohio sites. This species appears to be reproducing, based on the several size classes and juveniles found in this survey. Hosts are probably species of shiners and chubs based on studies of the subspecies *Quadrula cylindrica strigillata* (Yeager and Neves, 1986).

Purple Wartyback, *Cyclonaias tuberculata*, an Ohio special interest species, was common as living and freshly dead specimens throughout the lower quarter of the system. It appears to be reproducing. Known hosts are catfishes (Hove *et al.*, 1997).

Clubshell, *Pleurobema clava*, a Federal, Ohio, and Indiana endangered species, was encountered as weathered shells at all but the extreme headwater sites. It was found living or freshly dead at nine sites, most within Ohio. It may be reproducing, as several size classes were encountered. Hosts are the Striped Shiner and Blackside Darter (Watters and O'Dee, 1997).

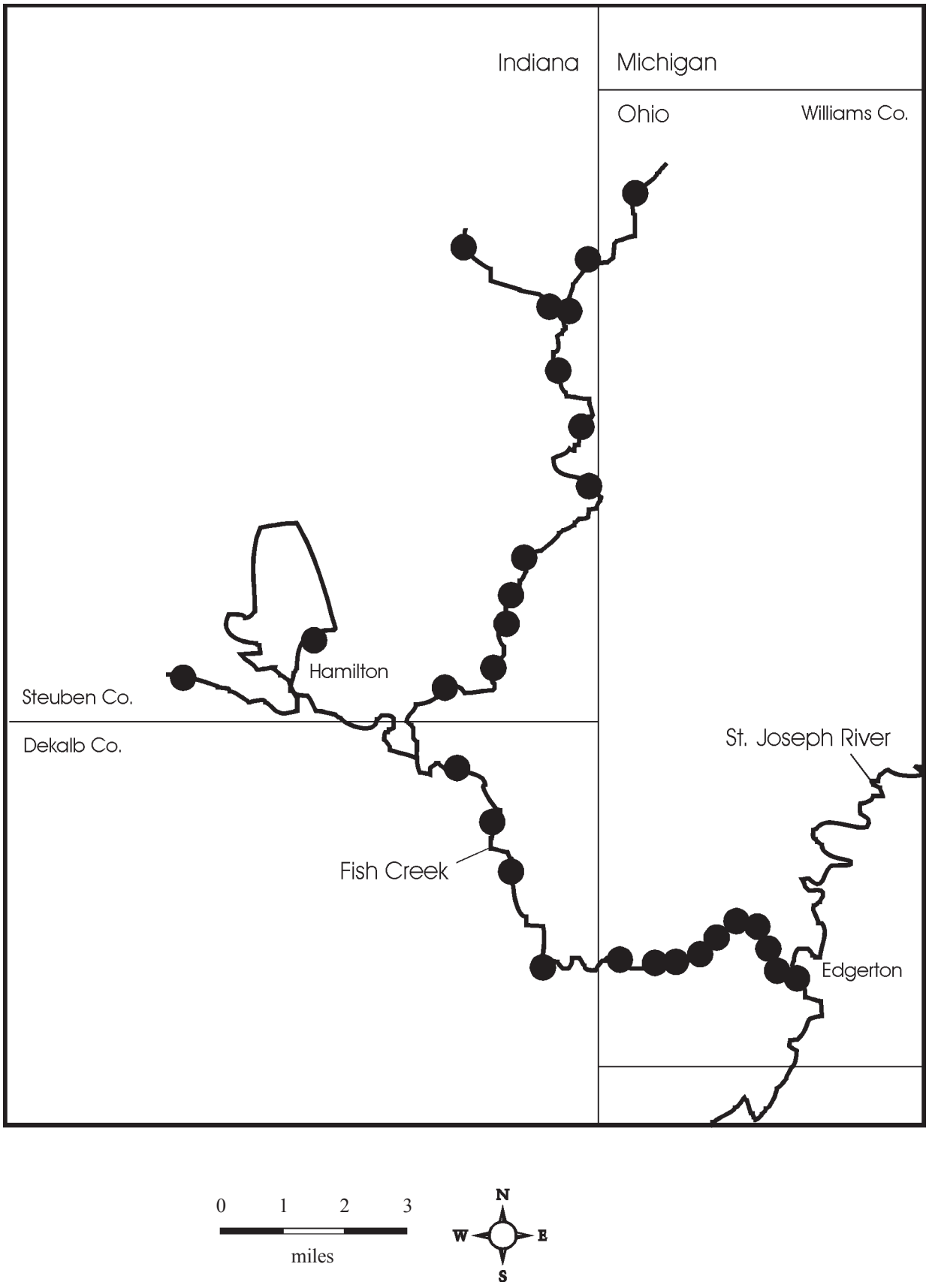

Figure 1. Map of collection locations on Fish Creek.

Table 1. Comparison of 1988 and 1996 surveys.

Taxon	Common Name	Status	1988	1996
Actinonaias ligamentina	Mucket		X	X
Alasmidonta marginata	Elktoe		X	X
Alasmidonta viridis	Slippershell		X	X
Amblema plicata	Threeridge		X	X
Anodontoides ferussacianus	Cylindrical Papershell		X	X
Cyclonaias tuberculata	Purple Wartyback	OSI	X	X
Elliptio dilatatus	Spike		X	X
Epioblasma o. perobliqua	White Catspaw	FE, OE, IE	X	
Epioblasma rangiana	Northern Riffleshell	FE, OE, IE	X	
Fusconaia flava	Wabash Pigtoe		X	X
Lampsilis cardium	Plain Pocketbook		X	X
Lampsilis fasciola	Wavy-rayed Lampmussel		X	X
Lampsilis radiata luteola	Fat Mucket		X	X
Lasmigona complanata	White Heelsplitter		X	X
Lasmigona compressa	Creek Heelsplitter		X	X
Lasmigona costata	Fluted-shell		X	X
Ligumia recta	Black Sandshell	OT	X	
Obovaria subrotunda	Round Hickorynut		X	X
Pleurobema clava	Clubshell	FE, OE, IE	X	X
Pleurobema sintoxia	Round Pigtoe		X	X
Ptychobranchus fasciolaris	Kidneyshell		X	X
Pyganodon grandis	Giant Floater		X	X
Quadrula cylindrica	Rabbitsfoot	OE, IE	X	X
Simpsonaias ambigua	Salamander Mussel	OSI, ISC	X	X
Strophitus undulatus	Squawfoot		X	X
Utterbackia imbecillis	Paper Pondshell		X	X
Villosa fabalis	Rayed Bean	OE	X	X
Villosa iris	Rainbow		X	X
		Total	**28**	**25**

Status codes: FE - Federally endangered; OE - Ohio endangered; IE - Indiana endangered; OT - Ohio threatened; OSI - Ohio special interest; ISC - Indiana special concern

The White Catspaw, *Epioblasma obliquata perobliqua*, a Federal, Ohio, and Indiana endangered species is now believed to occur only in Fish Creek. Only two living specimens have been found in the past eight years. No specimens, in any condition, were encountered in this survey. It may still exist in Fish Creek, but its numbers may have fallen below the level of detection.

The Northern Riffleshell, *Epioblasma torulosa rangiana*, another Federal, Ohio, and Indiana endangered species, was historically rare in Fish Creek. No evidence was found in this survey that it still occurs in the drainage. Like the White Catspaw, it may still live in Fish Creek, but it is very rare.

Figure 2 depicts the species diversity from mouth to headwaters for both surveys. Twenty-three of the 30 sites have fewer species in 1996 than in 1988. I believe this is due, at least in part, to the exceptional survey conditions in 1988. A severe drought in 1988 resulted in the stranding of numerous mussels, rendering collection extremely easy. By contrast, 1996 had above-normal precipitation. Although survey work was conducted to maximize the likelihood of encountering as many species as possible, few mussels were stranded or otherwise unburied. This alone probably accounts for most of the departure in terms of diversity of 1996 from 1988. The 1988 drought continued for several years and undoubtedly resulted in the death of a significant portion of the mussel fauna.

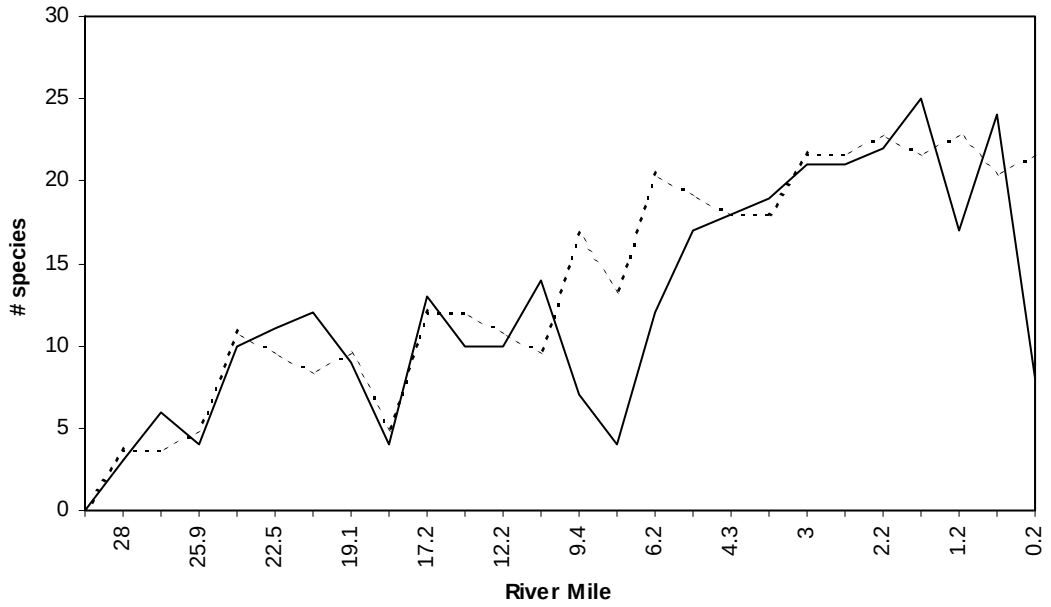

Figure 2. Number of species by river mile. Solid line - 1988. Dashed line - 1996.

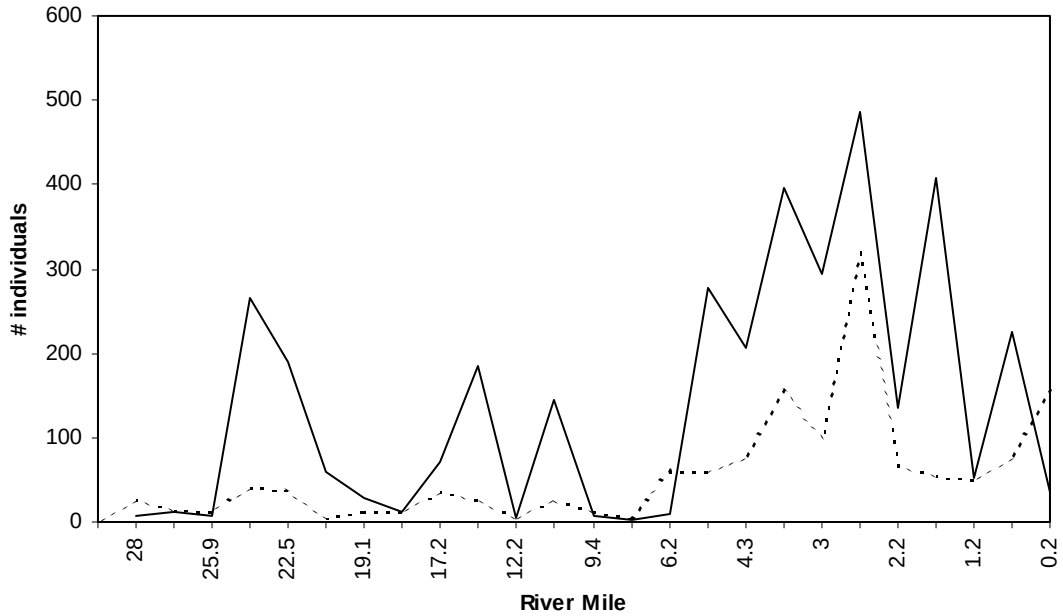

Figure 3. Number of living and freshly dead individuals of all species by river mile. Solid line - 1988. Dashed line - 1996.

Figure 3 depicts the numbers of living or freshly dead individuals encountered in 1996 and 1988. There is a significant difference between the two surveys that cannot be explained solely as the result of drought conditions in 1988. In 1988, 3520 individuals were encountered; in 1996, only 1189. The four most abundant species in Fish Creek were Threeridge, Kidneyshell, Fat Mucket, and Spike, although these species occupy different habitats within the system. All four were encountered less frequently in 1996. However, as fewer total individuals were encountered in the 1996 surveys as a whole, this result was not unexpected. But differences between each of these four species expressed as the percentage of the total individuals found of all species at a site, indicate that all four species have declined in relative abundance, particularly the Threeridge. This species was dramatically less common at several sites, notably Site 25, where 101 living individuals were found in 1988, but only one in 1996. This result is mirrored in other midwestern systems. These data indicate that certain species may be declining for unknown reasons.

Fish Creek remains among the most important sources of mussel diversity in North America. This survey suggests that declines in mussel populations found throughout the Midwest are evident in Fish Creek as well. Although overall diversity has not dramatically deteriorated, there is a suggestion that overall abundance of individuals, particularly of some once common species, has declined. The reasons for this are not clear, and certainly are not due to any one cause.

Acknowledgments

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