

The Status of the Curtis' Pearly Mussel, *Epioblasma florentina curtisi*, in Missouri

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by

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INTRODUCTION

The Curtis' pearly mussel, Epioblasma florentina curtisi (Utterback 1915), a federally listed endangered species (United States Department of the Interior 1976) is on the verge of extinction. Since the turn of the century its range and population have declined steadily. Since the early 1900's it has not been found outside of Missouri. Extensive work on this species since 1980 in Missouri (Buchanan 1979; 1982; 1987) has delineated the range of this species to a small portion of the Castor River near Zalma, Missouri and about 7 miles of the Upper Little Black River in Ripley County, Missouri. Since 1978 it has been found only in the latter stream, where its populations have continued to decline for unknown reasons. This report is an attempt to update the status of this species in Missouri and, where published or anecdotal data exists, outside of Missouri, and provide suggestions for further management.

Historical Distribution

Early in the 1900's, Epioblasma florentina curtisi occurred at scattered locations in the White and St. Francis River basins in southern Missouri and northern Arkansas. Utterback (1917) listed this species as abundant in the White River Basin in southwestern Missouri and scarce in the Black River Basin in southeastern Missouri. Utterback (1915) reported this species from the White River near Hollister, Missouri. Johnson (1978) lists a collection of this species from the White River near Forsyth, Missouri in the early 1900's. The White River has been impounded at both Hollister and Forsyth, and E. f. curtisi no longer occurs in this stream. An old record (1916) of E. f. curtisi also exists from South Fork of the Spring River, a tributary to Black River in Arkansas (personal communication with Mr. Mark Gordon, University of Arkansas, Fayetteville, Arkansas).

More recent historic records of E. f. curtisi exist for the Black River between Williamsville and Poplar Bluff in Wayne and Butler counties, Missouri (OSUM 13647 and 26509) (Oesch 1984; personal communication with Dr. David H. Stansbery, Ohio State University, Columbus, Ohio). These records are as recent as 1971.

Recent Distribution

Since the mid-1970's E. f. curtisi has been found in the Castor River (Oesch 1984), Cane Creek, a tributary to Black River, and Little Black River. Oesch (1984) found a subfossil shell of this species in Cane Creek in 1979; no fresh material was found. Living specimens and fresh shell of E. f. curtisi were found in the Castor River at Zalma (OSUM 35918, 40480, 42223) between 1971 and 1978 (Oesch 1984; personal communication with Dr. David H. Stansbery, Ohio State Museum of Zoology, Columbus, Ohio; Bates and Dennis 1983). This species was found at 3 sites in 5 miles of the Upper Little Black River, a tributary to Current River, in 1979 during a survey funded by the Soil Conservation Service (Buchanan 1979).

A survey was conducted during 1981 through 1983 to determine the distribution of the Curtis' pearly mussel in southern Missouri (Buchanan 1983). One hundred and forty-two sites were sampled on 26 streams between and including the James and

Castor Rivers in southern Missouri. Fresh material of E. f. curtisi was found only in Little Black River at that time, and this species was believed to be restricted to less than 7 miles of Castor River near Zalma, Missouri, and 6.1 miles of the upper Little Black River.

Ecology and Life History

Epioblasma florentina curtisi occurs in stream reaches which are transition areas between headwater and lowland stream reaches. It has been found in order 4 to 7 streams with gradients of 0.9 to 8.0 feet per mile, in stable substrates of sand and gravel to gravel, cobble and boulder, in riffles or runs (Buchanan 1983). Mean particle size of the substrate where this species is found, based on substrate analysis in the Little Black River, ranges from small gravel to cobble (Buchanan 1982). It is found in 2 to 30 inches of water in slow (less than 0.06 ft/sec. to 0.7 ft/sec. at the bottom) current (Buchanan 1982; 1983). Like other mussels, the Curtis' pearly mussel has a life cycle in which its larvae (glochidia) are obligate parasites on fish. Many mussels can only parasitize certain species of fish; E. f. curtisi's host is believed to be the rainbow darter (Etheostoma caeruleum) (Buchanan 1987). E. f. curtisi is bradyctictic (eggs are fertilized in the fall and mature glochidia are released during early spring). Females are extremely difficult to find except during March and April when they can be found lying on their sides on the surface of the substrate, releasing glochidia. During the remainder of the year they remain buried in the substrate.

Population Density and Trends

Within its known range, populations of the Curtis' pearly mussel have declined significantly since 1980, based on quantitative sampling in Little Black and Castor rivers in Missouri.

In Little Black River, which appeared to be the last stronghold for E. f. curtisi in the late 1970's and early 1980's, densities of mussels declined by between 60 and 89 percent between 1980 and 1992, based on quantitative sampling at three sites in 1980/81, 1988, and 1992 (Buchanan 1993) (Table 1). During this same period, species richness declined at all three sites sampled. The Curtis' pearly mussel, found in 8 of 360 quadrats sampled during 1980 and 1981, was not found in any of the 324 quadrats sampled in 1988 or 370 quadrats sampled in 1992. While over 100 individual specimens were aged, measured and marked during the early 1980's in Little Black River, none were encountered in qualitative sampling during 1988 and 1992.

Based on quantitative surveys at one site in Castor River, mussel populations declined by 23% between 1980 and 1988. Species diversity (Shannon-Weaver) declined from 0.909 to 0.634 over the same period. No E. f. curtisi were found during quantitative sampling in Castor River.

Because of significant declines in numbers of mussels, including the Curtis' pearly mussel, in Little Black River between 1980 and 1992, and because no living specimens had been encountered since 1985, representatives of the Missouri Department of Conservation and U.S. Fish & Wildlife Service searched for this species

Table 1. Comparison of naiad and Asiatic clam densities at study sites in the Little Black River between 1980, 1988, and 1992.

Site	Taxon	1980/1981			1988			1992		
		No./yd ²	No. of Species	Diversity	No./yd ²	No. of Species	Diversity	No./yd ²	No. of Species	Diversity
1	Naiades	1.9	10	1.416	0.5	5	0.869	0.6	3	0.485
	Corbicula	39.8			30.4			62.2		
2	Naiades	21.7	17	1.801	4.4	10	1.643	2.9	9	1.533
	Corbicula	248.4			141.0			69.2		
3	Naiades	3.7	13	2.099	1.0	8	1.578	0.3	7	1.711
	Corbicula	106.7			11.7			10.5		

Diversities are Shannon-Weaver

in April and July, 1993. During the early to mid-1980's, approximately 4 hours of search time was required to find a single male Curtis' pearly mussel and approximately 31 hours were required to find a single female. In July, 1993 after over 50 hours of searching, a single male E. f. curtisi was found living in an area of Little Black River where this species had been found in the past. The 10 year old specimen was in apparently good condition. All search effort was concentrated in an area of Little Black River where this species had been found previously.

Survey Needs

The Curtis' pearly mussel appears to be on the brink of extinction. Unless there are populations within or outside of Missouri which we do not know about, its future is bleak. Reasons for the decline in numbers of this species and others in the Little Black River are unknown. Suspected causes of the decline are habitat instability in areas where the bulk of this species' populations occurred in the past, and/or the introduction of some contaminant to the Little Black River System which has adversely impacted mussels. Bank stabilization measures will help prevent further degradation of habitat in Little Black River.

Management Needs

A. Habitat management.

Instability in Little Black River at several locations has resulted in the decline in E. f. curtisi habitat. This habitat decline is believed to be at least partially responsible for the decline in numbers of this species at two sites.

Streambank stabilization procedures should be initiated to reduce bank erosion and bed instability at two sites on Little Black River.

B. Population management.

Populations of E. f. curtisi declined drastically in Little Black River between 1980 and 1992. If left on its own, this species will probably go extinct before the turn of the century. Numbers should be augmented in Little Black River through artificial propagation. This can only be accomplished by removing viable glochidia from gravid females and raising them in cultures under laboratory conditions. Juveniles would then be stocked in suitable habitat in Little Black River. If artificial propagation proves successful in Little Black River, attempts should be made to reestablish and/or augment populations in Castor River and, subsequently, Black River where this species occurred previously.

C. Surveys

Further surveys should be conducted in the Little Black and Castor rivers to further delineate the distribution and abundance of the Curtis' pearly mussel in these streams. Streams in Arkansas, such as South Fork Spring River, should be surveyed to determine if this species occurs anywhere else within its historical range.

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