Status Survey for Mussels in the Tributaries of the Black Warrior River, Alabama 1990

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INTRODUCTION

Historically, the Black Warrior River supported an abundant and diverse freshwater unionid mussel fauna. At least 45 species have been recorded from the drainage (Hinkley 1904, van der Schalie 1981, Dodd et. al. 1986, Williams et. al. 1991). Among these are two federally protected species (Epioblasma penita and Potamilus inflatus), and five species that have been listed as candidates for Federal protection by the Department of Interior (Epioblasma metastriata, Lampsilis perovalis, Lasmigona holstonia, Pleurobema rubellum, and Lampsilis altilis).

Most of the early unionid records were from the main stem of the Black Warrior and some of its lower tributaries, areas that have since been flooded by a series of navigation impoundments. A 1975 mussel survey of the Black Warrior River main channel encountered only 18 species of unionid mussels, and determined that the diversity of the unionid fauna in the lower Black Warrior River has been severely reduced (Williams et. al. 1991). Potamilus inflatus was the only federally listed or candidate species found in this impoundment affected portion of the river.

A more recent study reported 28 species of unionid mussels, including four candidate species, from 10 locations in the upper Black Warrior drainage (Dodd et. al. 1986). Other than this limited study, the present distribution and diversity of mussels in the remaining free-flowing Black Warrior tributaries is virtually unknown. The purpose of this survey was to investigate the current status and range of unionid mussels in Black Warrior River tributaries.

STUDY AREA

The Black Warrior River system drains approximately 6,276 square miles in west-central Alabama (Mettee et. al. 1989). The lower 23 percent of the drainage is below the Fall Line and is part of the East Gulf Coastal Plain physiographic province. The remaining 77 percent of the watershed lies above the Fall Line, primarily in the Valley and Ridge physiographic province. Major tributaries above the Fall Line are the North River, Mulberry Fork and Locust Fork drainages.

METHODS

Historical and recent collecting sites on tributaries where unionid mussels had been collected were identified (Hinkley 1904, Van der Schalie 1981, Dodd et. al. 1986) and visited. A number of tributary sites with road access were searched regardless of the existence of historical records. A total of 73 sites were surveyed in the Black Warrior drainage during the summer of 1990 by polywogging and searching bars and riffles for shell (Figure 1). Two scuba divers made random transect searches of several deep water reaches of the Mulberry and Sipsey Forks. Notes were made on habitat

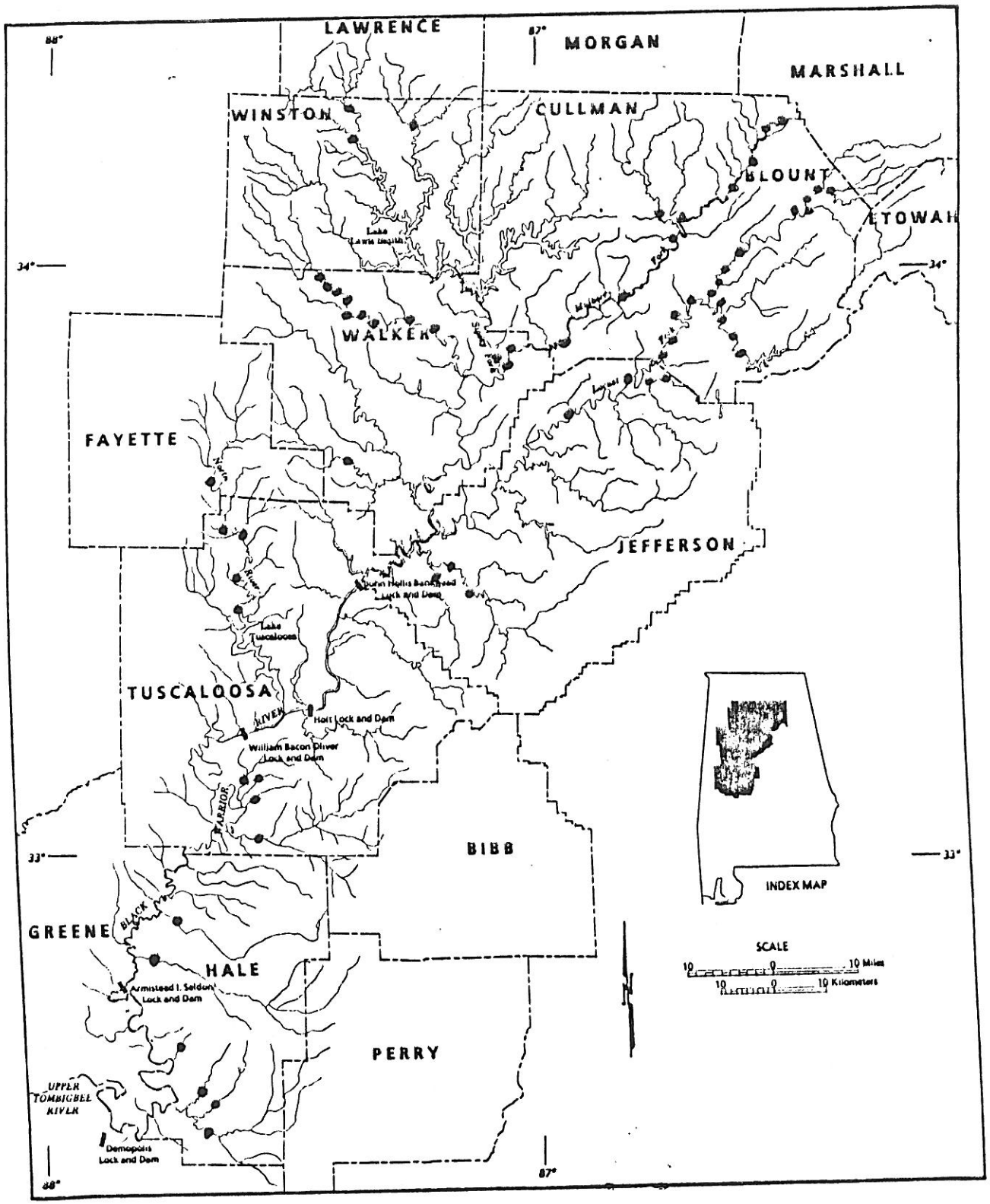

Figure 1.--The Black Warrior River system.

● = Collection Sites

condition at all sites. Snails were collected where present and shipped to the Florida Museum of Natural History for identification. Mussels were identified in the field by the investigator. Live mussels were returned to their original positions in the stream bed. Selected fresh dead and relict shells were retained as vouchers.

RESULTS

COASTAL PLAIN TRIBUTARIES:

Eight streams tributary to the Black Warrior below the Fall Line were included in the survey. No mussels were found in Big Prairie, Little Prairie, Big German, Limestone, Five-mile, Big Sandy or Little Sandy Creeks. Fresh dead shells of five species were found in Big Brush Creek at State Highway 60: Lampsilis teres (8), L. ornata (1), L. claibornensis (2), Quadrula asperata (1), and Tritogonia verrucosa (10). At this location, the stream had a firm sandy gravel bottom, strong current and pool/riffle sequences. Access to the Coastal Plain streams was limited and only single sites were searched at each. All have been affected in their lower reaches by impoundment of the Black Warrior. Agricultural activity was very high in this area and impacts such as sedimentation and erosion were noted in six of the streams. Commercial catfish ponds were common in the Big Prairie Creek drainage.

NORTH RIVER:

The North River was searched at six road crossings above Lake Tuscaloosa. The water was turbid and slightly high. Only a single, badly eroded valve of Quadrula asperata was found. The channel appeared to be in good shape, and substrates consisted of various combinations of boulder, cobble, gravel and sand. A very large, active coal mine was noted adjacent to the channel in the upper reach of the river in Fayette County.

LOCUST FORK DRAINAGE:

Sixteen collections were made in the main channel of the Locust Fork. The most favorable mollusc habitat encountered on the Locust Fork was between State Highway 77 below Warrior, and the river at Shoal Creek. It is evident from relict shells that this reach of the river formerly supported a diverse mussel community. Live mussels were encountered at only two locations. A single individual of Leptodea fragilis was collected at the State Highway 77 bridge below Warrior, and four individuals of Lampsilis ornata were collected at a county road bridge just upstream from I-65. Three additional species were collected fresh dead from the river: Potamilus purpuratus, Quadrula rumphiana, and Tritogonia verrucosa. Another 12 species were identified from relict and badly weathered shells, or shell fragments: Megalonaias nervosa, Lampsilis teres, Fusconaia cerina, Lasmigona complanata, Ellipsaria lineolata, Pleurobema furvum, Quadrula asperata, Ligumia recta, Elliptio crassidens, E. arctata, E. arcus, Obovaria sp.. No mussels or relict shells were found in the river above the confluence with Blackburn Fork.

The Locust Fork was badly silted in its upper reaches between Snead (State Highway 74), to just above U.S. Highway 231. Truck farms and irrigation have been noted to be a primary source of sediments in the Locust Fork drainage (U.S. Army Corps of Engineers 1990). Chicken farms were plentiful along the upper reaches of the river, and their odor was noticeable. Many abandoned coal strip mines were observed on hills bordering the river between Warrior and Nectar that apparently impacted the river at some time in the past. No active mines were observed, however, abandoned mines may still be contributing sediment and chemical pollution to the streams in this portion of the basin.

Locust Fork tributaries had little evidence of an extant unionid fauna. Tributary collections were made in Valley, Mud, Turkey and Gurley Creeks, Blackburn Fork, and Little Warrior River. Only a single weathered shell of Tritogonia verrucosa was found in Gurley Creek, and a relict shell of Lampsilis teres was collected from the Blackburn Fork. Unidentifiable fragments of relict unionids were collected at two locations in Valley Creek. No unionids were found in Mud and Turkey Creeks or the Little Warrior River.

Weathered, fresh dead and live Asiatic clams, Corbicula fluminea, were found throughout the Locust Fork drainage. Snails were present at most sites visited, however, diversity and abundance varied greatly between sites. Only ancylid snails were found at the Blackburn Fork site. Substrate throughout the drainage appeared favorable for unionid mussels and consisted of boulder, cobble, gravel and sand. Most streams examined had swift currents and clear, cold water. Extensive muskrat middens were found at most of the riffle sites searched, however, all were composed entirely of Asiatic clam shells.

MULBERRY FORK DRAINAGE:

Eleven sites on the Mulberry Fork between U.S. Highway 278 and the river's confluence with the Sipsey Fork were included in this survey. No mussels were found in the main stem except for an area just upstream from the town of Sipsey. At this location, the river appears to be influenced by Bankhead Lake. The water was deep, had little perceptible flow, smelled foul, and had black algal masses floating on the surface. Three dives using scuba were made in the area. A single mussel, Obliquaria reflexa, was collected alive. Shells of Leptodea fragilis were common at one location in muskrat middens. A few weathered and fresh shells of Potamilus purpuratus, Strophitus subvexus, Lampsilis ornata, and Quadrula asperata were also found at this location. At the other ten sites examined in the upper Mulberry Fork, only physid snails were found. Asiatic clams were present at all locations. The Mulberry Fork channel appeared stable at all locations examined with little evidence of erosion. The stream was generally characterized by riffle/shallow pool sequences, moderate to strong currents, and boulder/cobble/gravel substrates. Sand and silt sediments became more common in the downstream reaches. Algal growth was prominent on the substrate.

Six tributaries to the Mulberry Fork were surveyed for unionid mussels. Two tributaries were searched in the upper river, Blue Springs Creek in Blount County and Broglen River in Cullman County. Snails were diverse and abundant in Blue Springs Creek, but no unionid mussels were found. A single unionid, Leptodea fragilis, was observed in the Broglen River. The specimen was fresh dead with soft parts intact. The only snails found in Broglen River were physids.

Nine bridge crossings on Blackwater Creek, a Mulberry Fork tributary, were surveyed in Walker County. Only two unionids were found, both at the same location. A single fresh dead shell each of Elliptio arctata and Villosa vibex were collected at Harris Bridge north of Jasper. A County road bridge was being constructed at this site in 1990 and the riffle had been heavily silted. The only site in the drainage where live snails were found was at the uppermost collecting site near the Town of Nauvoo. Asian clams were present at all locations. Active and abandoned coal mines were observed in the drainage.

The Sipsey Fork was searched by scuba below Lewis Smith Lake in Walker County near its Mulberry Fork confluence. The Sipsey Fork was very clear, cold and deep. No mussels or snails were found, but a few Asiatic clam fragments were seen in the middle of the channel. The bottom was sandy gravel with some boulders. The banks were primarily firm, stable mud. Coal fragments littered the river bottom.

The Sipsey Fork was also searched at two locations in the Bankhead National Forest. No mussels were found in the vicinity of the State Highway 60 bridge. At this upper crossing, the stream is small and shallow with a sandy gravel bottom. Unionids were found in the Sipsey Fork scattered along a survey reach from the State Highway 33 bridge upstream approximately two miles (3.3 km). In this lower reach, the channel is wider, the current stronger, and the substrate is primarily boulder/cobble. Only two live mussels were encountered, both Tritogonia verrucosa. In one of these, the shell had eroded exposing the soft parts. An additional ten species were also recorded: Elliptio arctata, Potamilus purpuratus, Villosa vibex, V. lienosa, Quadrula asperata, Pleurobema furvum, Lampsilis ornata, and Ptychobranchus greeni. Most of these were badly weathered shells or fragments. Only E. arctata and P. greeni were found fresh dead. A riffle at the old Forest Service Road (FSR) 234 crossing had been recently cleaned by a Forest Service bulldozer clearing the stream and closing the road.

A Sipsey Fork tributary, Brushy Creek was searched at FSR 255. Fairly fresh dead shells of Ptychobranchus greeni (1), Villosa vibex (1), Strophitus subvexus (1), Fusconaia cerina (3), and Pleurobema furvum (1) were scattered along a distance of approximately 0.6 miles (1 km). The water was clear and cold, and substrate was cobble/gravel/boulder.

The Mulberry Fork tributary Wolf Creek was searched at the State Highway 69 crossing. This stream had deep pools of black water separated by dry riffles. There was no perceptible flow. No unionid mussels or snails were found. A few dead Asian clams were scattered in the dry riffles. There was a large, active coal mine on the north bank at this location.

DISCUSSION

Among the species that have been recorded from tributaries of the Black Warrior River, at least six have been considered as endangered or threatened throughout their range (Stansbery 1976): P. perovatum, P. rubellum, Lampsilis perovalis, Epioblasma metastriata, Lasmigona holstonia, and Ptychobranchus greeni. Four of these and one other species are listed as candidates for protection (Department of Interior 54 FR 578-579): Epioblasma metastriata, Lampsilis perovalis, Lasmigona holstonia, Pleurobema rubellum, and Lampsilis altilis. Two additional species that are known to have formerly occurred in the drainage are exceedingly rare in collection records: Pleurobema furvum and P. hagleri.

Van der Schalie (1981) listed some mussel collections from Black Warrior River tributaries that were made during the early part of this century. Among these he reported Pleurobema perovatum from Big Prairie Creek, a coastal plain drainage. At least two other records of this species in Big Prairie Creek around the turn of the century are in museum collections (Philadelphia Academy of Sciences, U.S. National Museum). Since that time, agricultural activities and commercial catfish pond effluents have severely affected Big Prairie Creek as well as other coastal plain tributaries.

Van der Schalie also reported Ptychobranchus greeni and Pleurobema hagleri from the North River prior to 1920. The development of a coal mine industry, and the inundation of historical shoals and other collecting localities on the North River by Lake Tuscaloosa has apparently severely depleted the mussel fauna of that stream.

T.A. Conrad collected Epioblasma metastriata from the Mulberry Fork (Black Warrior River near Blount Springs) in 1838 (J.D. Williams, unpublished manuscript, 1981). Hinkley (1904) reported 17 species from the Mulberry Fork of the Black Warrior, including Pleurobema rubellum and Lampsilis perovalis. In 1990, the only evidence of a unionid fauna in the Mulberry Fork was found at a single location in the lower river affected by Bankhead Lake. It is also notable that no pleurocerid snails were found in the free-flowing portion of the river, although this family of snails was common to abundant in most other streams examined. Based on the odor noted at several locations and the prominent algal growth on all substrate, Mulberry Fork water quality appears to be affected by heavy organic input. The primary source of this organic input has been identified as live-stock and poultry waste (U.S. Army Corps of Engineers 1990).

Dodd et al. (1986) collected mussels from five Mulberry Fork tributaries. Among these collections he recorded Pleurobema furvum (reported as Pleurobema rubellum), P. perovatum, Ptychobranchus greeni, and Lampsilis altilis from the Sipsey Fork and Brushy Creek; Lampsilis altilis from Capsey Creek; and Pleurobema perovatum from Black Water Creek. He noted that the Black Water Creek records were based on old, eroded shells. A U.S. Fish and Wildlife Service biologist, John Pulliam, collected fresh dead specimens of Pleurobema furvum, Medionidus acutissimus, and M. parvulus from one location on the upper Sipsey Fork in 1985. These specimens are catalogued in the Mississippi Museum of Natural Science mollusk collection in Jackson, MS. This represents the first record of Medionidus parvulus from the Black Warrior drainage. The presence of only two of Dodd's and Pulliam's records, Ptychobranchus greeni and Pleurobema furvum in the upper Sipsey Fork and Brushy Creek, was confirmed by the 1990 survey. However, this same portion of the drainage possibly continues to provide habitat for Pleurobema perovatum, Medionidus acutissimus, M. parvulus and Lampsilis altilis based on Dodd and Pulliam's recent collections. It is important to note that the upper Sipsey Fork and Brushy Creek contain very limited reaches of habitat, and are isolated from each other and the rest of the Warrior drainage by Lake Lewis Smith. Mulberry Fork tributaries have all been variously affected by impoundment, coal mining activities, siltation from agriculture and forest harvest, non-point pollution from animal feedlot runoff, and urban drainage.

Dodd also reported mussel collections from the Locust Fork and three of its tributaries. He noted that most of the shells found in the Locust Fork drainage were old and eroded specimens. Among the species he listed were Pleurobema perovatum and Ptychobranchus greeni from the Locust Fork; Ptychobranchus greeni from the Little Warrior River (Dodd's Blackburn Fork site); and Lasmigona holstonia from Gurley Creek. Although the 1990 survey of these streams was not very productive, the Little Warrior River and Gurley Creek sites appeared to offer high quality mollusk habitat. Pleurocerid snails were extremely abundant at both locations. It is likely that small, localized mussel populations may continue to exist in these two streams.

Van der Schalie (1981) reported a 1912 collection of Pleurobema hagleri from Valley Creek, also a Locust Fork tributary. No evidence of an extant unionid mussel fauna was found in this stream during the 1990 survey. Urban development has impacted Valley Creek, which drains the western portion of Birmingham. Mettee et. al. (1989) noted that Valley Creek has historically had significant water quality problems.

Although apparently suitable mussel habitat was observed throughout the Black Warrior drainage during this survey, only six live mussels (two species) were found at the 73 sites examined, and only nine other species were encountered fresh dead. These results are comparable to another recent survey of the drainage. Robert Hanley searched 13 tributary streams at 18 sites for molluscs between 1980 and 1982 (Hanley, Greenville, SC, in Litt. 1990). He found unionid mussels in only four tributaries: Five Mile and Big Brush Creeks, Hale County; Yellow Creek, Tuscaloosa County; Borden Creek, Lawrence County. Hanley collected four species (Lampsilis claibornensis, Villosa lienosa, Fusconaia cerina, and Quadrula pustulosa) in Big Brush Creek, however, only Villosa sp. and/or Toxolasma sp. were encountered at the other three tributary sites.

It is beyond the scope of this survey to determine any of the rare species known from the drainage to be extirpated, however, based on museum collection records and the literature, Pleurobema hagleri and P. rubellum have not been collected in over 50 years and their continued existence is in serious doubt. It is also apparent that the mussel fauna in the entire Black Warrior River system has experienced a severe decline in diversity, distribution and abundance. Impoundments and water quality degradation appear to be the major contributors of the decline.

Many of the historic mussel collecting localities have been inundated or otherwise affected by the construction of the Black Warrior-Tombigbee Waterway and other impoundments. Over 170 miles, the entire main channel, of the Black Warrior River have been impounded by a series of four lock and dams. The impounding effect of the upper-most structure, John Hollis Bankhead Lock and Dam, extends at least 20 miles into the lower reach of the Locust Fork, and over 40 miles into the lower Mulberry Fork. At least 30 miles of riverine habitat in the North River has been impounded to provide a municipal water supply for the City of Tuscaloosa. Over 30 miles of the Sipsey Fork, and at least as many miles of its tributaries, were impounded by the Alabama Power Company for hydroelectric generation. Numerous smaller dams occur throughout the drainage.

Agricultural silt was noted in some head-water streams, and in all coastal plain streams. Urban drainage and organic input affects several streams above the Fall Line. Nonpoint pollution from poultry and cattle feedlots has been identified as the major contributor to water pollution in the Black Warrior River drainage. Active and inactive coal mines occur throughout the upland drainages. The Warrior Coal Basin, which underlies a substantial portion of the Black Warrior drainage, accounts for almost 90 percent of Alabama's coal production (Dodd et. al. 1986). Runoff from coal surface mining activity can result in acidification, mineralization and sediment loading of streams and rivers, all of which are detrimental to the unionid fauna.

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