Threatened and Endangered Mollusk Survey in the Little Cahaba River, Jefferson County, Alabama

Final Report

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Introduction

The upper Cahaba and Little Cahaba rivers in Jefferson, Shelby and St. Clair counties in central Alabama support a diverse freshwater community that includes populations of at least two federally listed mussels, more than 25 native fishes and a range of other endemic freshwater taxa. This is surprising because these streams flow through the city limits of Birmingham and one of the most heavily populated regions in Alabama. However, because the Little Cahaba is an important source of drinking water its watershed has historically been protected.

Historically, at least 28 species of freshwater mussels occurred in the upper Cahaba and Little Cahaba Rivers in Jefferson County (Williams et al. 2008). However, widespread land clearing and water pollution in the early part of the 20th century resulted in the loss of much of the upper Cahaba's mussel populations. Prior to 2006, there were relatively few recent records for mussels in the Upper Cahaba River or its tributaries in Jefferson County (USFWS 2000). However recent surveys are changing that perception.

In 2006, I found populations of Finelined pocketbook mussels (*H. altilis*, n = 3) and Rayed kidneyshells (*P. formanianus*, n = 4) in the Little Cahaba River (Jefferson County) downstream of Lake Purdy along with populations of 5 other mussel species. Later, Gangloff et al. (2009) focusing on a small dam in the Little Cahaba River near the Coal Branch confluence found 9 *H. altilis* along with populations of 2 other species. Gangloff et al. (2009) also examined the Cahaba River near Grants Mill Road and found populations of *P. formanianus* (n = 4) along with 4 other mussel species. In 2011, Gangloff working for Vittor and Associates found *P. formanianus* and 7 other mussels in the Cahaba near the confluence of Stinking Creek near Leeds, AL. Most recently, Gangloff (2015) surveyed the Cahaba River in Hoover near the confluence of Bailey Branch and found 7 mussel species but did not find any listed species.

The goal of this survey was to re-examine the reach of the Little Cahaba River surveyed in 2005 and 2009 to determine whether threatened and endangered mussels are still extant in the reach extending from Lake Purdy to Cahaba Beach Road.

Methods

Study Sites

The Little Cahaba River originates just north of the town of Moody in Jefferson County, Alabama and flows southwest through the city of Leeds and eventually through Lake Purdy several km upstream of its confluence with the mainstem Cahaba River just upstream of US Highway 280 (Fig. 1). The study reach encompassed four sites along an ~4 km reach of the Little Cahaba River.

Landuse within the study reach is primarily low-density residential with largely forested lots. Evidence of human encroachment is limited to several small foot and single lane or defunct (e.g., Cahaba Beach Road) bridges. A small (<1.5 m high) mill dam is present just downstream of the confluence of Coal Branch but the extent of stream impounded by this structure is very limited. There were numerous patches of high quality physical habitat (stable runs and riffles) within the study reach (Figs. 2 and 3).

Native fishes, including sunfishes (*Lepomis auritus*, *L. cyanellus*, *L. macrochirus*), basses (*Micropterus coosae* and *M. henshalli*), minnows (*Campostoma oligoleipis*, *Cyprinella venusta*) and darters (*Percina kathae*, *P. nigrofasciata*) were common throughout the study reach. Many of these fishes are confirmed hosts for threatened and endangered mussels (Williams et al. 2008).

Biotic surveys

Along with three experienced mussel surveyors I conducted mask and snorkel-aided visual-tactile searches at four sites within the Little Cahaba study reach on 30 September 2017. A total of 19 person hours were spent conducting mussel surveys. The weather was clear and sunny and water conditions were optimal. We examined larger particles for snails and tactilely examined gravel beds and substrates along banks and in riffle/run habitats for mussels. I noted the presence of other indicator organisms including the Asiatic clam (*Corbicula fluminea*), crayfish and fishes encountered during the survey.

Results

Surveys on 30 September 2017 revealed populations of federally-threatened Finelined pocketbook mussels (*Hamiota altilis*) at all four sites. Populations of 6 other species were also detected (one species, *Toxolasma corvunculus* was found only as a dead shell). Although the density of living mussels was relatively low (n = 32 mussels in 17 person hours searching) most species appeared to be reproducing (smaller individuals were encountered in addition to much larger, older animals). Finelined pocketbooks appear to be reproducing in this reach (Figs. 4-5) and were the second most abundant species encountered during 2017 surveys after the Paper pondshell (*Utterbackia imbecillis*, Fig. 6). Other mussel species encountered included the Southern Rainbow (*Villosa vibex*) and the Little Spectaclecase (*Villosa lienosa*, Figs 7 and 8). Both *Villosa* spp. Are common in headwater streams across Alabama and the southeastern US (Williams et al. 2008). The introduced Asian clam (*Corbicula fluminea*) was the most abundant mollusk in this system- its shells were a dominant substrate in some habitats (Fig. 9). I did not find any mussels that could be positively identified as Rayed kidneshells (*Ptychobranchus formanianus*) during 2017 surveys but genetic data or inspection of internal anatomy (gills and hinge teeth) would be needed to confirm that identification.

Discussion

Surveys during September 2017 revealed that the freshwater mussel assemblage in the Little Cahaba River between Lake Purdy and Cahaba Beach Road is largely unchanged from the one encountered during 2006 surveys. The only conspicuously absent taxon was the Rayed kidneyshell. The fact that this mussel was detected during 2006 surveys and not during any subsequent surveys of the Little Cahaba may be due to the fact that 2006 surveys were conducted in late May when kidneyshells are typically much easier to detect than later in the fall. This is because this species moves to the substrate surface in late spring to attract a host fish and release its larvae (Williams et al. 2008).

Residential and infrastructure development remain the primary threats to water quality in the Little Cahaba. Studies in other Piedmont streams found that mussel and fish populations in rural or protected stream reaches may be impacted by urbanization of adjacent headwaters. For example, declines of endangered mussels in the South Toe River (western North Carolina) appear linked to sediments associated with the expansion of the US Highway 19E corridor (Gangloff unpublished data). These unanticipated impacts have led NCDOT to re-enter consultation with USFWS about take of endangered species. Similarly, critical habitat for listed mussels in Chewacla Creek, a tributary of the lower Tallapoosa River is impacted by sediments and wastewater effluent originating from its headwaters in the towns of Auburn, Alabama (Gangloff et al. 2009).

Taken together prior and recent surveys suggest that headwaters of the Cahaba River (including the Little Cahaba River) support stable populations of at least 2 threatened and endangered mussels. However, recent surveys also suggest that these species do not occur again in the Cahaba River for a considerable distance downstream (USFWS 2000, Williams et al. 2008, Gangloff 2015). Because of this it seems likely that populations of listed mussels in the upper Cahaba and Little Cahaba Rivers are likely to be isolated from downstream populations and this may place them at increased risk of local extinction. Additionally the fact that these populations have likely been isolated for a considerable period of time means that it is possible that they may possess unique genes that may prove useful in future efforts to recover listed species.

References

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Table 1. List of sites surveyed for freshwater mussels and numbers of each taxon detected at sites in the Little Cahaba River during 30 September 2017 surveys. Site numbers correspond to numbers in Figure 1.

Site	Mussel Taxa
1. Little Cahaba River upstream from Coal Branch (33.45055, -86.68665)	*Hamiota altilis* 3 *Utterbackia imbecillis* 10 *Villosa lienosa* 1
2. Little Cahaba at swimming hole rapid (33.44956, -86.68435)	*Utterbackia imbecillis* 2
3. Little Cahaba River 500 m downstream from Coal Branch (33.44907, -86.69567)	*Amblema elliotti* 1 *Hamiota altilis* 3 *Quadrula asperata* 1 *Toxolasma corvunculus* FD *Utterbackia imbecillis* 3 *Villosa lienosa* 1 *Villosa vibex* 1
4. Little Cahaba River downstream of Cahaba Beach Road (33.44030, -86.70054)	*Amblema elliotti* 1 *Hamiota altilis* 3 *Quadrula asperata* 1 *Villosa vibex* 1

FIGURES

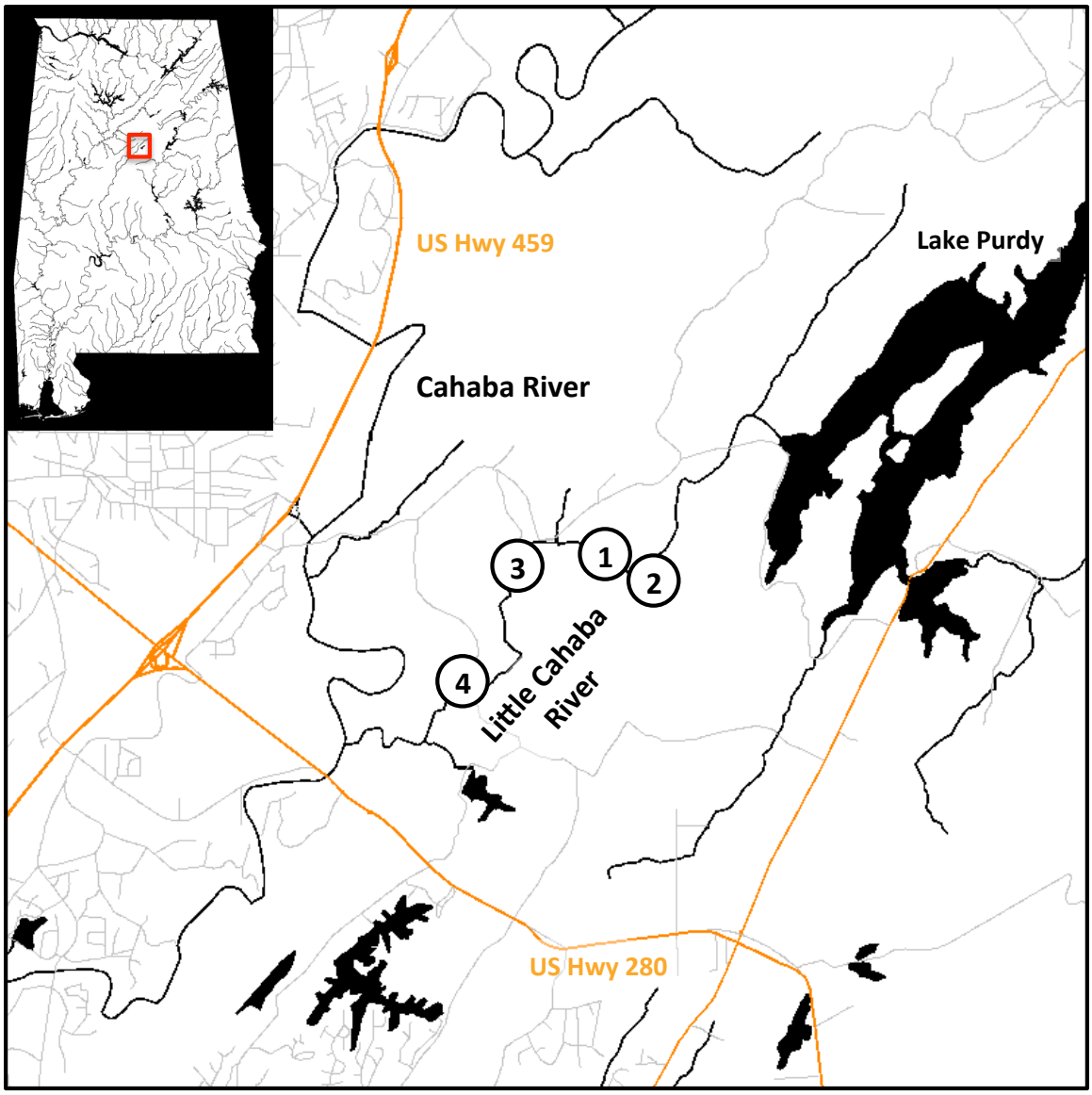

Figure 1. Map of the upper Little Cahaba River and the study reaches examined on 30 September 2017 in Jefferson County, AL. Inset map shows the area of detail in central Alabama. Study site numbers correspond to localities described in Table 1.

Figure 2. Surveys were focused on riffle run habitats in the Little Cahaba River, Jefferson County, Alabama on 30 September 2017

Figure 3. Stable riffle-run habitats afford optimal habitats for threatened and endangered freshwater mussels in the Little Cahaba River.

Figure 4. The fine-lined pocketbook (*Hamiota altilis*) is a threatened freshwater mussel endemic to the Mobile River Basin.

Figure 5. A large, 10+ year old Finelined pocketbook mussel from the Little Cahaba River in Jefferson County, Alabama.

Figure 7. The Paper pondshell (Utterbackia imbecillis) is found throughout the study reach (and in almost all types of freshwater habitats) in the Little Cahaba River.

Figure 8. The Southern rainbow (*Villosa vibex*) is widespread in Gulf of Mexico drainage streams.

Figure 9. The Little spectaclecase (Villosa lienosa) was the most frequently encountered mussel during 2017 surveys of the Little Cahaba River in Jefferson County, Alabama.

Figure 10. The Little Cahaba River supports very large populations of exotic bivalves. The Asian Clam (*Corbicula fluminea*) is extremely abundant and the substrate in some parts of the river is an equal mix of gravel and *Corbicula* shells.

Figure 11. Pleurocerid snails (*Elimia* spp.) grazing algal covered substrates in the Little Cahaba River, Jefferson County, Alabama on 30 September 2017.