

Surveys for Cahaba Shiners *Notropis cahabae* in the Locust Fork and Crooked Creek, Jefferson
County, Alabama

by

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Introduction

The Cahaba Shiner *Notropis cahabae* is a fish species restricted to main-channel habitat in the Cahaba River and the Locust Fork of the Black Warrior River in central Alabama (Figure 1). Cahaba Shiners are found where shoal microhabitats predominate. This species is typically not associated with smaller tributaries except during times of high water, when Cahaba Shiners move into the mouths of large creeks. Cahaba Shiners are typically found in microhabitats of quiet shallow backwater just below or adjacent to riffles and runs primarily over clean sand or sand-gravel substrates (Mayden and Kuhajda 1989). This species was federally listed as an endangered species in 1990 due to residential, industrial, and commercial development threatening water quality and due to its restricted range; at the time of listing the Cahaba Shiner was only known from 60 miles of the main channel of the Cahaba River, with its stronghold restricted to 15 miles (USFWS 1990). In 1998 the Geological Survey of Alabama discovered Cahaba Shiners in the Locust Fork main channel (Shepard et al. 2004), an area that had previously been poorly surveyed. Even with this range extension the Cahaba Shiner is still considered endangered. Main threats to this species in the Locust Fork include mining activities, industrialization, and municipal pollution from the Birmingham metropolitan area and other cities in the watershed as well as poor agricultural and silviculture practices near Sand Mountain (Shepard et al. 2004, USFWS 2016). A proposal for a mine along Crooked Creek and the Locust Fork downstream of the mouth of Crooked Creek in northern Jefferson County, Alabama (Black Creek Mine) created a need to survey this area for the endangered Cahaba Shiner, as mining activities are considered a threat to this species, and it has been found in the Locust Fork both upstream and downstream of the proposed mine site (Shepard et al. 2004).

Survey Objective

Surveys for fishes in Crooked Creek and Locust Fork were conducted to determine the presence of Cahaba Shiners in the aquatic habitats threatened by this proposed Black Creek Mine.

Methods

Surveys for fishes were conducted on 13 October 2016 at six sites: one site in Crooked Creek, one site/riffle on the Locust Fork mainstem just upstream of the mouth of Crooked Creek, and at four sites/riffles on the Locust Fork mainstem downstream of the mouth of Crooked Creek (Figure 2). Fishes were collected using a 10'x6'x1/8" seine either by hauling the seine over the substrate or by setting the seine on the substrate and kicking downstream into it, depending on the substrate conditions and water velocity. We concentrated our sampling efforts in habitat appropriate for Cahaba Shiners. All fishes collected were identified, counted, and released. Photos were taken of the sampling sites and photo-vouchers were taken for all Cahaba Shiners collected.

Results

Water levels were low in Crooked Creek and Locust Fork on 13 October 2016 due to prevalent drought conditions, with flows at the USGS gaging site in Sayre, Alabama (approximately 9 miles downstream of our sampling area) at only 24 cfs compared to a 79 year median of 110 cfs

(<http://waterdata.usgs.gov/al/nwis/current/?type=flow>). Twenty three species of fishes totaling 1,519 specimens were collected at the six sites surveyed. A total of 40 Cahaba Shiners were collected, all at sites in the Locust Fork. This included 26 Cahaba Shiners in the riffle upstream of the mouth of Crooked Creek (Site 2), 11 specimens in the first riffle downstream of the mouth of Crooked Creek (Site 3), 1 specimen in the second riffle downstream of the mouth of Crooked Creek (Site 4), and 2 specimens in the third riffle downstream of the mouth of Crooked Creek (Site 5). Another imperiled fish species, the Coal Darter *Percina brevicauda*, was also collected during this survey; 1 specimen in the second riffle downstream of the mouth of Crooked Creek (Site 4), and 1 specimen in the third riffle downstream of the mouth of Crooked Creek (Site 5) (Table 1). This species is state protected in Alabama (ANHP 2016), considered a species of Greatest Conservation Need (ADCNR 2015), and has been petitioned for federal listing and is currently under status review (USFWS 2011). Following is a description of each survey site.

Site 1 – Crooked Creek at first shallow area upstream of its mouth, 33.758925, -86.895140. No flow was present and the water was dark and tannin-stained. The stream bottom consisted of mud, bedrock, and boulders (Figure 2 & 3). B. Kuhajda, D. Neely, and N. Brooke collected from 10:32-10:52. Eight species of fishes totaling 154 specimens were collected in four seining efforts, with no Cahaba Shiners or Coal Darters collected (Table 1).

Site 2 – Locust Fork at the first riffle upstream of the mouth of Crooked Creek, 33.758797, -86.896560. Slow to moderate flow was present and the water was clear. The stream bottom consisted of bedrock, cobble, boulders, and gravel (Figure 2 & 4). B. Kuhajda, D. Neely, and N. Brooke collected from 11:00-12:00. Fifteen species of fishes totaling 394 specimens were collected in five seining efforts, including 26 Cahaba Shiners (Table 1). Photo-vouchers for Cahaba Shiners are provided in Figures 5-12.

Site 3 – Locust Fork at the first riffle downstream of the mouth of Crooked Creek, 33.757771, -86.897123. Slow to moderate flow was present and the water was clear. The stream bottom consisted of bedrock, cobble, boulders, and some gravel (Figure 2 & 13). B. Kuhajda, D. Neely, and N. Brooke collected from 12:21-13:12. Thirteen species of fishes totaling 557 specimens were collected in six seining efforts, including 11 Cahaba Shiners (Table 1). Photo-vouchers for Cahaba Shiners are provided in Figures 14-16.

Site 4 – Locust Fork at the second riffle downstream of the mouth of Crooked Creek, 33.753877, -86.897786. Slow to moderate flow was present and the water was clear. The stream bottom consisted of bedrock, cobble, boulders, and some gravel (Figure 2 & 17). B. Kuhajda, D. Neely, and N. Brooke collected from 13:45-14:21. Fifteen species of fishes totaling 212 specimens were collected in six seining efforts, including 1 Cahaba Shiner and 1 Coal Darter (Table 1). A photo-voucher for the Cahaba Shiner is provided in Figure 18.

Site 5 – Locust Fork at the third riffle downstream of the mouth of Crooked Creek, 33.751920, -86.898331. Slow to moderate flow was present and the water was clear. The stream bottom consisted of bedrock, cobble, boulders, and some gravel (Figure 2 & 19). B. Kuhajda, D. Neely, and N. Brooke collected from 14:30-15:02. Twelve species of fishes totaling 123 specimens were collected in seven seining efforts, including 2 Cahaba Shiners and 1 Coal Darter (Table 1). Photo-vouchers for Cahaba Shiners and the Coal Darter are provided in Figures 20-22.

Site 6 – Locust Fork at the fourth riffle downstream of the mouth of Crooked Creek, 33.749717, -86.898893. Slow flow was present and the water was clear. The stream bottom consisted of bedrock, boulders, some cobble, and little gravel (Figure 2 & 23). B. Kuhajda, D. Neely, and N. Brooke collected from 15:25-15:45. Eight species of fishes totaling 79 specimens

were collected in six seining efforts in this smaller riffle, with no Cahaba Shiners or Coal Darters collected (Table 1).

Discussion

The Geological Survey of Alabama surveyed for fishes 0.25 miles upstream of Jefferson County Road 77 (Mt. Olive Road) at the remnants of a mill dam (33.749674 -86.921759 from Google Earth) on 28 May 1998 from 13:00-13:45 using a backpack electroshocker and a 6 or 8 foot long seine. At this site they collected 17 fish species, 199 specimens, 18 Cahaba Shiners, and 6 Coal Darters (Shepard et al. 2004). Although their use of a backpack electroshocker was a more efficient method for capturing fishes, these numbers are comparable to the number of fish species, specimens, and Cahaba Shiners we collected during our survey in 2016, especially for our Sites 2 and 3 (Table 2). This demonstrates that in this section of the Locust Fork, data from these two separate surveys do represent an accurate portrayal of the fish community present. It is clear that the federally endangered Cahaba Shiner and the state protected Coal Darter reside in the Locust Fork at and downstream of the proposed Black Creek Mine. Allowing this mine to operate is a direct threat to these imperiled fish species (Shepard et al. 2004, USFWS 2016).

Literature Cited

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Table 1. List of fish species collected at each of six sites surveyed on 13 October 2016 in Crooked Creek (Site 1), first riffle upstream of mouth of Crooked Creek in Locust Fork (Site 2), and first, (Site 3), second (Site 4), third (Site 5), and fourth (Site 6) riffle downstream of mouth of Crooked Creek in Locust Fork.

Fish species	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Total number of specimens
<i>Campostoma oligolepis</i>		8	3	33	20	2	66
<i>Cyprinella callistia</i>		51	24	17	2		94
<i>Cyprinella venusta</i>	124	129	107	97	51	44	428
<i>Hybopsis winchelli</i>		79	31		1	1	112
<i>Luxilus chrysocephalus</i>	1						0
<i>Notropis cahabae</i>		26	11	1	2		40
<i>Notropis stilbicus</i>	18	61	343	28	36	21	489
<i>Notropis volucellus</i>	1	1	3				4
<i>Pimephales vigilax</i>		18	27		2		47
<i>Moxostoma erythrurum</i>				3			3
<i>Moxostoma poecilurum</i>			1	2			3
<i>Fundulus olivaceus</i>	5						0
<i>Gambusia affinis</i>				2			2
<i>Lepomis macrochirus</i>	2			5			5
<i>Lepomis megalotis</i>	1	1		3	3	1	8
<i>Micropterus henshalli</i>	2	6	2	10		7	25
<i>Etheostoma artesiae</i>		1					1
<i>Etheostoma douglasi</i>		1					1
<i>Etheostoma rupestre</i>			1				1
<i>Etheostoma stigmaeum</i>		1	1	3	3	2	10
<i>Percina brevicauda</i>				1	1		2
<i>Percina kathae</i>		10		5	1		16
<i>Percina nigrofasciata</i>		1	3	2	1	1	8
Number of species	8	15	13	15	12	8	–
Number of specimens	154	394	557	212	123	79	1519

Table 2. List of fish species collected at one site surveyed by the Geological Survey of Alabama (GSA) on 28 May 1988 in the Locust Fork approximately 3 miles downstream of current study sites and two sites surveyed on 13 October 2016 in the first riffle upstream of mouth of Crooked Creek in Locust Fork (Site 2), and the first riffle downstream of mouth of Crooked Creek in Locust Fork (Site 3). *Moxostoma* sp. YOY refers to young-of-the-year juvenile suckers not identifiable to species.

Fish species	GSA 1998	Site 2	Site 3
<i>Lepisosteus osseus</i>	2		
<i>Campostoma oligolepis</i>	41	8	3
<i>Cyprinella callistia</i>	4	51	24
<i>Cyprinella venusta</i>	50	129	107
<i>Hybopsis winchelli</i>	3	79	31
<i>Notropis cahabae</i>	18	26	11
<i>Notropis stilbius</i>		61	343
<i>Notropis volucellus</i>	4	1	3
<i>Pimephales vigilax</i>	43	18	27
<i>Hypentelium etowanum</i>	2		
<i>Moxostoma poecilurum</i>			1
<i>Moxostoma</i> sp. YOY	3		
<i>Strongylura marina</i>	1		
<i>Lepomis cyanellus</i>	1		
<i>Lepomis megalotis</i>	7	1	
<i>Micropterus henshalli</i>	1	6	2
<i>Etheostoma artesia</i>		1	
<i>Etheostoma douglasi</i>	2	1	
<i>Etheostoma rupestre</i>			1
<i>Etheostoma stigmaeum</i>		1	1
<i>Percina breviceuda</i>	6		
<i>Percina kathae</i>		10	
<i>Percina nigrofasciata</i>	11	1	3
Number of species	17	15	13
Number of specimens	199	394	557

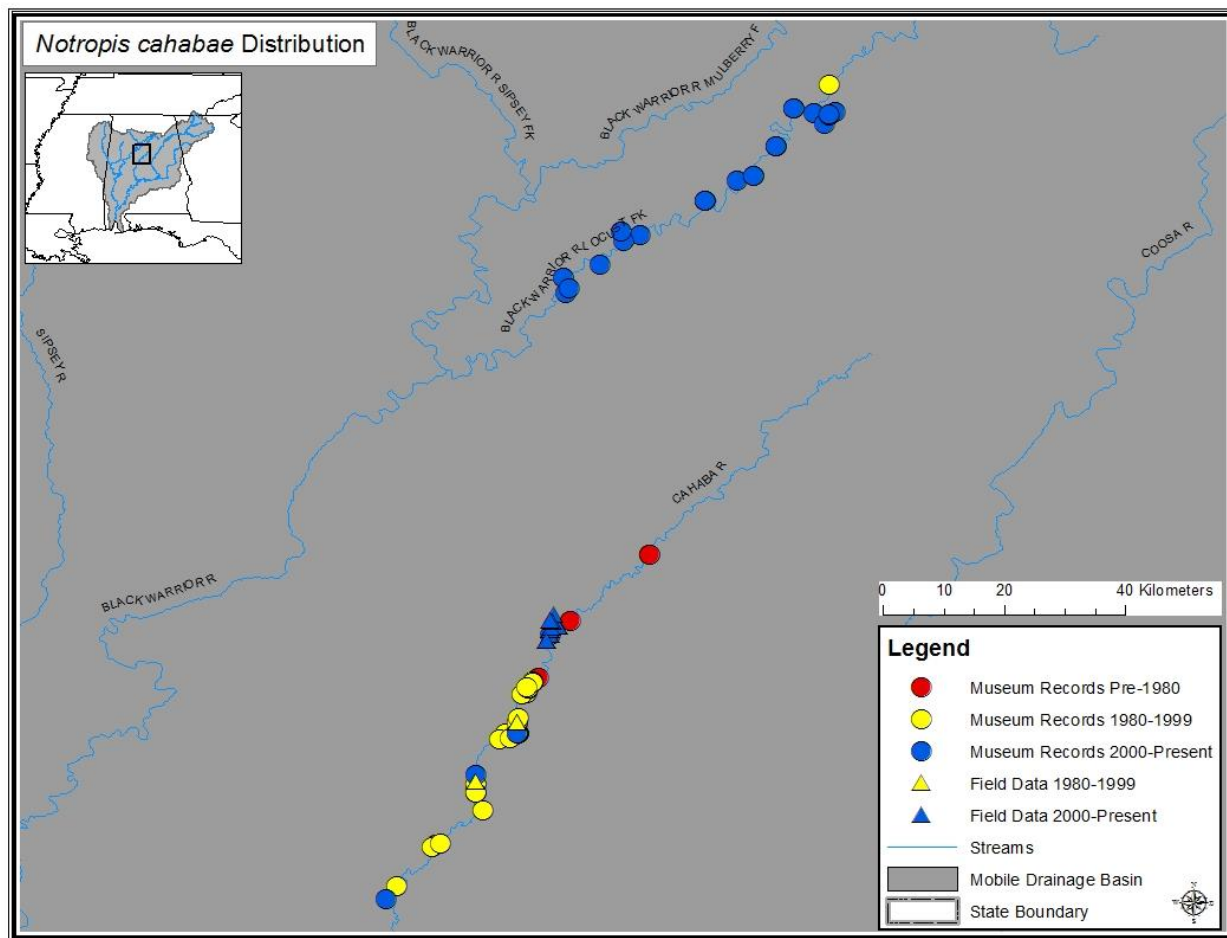


Figure 1. Distribution of the Cahaba Shiner *Notropis cahabae*.



Figure 2. Sampling areas for Cahaba Shiners *Notropis cahabae*: 1) first shallow area upstream of mouth in Crooked Creek, 2) first riffle upstream of mouth of Crooked Creek in Locust Fork, 3) first, 4) second, 5) third, 6) and fourth riffle downstream of mouth of Crooked Creek in Locust Fork.



Figure 3. First shallow area upstream of mouth in Crooked Creek (Site 1).



Figure 4. First riffle upstream of mouth of Crooked Creek in Locust Fork (Site 2).



Figure 5. Two Cahaba Shiners collected at Site 2.



Figure 6. Three Cahaba Shiners collected at Site 2.



Figure 7. Five Cahaba Shiners collected at Site 2.



Figure 8. Five Cahaba Shiners collected at Site 2.



Figure 9. Six Cahaba Shiners collected at Site 2.



Figure 10. One Cahaba Shiner collected at Site 2.



Figure 11. One Cahaba Shiner collected at Site 2.



Figure 12. Three Cahaba Shiners collected at Site 2.



Figure 13. First riffle downstream of mouth of Crooked Creek in Locust Fork (Site 3).



Figure 14. Four Cahaba Shiners (bottom) and one Mimic Shiner (top) collected at Site 3.



Figure 15. Three Cahaba Shiners collected at Site 3.



Figure 16. Four Cahaba Shiners collected at Site 3.



Figure 17. Second riffle downstream of mouth of Crooked Creek in Locust Fork (Site 4).



Figure 18. One Cahaba Shiner collected at Site 4.



Figure 19. Third riffle downstream of mouth of Crooked Creek in Locust Fork (Site 5).



Figure 20. One Cahaba Shiner collected at Site 5.



Figure 21. One Cahaba Shiner collected at Site 5.



Figure 22. One Coal Darter collected at Site 5.



Figure 23. Fourth riffle downstream of mouth of Crooked Creek in Locust Fork (Site 6).