Freshwater Mussel Survey Report Update

Monroe Bypass

(STIP No. R-3329/R-2559)

Mecklenburg and Union Counties, NC

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1.0 INTRODUCTION & BACKGROUND

The North Carolina Turnpike Authority (NCTA) proposes construction of the Monroe Bypass on new location from I-485 near Indian Trail, NC, to US 74 just west of Marshville, NC (Figure 1). Project construction will impact streams within the Rocky River Subbasin of the Greater Yadkin-Pee Dee River Basin, and potentially the headwaters of Four Mile Creek within the Sugar Creek Subbasin of the greater Catawba River Basin. The Federally Endangered Carolina Heelsplitter (*Lasmigona decorata*) and the state Endangered/Federal Species of Concern (FSC) Atlantic Pigtoe (*Fusconaia masoni*), Carolina Creekshell (*Villosa vaughaniana*), and Savannah Lilliput (*Toxolasma pullus*), are known to occur in the Rocky River Subbasin. In addition to these species, there are several other rare freshwater mussel species that are known to occur in this portion of the Rocky River Subbasin: Eastern Creekshell (*Villosa delumbis*), Creeper (*Strophitus undulatus*), and Notched Rainbow (*Villosa constricta*). The Creeper is considered Threatened and the Notched Rainbow and Eastern Creekshell are considered Special Concern and Significantly Rare by North Carolina.

In 2009 the Catena Group, Inc. (Catena) conducted freshwater mussel surveys in water bodies within the proposed alignment. This included select stream reaches that were lacking recent survey data within the proposed alignment that are within what was at the time considered the Future Land Use Study Area (FLUSA), but is now referred to as the Project Study Area (PSA) in the yet to be published Indirect and Cumulative Effects Quantitative Analysis Update. The Carolina Heelsplitter was not found within any of the streams surveyed; however, it is known to occur within Goose/Duck Creek, which is within the PSA. The survey results, which are detailed in the July 21, 2009 Freshwater Mussel Survey Report, indicated fairly diverse and robust freshwater mussel populations within South Fork Crooked Creek and Stewarts Creek in the vicinity of the project alignment, as well as in portions of Crooked Creek and Richardson Creek within the PSA. The Savannah Lilliput was found within the project crossing in the PSA. The U.S. Fish and Wildlife Service (USFWS) is in the process of developing an "Elevation to Candidate Species Status" package for this species to determine if it warrants formal listing as Threatened or Endangered in the future (John Fridell, USFWS Recovery Biologist, personal communication). In addition, the Center for Biological Diversity (CBD) recently petitioned the USFWS to list 404 aquatic species in the southeastern United States, including the Savannah Lilliput as either Threatened or Endangered under the Endangered Species Act (CBD 2010).

Since more than two years have passed since these surveys were completed, Catena was retained by Atkins to update mussel surveys for the Monroe Bypass.

2.0 MUSSEL SURVEY EFFORTS

In order to determine the location for the 2012 mussel surveys, the location of potential effects and/or impacts within the PSA were overlaid with streams identified during the 2009 surveys

that contain a robust freshwater mussel population that could potentially support the Carolina Heelsplitter. Accordingly, South Fork Crooked Creek and Stewarts Creek in the vicinity of the project alignment, and portions of Crooked Creek and Richardson Creek were surveyed.

2.1. Mussel Survey Methodology

Survey locations were chosen based on mapping and pre-survey investigations as provided by NCTA, accessibility, and appropriate habitat for the target species as determined in the field.

Surveys were conducted by Catena personnel on the following dates; September 26, 2012 (Tim Savidge, Tom Dickinson, Chris Sheats, and Ivy Kimbrough), October 3-5, 2012 (Tim Savidge and Ivy Kimbrough), and October 18, 2012 (Tim Savidge and Nancy Scott).

Within the surveyed reaches, all habitat types (riffle, run, pool, slack-water, etc.) were sampled by a minimum of a two-person team. The survey began at the downstream end of the survey reach and proceeded upstream with the team spread across the stream into survey lanes. A combination of visual, bathyscope (glass-bottom view buckets), and tactile methodologies were employed as appropriate. Upstream and downstream survey limits were recorded using a hand-help Garmin 12 or e-trex Vista GPS unit. Times searches were employed in each reach to provide a catch per unit effort (CPUE). Searches were also conducted for relict shells.

3.0 RESULTS

3.1. Within Alignment

3.1.1. South Fork Crooked Creek

South Fork Crooked Creek was evaluated in two sections; 1) from Unionville-Indian Trail Road (SR 1367) upstream approximately 580 feet and 2) from Rocky River Road (SR 1007) to 35.0652°N, -80.60031°W, approximately 1,000 feet below Secrest Shortcut Road (Figure 2).

1) Only approximately 580 feet of this section of South Fork Crooked Creek was surveyed in 2012 due to poor survey conditions. The stream channel ranged from 4 – 5 meters (13 – 16.5 ft) wide with approximately 2 meter (6 ft) high clay stream banks. Banks were unstable and significantly eroded. The surveyed reach consisted of mostly long pool and slow moving run habitat. Substrate was dominated by sand and hard-packed clay. The surrounding area consisted of a pasture and residences. There was a large amount of woody debris. Heavy accumulations of leaf pack and other organic material covered much of the substrate, making surveying difficult. A total of 8 Eastern Elliptio, 2 Variable Spike, and 1 Eastern Creekshell was found in 1.17 person hours of survey time (Table 1). In addition, the Asian Clam (*Corbicula fluminea*) was common and the aquatic snails *Physella* sp. and Two-ridged Rams Horn (*Helisoma anceps*) were also present.

Table 1. CPUE for Freshwater Mussels: South Fork Crooked Creek Section 1

Scientific Name	Common Name	Number	CPUE #/person hr
Elliptio complanata	Eastern Elliptio	8	6.84/hr
Elliptio icterina	Variable Spike	2	1.71/hr
Villosa delumbis	Eastern Creekshell	1	0.85/hr

2) The stream channel ranged from 4 – 8 meters (13 – 26 ft) wide with approximately 2 meter (6 ft) high clay banks. Banks ranged from unstable and scoured to more stable areas exhibiting only minor erosion and undercutting. The survey reach consisted of mostly long pool and slow moving run habitat with the occasional riffle areas where significant bedrock outcroppings were present. Substrate was dominated by sand, hard-packed clay, gravel, cobble, and silt with occasional slate bedrock outcropping. The surrounding landuse was predominately cropland, with riparian buffers of varying width. A total of 1,125 Eastern Elliptio, 398 Variable Spike, 3 lanceolate Elliptio sp., 2 Eastern Floater, 4 Eastern Creekshell, 3 Carolina Creekshell, 15 Florida Pondhorn (*Uniomerus carolinianus*) and 12 Savannah Lilliput were found in 11.4 person hours of survey time (Table 2). Eleven of the 12 Savannah Liliput were found in an approximately 10 meter (33 ft) section of the creek at 35.06540°N, -80.59915°W. The Asian Clam was common and the aquatic snails Physella sp. and Two-ridged Rams Horn were also present.

Table 2. CPUE for Freshwater Mussels: South Fork Crooked Creek Section 2

Scientific Name	Common Name	Number	CPUE #/person hr
Elliptio complanata	Eastern Elliptio	1,125	98.68/hr
Elliptio icterina	Variable Spike	398	34.91/hr
Elliptio sp	lanceolate elliptio species	3	0.26/hr
Pyganadon cataracta	Eastern Floater	2	0.18/hr
Uniomerus carolinianus	Florida Pondhorn	15	1.58/hr
Villosa delumbis	Eastern Creekshell	4	0.35/hr
Villosa vaughaniana	Carolina Creekshell	3	0.26/hr
Toxolasma pullus	Savannah Lilliput	12	1.05/hr

3.1.2. Stewarts Creek

In this downstream project crossing of Stewarts Creek (Figure 2), the stream channel ranged from 5 - 10 meters (16 – 33 ft) wide and stream banks ranged from 1 – 2 meters (3 – 6.5 ft) high. Banks ranged from stable to exhibiting some areas of erosion and undercutting. The surveyed reach sequenced from a rock fall riffle/run to a pool and slack water habitat often lined with bedrock outcroppings. Substrate was dominated by unconsolidated sand, angular cobble, and boulder, with areas of clay banks, silt, gravel, and bedrock. The surrounding area consisted of a moderate to wide forested buffer to poultry houses, and a utility corridor. A total of 17 Eastern

Elliptio, 6 Variable Spike and 7 Eastern Floater were located during 2.63 person-hours of survey time (Table 3). The Asian Clam was present.

Table 3. CPUE for Freshwater Mussels: Stewarts Creek

Scientific Name	Common Name	Number	CPUE #/person hr
Elliptio complanata	Eastern Elliptio	17	6.46/hr
Elliptio icterina	Variable Spike	6	2.28/hr
Pyganadon cataracta	Eastern Floater	7	2.66/hr

3.2. Additional Area Mussel Survey Results

Additional mussel surveys were conducted outside of the project study corridor in the best potential mussel habitats in the watersheds proposed to be impacted by the Monroe Bypass. The areas chosen for this effort were Richardson Creek upstream of the WWTP discharge facility and lower Crooked Creek, near its confluence with the Rocky River.

3.2.1. Richardson Creek

The additional mussel survey efforts in Richardson Creek were focused upstream of the Monroe WWTP discharge in the vicinity of the Walkup Road (SR 1106) crossing (Figure 2). In this section, Richardson Creek ranged from 12-15 meters (39 – 50 ft) wide with approximately 2 meter (6 ft) high stream banks. Banks generally exhibited some areas of erosion and undercutting, but were stabilized in areas with bedrock outcroppings. The surveyed reach mostly consisted of long shallow pool and slow moving run habitat punctuated with shallow gravel riffle areas. In order of dominance, substrate consisted of cobble, gravel, clay banks, silt, boulder, and bedrock. The surrounding area consisted of a narrow to moderate natural buffer to residential/ commercial areas and road. Large accumulations of leaf pack were present in some areas making surveying difficult, and there is a beaver dam in the upper limits of this survey reach. A total of 216 Eastern Elliptio, 15 Variable Spike, 2 lanceolate *Elliptio* sp., 12 Eastern Floater, 10 Florida Pondhorn, 10 Eastern Creekshell, 3 Carolina Creekshell, and 1 Paper Pondshell (*Utterbackia imbecellis*) were found in 7.00 person hours of survey time (Table 4). In addition, the Asian Clam and the aquatic snails Two-ridged Rams Horn, Marsh Rams-horn (*Planorbella trivolvis*), a Physid (*Physella* sp.) and Pointed Campeloma (*Campeloma decisum*) were present.

Table 4. CPUE for Freshwater Mussels: Richardson Creek Additional Area

Scientific Name	Common Name	Number	CPUE #/person hr
Elliptio complanata	Eastern Elliptio	216	30.86/hr
Elliptio icterina	Variable Spike	15	2.14/hr
Elliptio sp.	lanceolate elliptio species	2	0.29/hr
Pyganadon cataracta	Eastern Floater	12	1.71/hr
Uniomerus carolinianus	Florida Pondhorn	10	1.43/hr
Villosa delumbis	Eastern Creekshell	10	1.43/hr
Villosa vaughaniana	Carolina Creekshell	3	0.43/hr

Utterbackia imbecellis	Paper Pondshell	1	0.14/hr

3.2.2. Crooked Creek

The additional mussel survey efforts in Crooked Creek watershed were focused on the last several miles of the main stem of Crooked Creek from its confluence with Rocky River to the vicinity of Brief Road (SR 1547) (Figure 2). In this section, Crooked Creek ranged from 12 – 20 meters (39 – 65.5 ft) wide with approximately 0.5 – 2 meter (1.5 – 6.5 ft) high and mostly stable clay stream banks. The entire reach consisted of a relatively high gradient sequence of riffle/run to pool habitats marked by a dominance of slate bedrock that provided grade control and stability throughout. In order of dominance, substrate consisted of angular cobble, bedrock, gravel, boulder, sand, clay, and silt. The stream reach was surrounded by an extensive hardwood forest that buffers the area's mostly agricultural land use.

Crooked Creek was evaluated in three sections 1) from its confluence with Rocky River to 35.16088°N, -80.45517°W, 2) from 35.14651°N, -80.47060°W to 35.14168°N, -80.47370°W, and 3) from NC 218 up to 35.13177°N, -80.49202°W.

1) Heavy accumulations of leaf pack covered much of the substrate, making surveying difficult. A total of 7 Eastern Elliptio were found in 1.40 person hours of survey time (Table 5).

Table 5. CPUE for Freshwater Mussels: Crooked Creek Additional Area 1

Scientific Name	Common Name	Number	CPUE #/person hr
Elliptio complanata	Eastern Elliptio	7	5/hr

2) A total of 85 Eastern Elliptio, 16 Variable Spike, 23 Florida Pondhorn, 15 Eastern Creekshell, and 13 Carolina Creekshell were found in 12.00 person hours of survey time (Table 6). In addition, the Asian Clam and the aquatic snails Two-ridged Rams Horn and Pointed Campeloma were present.

Table 6. CPUE for Freshwater Mussels: Crooked Creek Additional Area 2

Scientific Name	Common Name	Number	CPUE #/person hr
Elliptio complanata	Eastern Elliptio	85	7.08/hr
Elliptio icterina	Variable Spike	16	1.33/hr
Uniomerus carolinianus	Florida Pondhorn	23	1.92/hr
Villosa delumbis	Eastern Creekshell	15	1.25/hr
Villosa vaughaniana	Carolina Creekshell	13	1.08/hr

3) A total of 20 Eastern Elliptio, 4 Variable Spike, and 2 Florida Pondhorn were found in 1.50 person hours of survey time (Table 7). In addition, the Asian Clam and the aquatic snails Two-ridged Rams Horn and Pointed Campeloma were present.

Table 7. CPUE for Freshwater Mussels: Crooked Creek Additional Area 3

Scientific Name	Common Name	Number	CPUE #/person hr
Elliptio complanata	Eastern Elliptio	20	13.33/hr
Elliptio icterina	Variable Spike	4	2.67/hr
Uniomerus carolinianus	Florida Pondhorn	2	1.33/hr

3.3. Mussel Survey Discussion

Catena conducted mussel surveys within the PSA for the proposed Monroe Bypass project in both 2009 and 2012. The streams identified during the 2009 surveys that contain a robust freshwater mussel fauna were revaluated in 2012 as these streams could potentially support the Carolina Heelsplitter. Overall the results of the two survey efforts are very similar, and as was the case in 2009, the Carolina Heelsplitter was not found in any of the surveyed streams. In addition, the Savannah Lilliput remains extant in South Fork Crooked Creek, and like in 2009, a concentration of individuals was found within the proposed roadway crossing.

Differences between the two survey efforts are more likely a result of differences in time of year, survey conditions, and level of effort, rather than an indication of changes in mussel abundances. For example, while the Savannah Lilliput was found in low numbers (3 individuals) in Richardson Creek in 2009, it was not located in 2012, but is likely still present. As mentioned above, there was a large amount of leaf pack covering the substrate in 2012 generally making surveying difficult. This coupled with the very small size of the Savannah Lilliput (< 2 inches) is likely the reason it was not detected. The fact that most of the other species occurring in Richardson Creek were found in similar numbers further supports this assumption. Furthermore, the difficulty of detecting a species that is present in low numbers during a one-time survey is highlighted by the fact that the Paper Pondshell was found (one individual) in Richardson Creek in 2012, but not in 2009, although it was known from the stream prior to 2009 (NCWRC Unpublished Aquatic Species Database).