



Lack of Evidence For Successful Freshwater Mussel Reintroduction in Cincinnati's Mill Creek

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Introduction

In the Fall of 2018, three freshwater mussel species were reintroduced to the Mill Creek. These species (*Lampsilis siliquoidea*, *Lasmigona complanata*, and *Pyganodon grandis*) were safely transported from the Miami River in Williamsburg and reintroduced into two locations in the Mill Creek (Mill Creek Alliance, 2018). The restoration of the Mill Creek has been a near decade long process to increase biodiversity and decrease local pollutants. Efforts such as removal of dams to create natural riffles have been conducted to increase water flow and expand biodiversity. Although the reason for their original extinction in the Mill Creek is unknown, it can be speculated that factors such as pollution, erosion, groundwater drawdown, and channel modification all played a significant roll in harming the mussels (High, 2018). In this study, we aimed to survey the Mill Creek to assess the status of *Lampsilis siliquoidea*, *Lasmigona complanata*, and *Pyganodon grandis*. Based on our findings we were able to make conclusions of the status of freshwater mussels and the overall biodiversity within the areas we surveyed. These findings yield a significant indicator for the status of Mill Creek restoration.

Methods

To assess the status of the three freshwater mussel species reintroduced, we surveyed 11 different sites throughout the Mill Creek. Each site was chosen based on riverbed consistency, depth, and location relevant to the nearest riffle. The riffles as seen in Figure 5 and Figure 6 were created by the Mill Creek Alliance to support proper water flow. Out of the 11 different sites, 9 of them were located at or near the relocation sites as seen in Figure 3. Sites 10 and 11 in Figure 4 were taken downstream, south of the first 9 sites. This was done to test if strong water flow caused the Mussels to move further downstream. For each site, an 8-meter by 30-meter box was measured using a field tape measure and marked with flags. Once a plot was measured, our group surveyed the area using clear bottom buckets. These buckets as seen in figure 1 were used to properly identify organisms and riverbed consistency. This bucket method was tested in the Little Miami River at Terrace Park (figure 2). The buckets proved effective in distinguishing rocks and debris from the species we were looking for.



Figure 1, one of the clear-bottom buckets used to survey the Mussels.

Figure 2, testing our methods in the Little Miami River.

Results

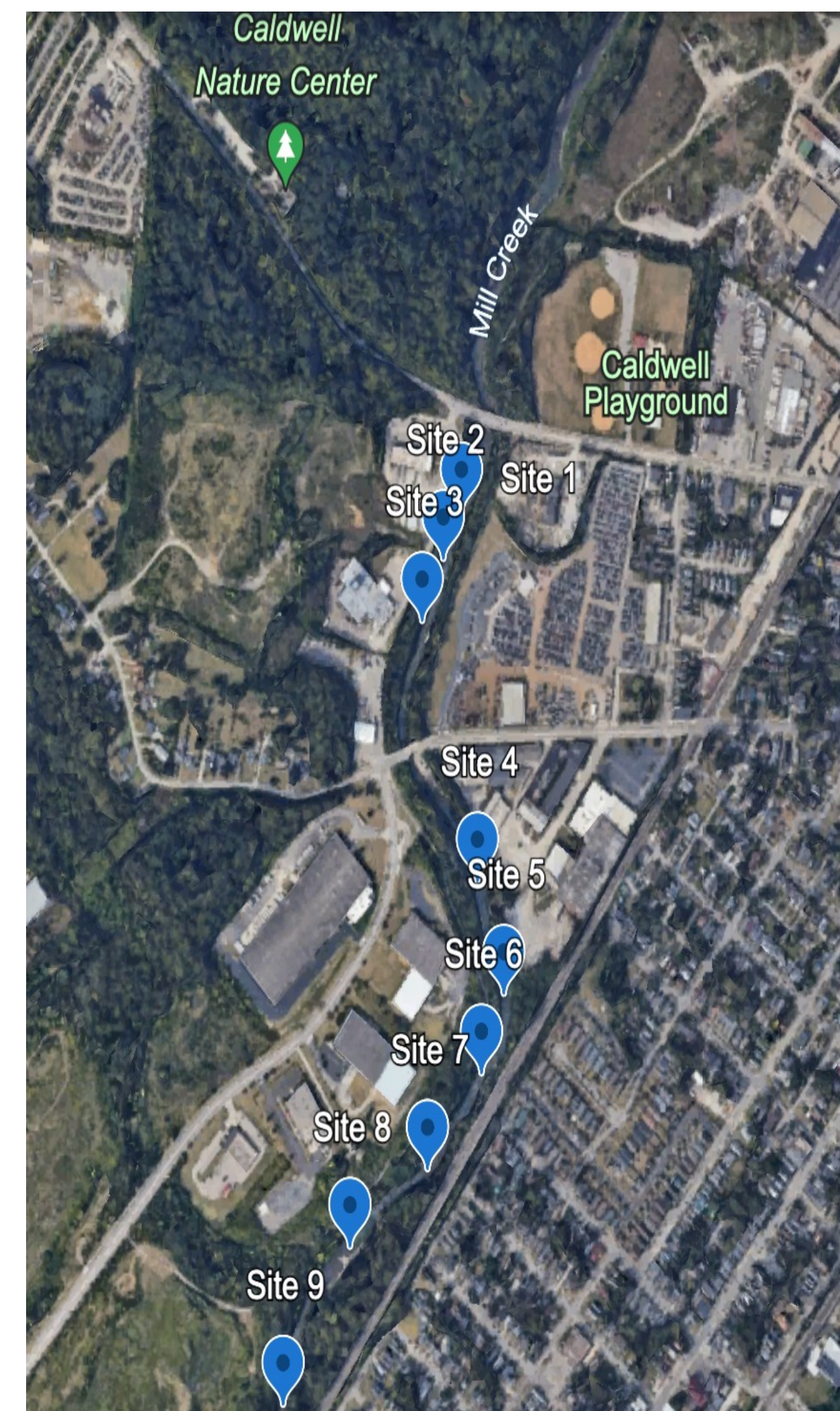


Figure 3, survey sites 1-9 spanning from the first relocation site near Caldwell to the end of the second relocation site near Este Avenue.

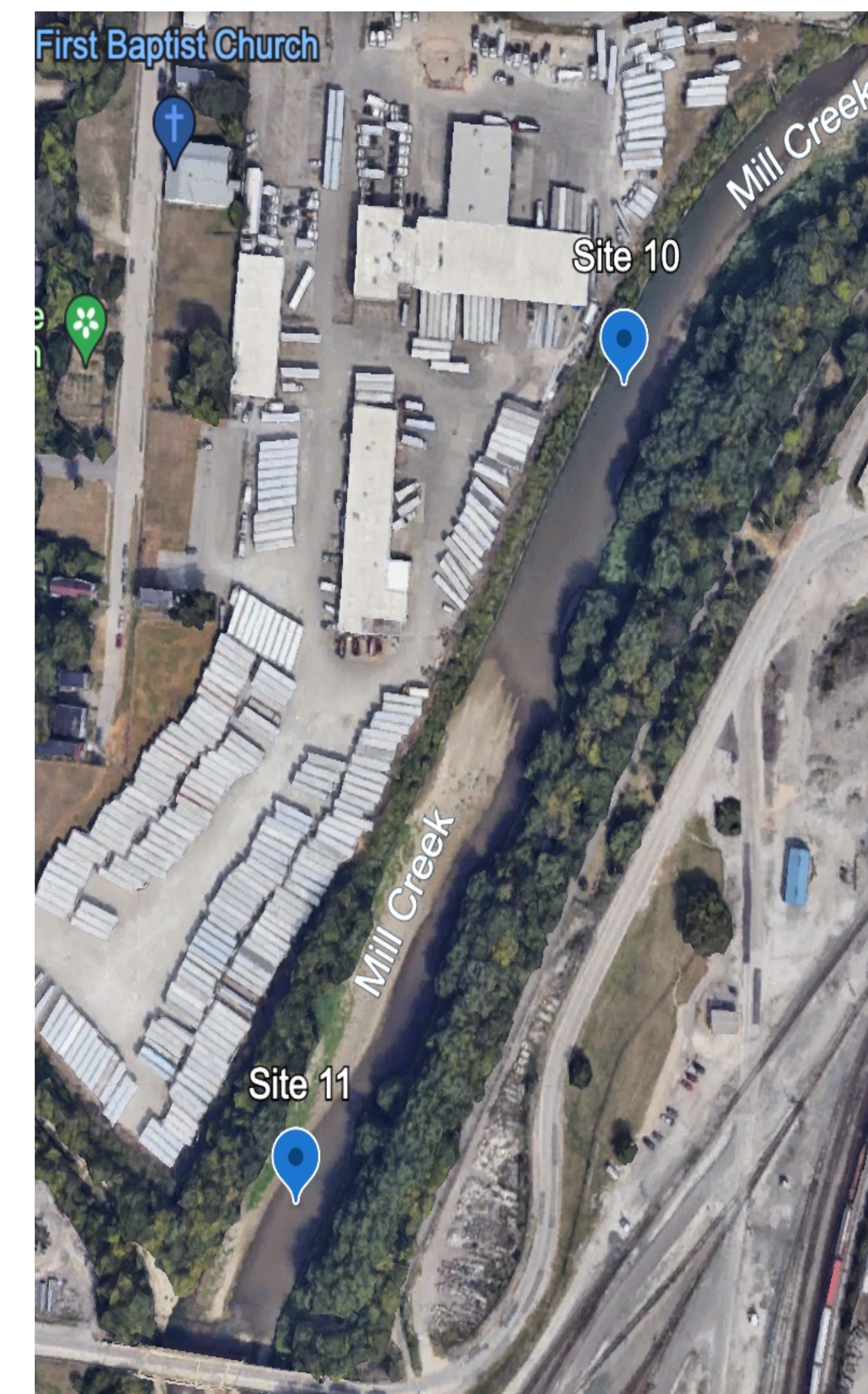


Figure 4, survey sites 10 and 11 were located south of the first 9 sites to test the theory of strong water flow and its effect on the three Mussel species.

Our results showed little evidence of a successful species re-introduction. Out of the 11 sites surveyed, one deceased *Lasmigona complanata* was found on the bank of site 4. Based on the features of its shell, it seems to have died roughly 1-2 years ago. Additionally, the shell of a *Pyganodon grandis* was found on a sand bar in site 3. Comparing our data to figure 8, which shows the original population of the three species reintroduced, it is evident that there has been a significant population decrease from the original 241 freshwater mussels reintroduced.



Figure 7, Deceased *Lasmigona complanata* found at site 4.

Mussel Species		Salvaged Individuals		Relocated to:	
Scientific Name	Common Name	Abundance	Relative Abundance (%)	EFLMR ¹	Mill Creek
<i>Alasmidonta viridis</i>	slippershell	2	0.3	2	0
<i>Amblema plicata</i>	threeridge	1	0.1	1	0
<i>Fusconaia flava</i>	Wabash pigtoe	1	0.1	1	0
<i>Lampsilis cardium</i>	plain pocketbook	1	0.1	1	0
<i>Lampsilis siliquoidea</i>	fatmucket	40	5.7	12	28
<i>Lasmigona complanata</i>	white heelsplitter	539	76.6	351	188
<i>Lasmigona costata</i>	fluted shell	11	1.6	11	0
<i>Pyganodon grandis</i>	giant floater	40	5.7	15	25
<i>Quadrula quadrula</i>	mapleleaf	1	0.1	1	0
<i>Strophitus undulatus</i>	creeper	9	1.3	9	0
<i>Tritogonia verrucosa</i>	pistolgrip	52	7.4	52	0
<i>Utterbackia imbecillis</i>	paper pondshell	7	1.0	7	0
TOTAL		704	100.0	463	241

Figure 8, the original freshwater mussel relocation survey (High, 2018).



Figure 5, the first relocation site of the 3 freshwater mussel species southwest of Caldwell Playground.

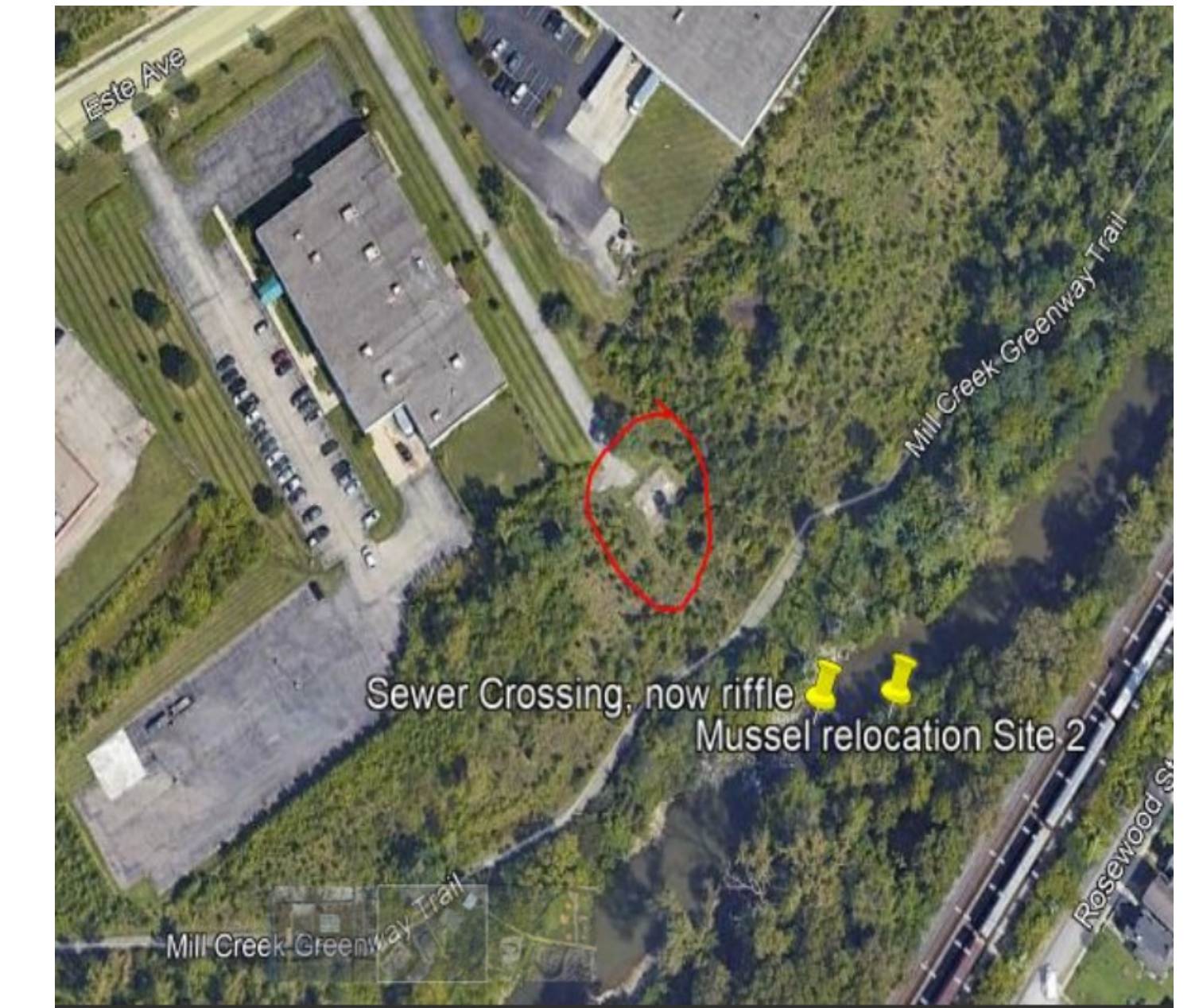


Figure 6, the second relocation site of the 3 freshwater mussel species southeast of Este Avenue.

Discussion

We found no significant evidence of a successful reintroduction for *Lampsilis siliquoidea*, *Lasmigona complanata*, and *Pyganodon grandis*. There could be many factors as to why there were no living species. Whether this had to do with their method of reintroduction or the conditions of the Mill Creek, it is unknown exactly what caused an unsuccessful reintroduction. Although our methods were proved successful, they were not used in parts of the Mill Creek that were deeper than 5 feet. This safety pre-caution was made to avoid being fully submerged in the river or losing survey equipment. Although major efforts have been contributed to restore the Mill Creek, it is still very polluted with trash and chemicals. Despite their filtering prowess, freshwater mussels remain sensitive to certain chemicals and other human pollutants (mass.gov, 2018). This factor along with differentiation of riffle flow in the Little Miami River and the Mill Creek most likely played a threatening role in their unsuccessful reintroduction. With more restoration efforts, a successful reintroduction could be possible.

Acknowledgments

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