

February 17, 2025
GEI Project No. 2000273

VIA EMAIL: kelly.brian@epa.gov

Mr. Brian Kelly
On-Scene Coordinator (OSC)
U.S. Environmental Protection Agency
Region 5, Emergency Response Branch
2565 Plymouth Road
Ann Arbor, Michigan 48105

**Re: Mussel Relocation Report
Allied Paper/Portage Creek/Kalamazoo River Superfund Site
Operable Unit 5 Area 4 TCRA**

Dear Mr. Kelly:

GEI Consultants of Michigan, P.C., on behalf of the Kalamazoo River Areas 2, 3 and 4 Remediation LLC (LLC), is pleased to provide this Mussel Relocation Report for the Area 4 Time-Critical Removal Action (TCRA) in Operable Unit 5 (OU5) of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site.

This work is being performed to meet certain requirements of the Consent Decree (CD) between NCR Corporation (now known as NCR Voyix), the United States Environmental Protection Agency (EPA), and the State of Michigan (December 2, 2020); the Statement of Work was modified to include Area 3 on October 11, 2023.

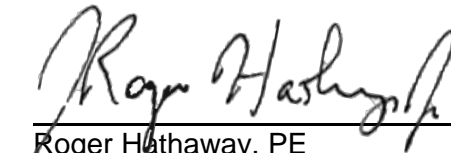
The Mussel Relocation Report is attached.

Sincerely,

GEI CONSULTANTS OF MICHIGAN, P.C.



Amber Ahles, PMP
Program Manager



Roger Hathaway, PE
Program Director

Attached: Mussel Relocation Report

c: John D. Jolly, NCR Voyix
Paul Ruesch, U.S. EPA

Mussel Relocation Report

OU5 Area 4 Time-Critical Removal Action Allied Paper/Portage Creek/ Kalamazoo River Superfund Site

Prepared for:
Kalamazoo River Areas 2, 3 and 4 Remediation LLC





Mussel Relocation Report

OU5 Area 4 Time-Critical Removal Action Allied Paper/Portage Creek/ Kalamazoo River Superfund Site

Prepared for:
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February 2025
GEI Project No. 2000273

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Abbreviations and Acronyms

CD	Consent Decree
cm	centimeters
°C	Degrees Celsius
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency
GPS	Global Positioning System
LLC	Kalamazoo River Areas 2, 3 and 4 Remediation LLC
ft	feet
MDNR	Michigan Department of Natural Resources
min	minute
mg/L	milligrams/liter
mm	millimeters
m	meter(s)
m ²	square meters
µS/cm	micro siemens per centimeter
n=	number or population size
OU5	Operable Unit 5
%	percent
PCB	Polychlorinated biphenyl
SOW	Statement of Work
TCRA	Time-Critical Removal Action
T/E	Threatened and Endangered
USFWS	United States Fish and Wildlife Service

1. Introduction

GEI Consultants of Michigan, P.C. is pleased to provide this Mussel Relocation Report for Area 4 of Operable Unit 5 (OU5) of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. This work was performed by GEI on behalf of the Kalamazoo River Areas 2, 3 and 4 Remediation LLC (LLC), which NCR Voyix (formerly NCR Corporation) formed to meet certain requirements of the Consent Decree (CD) between NCR Corporation, the United States Environmental Protection Agency (EPA), and the state of Michigan.

The CD was lodged in December 2019 and entered (approved) by the United States District Court for the Western District of Michigan on December 2, 2020 (EPA, 2020). The Statement of Work (SOW) was modified to include Area 3 on October 11, 2023 (EPA, 2023). The CD requires NCR to conduct response activities related to polychlorinated biphenyl (PCB) impacts present in Areas 2, 3, and 4 of OU5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. Work activities mandated by the CD include performance of a time-critical removal action (TCRA) in Area 4, and remedial design and remedial action in Areas 2 and 3.

Prior to the 2024 relocation efforts, freshwater mussel salvage/relocation efforts were conducted in Subareas E, F, and G in 2020 and 2021 in advance of Area 4 removal actions (Appendix A). This document summarizes the results of 2024 mussel relocation efforts in Area 4, Subareas C and D, which focused on near-bank areas where temporary bank stabilization controls may be installed in 2025 (Fig. 1). This report also summarizes additional mussel relocation efforts that occurred in summer of 2024 in portions of Subarea E where dredging is proposed in 2025 (Fig. 2).

Representative photographs of the relocation efforts are provided in Appendix A. Mussel relocation techniques and handling practices were consistent with Michigan's 2021 Freshwater Mussel Survey Protocol for Rivers and Streams (Hanshue et. al, 2021) and GEI's mussel relocation plan (Appendix B). Permits obtained for this effort, including Michigan Department of Natural Resources (MDNR) Scientific Collector's Permit and GEI's Threatened and Endangered (T/E) Species Permit, are included as Appendix C.

2. Methods

Mussel salvage and relocation efforts focused specifically on Subareas C, D, and E of Area 4 (Figs. 1 and 2). Efforts described herein were conducted by GEI biologists and technicians who possess, at minimum, a B.S. in biology, natural resources, or a related field, and knowledge of the ecology of freshwater mussels. Survey efforts were led by people who have passed the Michigan mussel identification exam or accredited alternative (e.g., exams administered by the State of Ohio and/or the United States Fish and Wildlife Service) and have direct experience implementing Michigan's mussel protocol.

Subarea C and D survey and relocation efforts were targeted in near-bank areas where temporary bank stabilization controls may be installed in 2025 (Fig. 1). Subarea E mussel relocation efforts focused on portions of survey blocks that overlap with areas where dredging is currently proposed for 2025 and where mussels were reasonably abundant during the 2020/2021 mussel salvage efforts (GEI, 2022; Fig. 2).

Mussel survey and/or relocation efforts were conducted only in areas safely accessible and suitable for mussels (Fig. 2). As outlined in the mussel relocation plan (Appendix B), portions of Area 4, Subarea E that were considered not safe for mussel efforts in 2020/2021 were not revisited in 2024 unless conditions had considerably changed.

Prior to survey, general water chemistry parameters were taken at the site via a calibrated YSI Pro+ sonde. Metrics gathered included water temperature (°C), pH, dissolved oxygen (DO [mg/L, % saturation]), and specific conductance (µS/cm).

2.1 Transplant Area Verification

Prior to the start of 2024 efforts, conditions of the upstream transplant area used during 2020/2021 Area 4 mussel salvage/relocation efforts were assessed. Meander searches were conducted in the transplant area for a minimum of 60 minutes total among divers. These searches verified that suitable conditions and live mussels still existed in these areas (prior to transplanting additional mussels in 2024). The transplant area is off River Road approximately 3.5 miles upstream of Trowbridge Dam along the left descending bank (Fig. 3; also see GEI, 2022).

2.2 Site Set Up

2.2.1 Subarea C and D: Near-bank Areas

Near-bank areas proposed for temporary bank stabilization in Subarea C and D were estimated to be approximately 1,025 m in total length based on project plans (Fig. 1).

Fifteen individual target areas (hereafter “transects”) were established for guiding and conducting mussel salvage efforts of these areas in 2024. Individual transect lengths ranged from 6 to 600 m based on proposed project plans. Transects were marked at every meter and had a unique marker every 10 m to denote 10-m segments along each transect.

Transects were located in the field using a Trimble R1 GPS receiver (sub-meter accuracy), and the upstream and downstream boundaries of each bank stabilization footprint were flagged. Current, visibility, and water depth were assessed. Due to the high presence of large woody debris, variable/unstable banks, and irregular lengths of each transect, a weighted rope transect line was not used for near-bank surveys. Instead, surveyors worked side-by-side to collectively clear a 2–3-m swath along each bank. Surveyors worked from the downstream flag to the upstream flag at each transect. Mussel collection within each transect proceeded as outlined in Section 2.3.

2.2.2 Subarea E: Blocks E2, E3, and E5

Salvage areas in Subarea E were based on results of 2020/2021 efforts and areas proposed for dredging in 2025 (Fig. 2; GEI, 2022). The targeted mussel relocation areas (Blocks E2, E3, and E5) were located using a Trimble R1 GPS receiver (sub-meter accuracy). The corners of each survey block were marked using a cinder block with a colored buoy attached. Current, visibility, and water depth were assessed prior to survey.

Where deemed effective, weighted rope transects were set parallel to flow in each survey block to guide divers during mussel search efforts (Fig. 2). Some areas of the blocks were obstructed (large woody debris) or had high current/flow; in those cases, meander searches were used in lieu of setting transect lines. Mussel collection proceeded as outlined in Section 2.3.

2.3 Mussel Collection

Snorkel gear was used to conduct mussel relocation where water depths were <2.5 feet and visibility allowed. Scuba equipment and surface-supplied diving equipment were used to search areas that were not accessible via snorkeling (>2.5 feet). Certified scuba divers conducted all diving activities (scuba and surface-supplied). When scuba equipment was employed, one scuba certified diver remained on shore (or on the boat) as safety spotter.

As described above, 2024 efforts were not conducted in areas of Area 4, Subarea E that were considered not safe for mussel efforts in 2020/2021. Additionally, searches were not performed in any areas that contained highly unsuitable substrates (e.g., highly mobile sand, calcified hardpan), were not safely accessible (e.g., unsafe flows

and currents), or had underwater hazards (e.g., large woody debris, swift underwater currents). Areas that were removed from survey in Area 4, Subarea E are depicted in Fig. 2.

The mussel collection process consisted of three basic steps: 1) a visual-tactile search of the surficial substrate, 2) excavation of the substrate (e.g., moving cobble/woody debris out of the way, hand-sweeping away silt) in the upper 2–3 inches, and 3) a second visual tactile search in the cleared area. Hand-grubbing was utilized in lieu of a second visual-tactile search in areas where silt and/or particulate matter impacted water-column visibility.

Targeted mussel search rate was ≥ 1 minute per square meter (min/m^2) in areas with heterogenous, stable substrates and $2 \text{ min}/\text{m}^2$ in areas where listed and/or small-bodied individuals were encountered. Search rate was decreased to $< 1 \text{ min}/\text{m}^2$ in areas dominated by unsuitable substrate (e.g., mobile sand, calcified hardpan, thick silt, clay “sludge”). It should be noted that Blocks E2, E3, and E5 were cleared of mussels in 2020/2021. As such, where mussel abundance was found to be low (i.e., ≤ 0.1 mussels/ m^2) searches were also expedited to $< 1 \text{ min}/\text{m}^2$. Mussel data, water depth, and substrate proportions were recorded for each transect (Subarea C and D) or cell (Subarea E).

Mussel relocation efforts started at the downstream end of each given transect and worked upstream. Two or three surveyors worked side by side, collectively clearing a 2–3-m path along each transect. A minimum of two passes were made along each transect. A transect was considered “cleared” when less than 5% of the mussels (or ≤ 2 individuals) found on the initial pass were found on the follow-up pass (or passes). Transects were repositioned throughout Subarea E blocks as needed until the entire safely accessible target area was cleared.

2.4 Mussel Handling and Relocation

All live mussels found during relocation efforts were extracted from the streambed, placed in flow-through containers (e.g., mesh bags, buckets with holes in them), and kept out of the sunlight. Mussels were identified by biologists with experience and training in the identification of mussels from Great Lakes states. When warranted, various taxonomic references were consulted to confirm species identification (Metcalf-Smith et al., 2005; Mulcrone and Rathbun, 2018; Watters et al., 2009).

Mussels were measured to the nearest millimeter (mm) using calipers. Sex and age status (e.g., juvenile [≤ 5 years] or adult) of specimens were recorded when determination could be made with confidence. Due to an absence of T/E specimens and low abundance of special-concern specimens, all mussels (including common species)

found were tagged with glue-on shellfish/bee tags for potential post-relocation monitoring, should it be required.

Representative photographs (i.e., left valve, right valve, beak/umbo) of each species were taken. Shells from dead specimens (not also found live) were photographed to generate a sitewide species list inclusive of species for which only shells were found.

Mussels were relocated at the end of each day. During relocation, live mussels were moved to the transplant area by boat in mesh bags or buckets filled with site water. Care was taken to keep mussels out of direct sunlight for extended periods and to expose mussels consistently to fresh river water. Mussels were positioned in the transplant area, evenly spaced along the 40-m transect line, placed posterior end up, and buried approximately halfway into the sediment.

3. Results

Mussel relocation efforts occurred July 30 through August 1 in Subarea C and D, and on August 5 through 7 in Subarea E. Efforts were conducted by a team of six or seven GEI biologists and technicians. The total area cleared during mussel relocation was 7,662 m² across Area 4. The area cleared in Subareas C and D totaled 4,222 m² across the 15 transects. The surveyable area cleared in Subarea E was 3,440 m² total; all other areas in Blocks E2, E3, and E5 were unable to be searched due to unsafe conditions (e.g., high current).

Total survey time in Subareas C and D was 34 hours and 46 min (2,086 min), resulting in an average search rate of 0.50 min/m². Total survey time in Subarea E was 25 hours and 13 min (1,513 min), resulting in an average search rate of 0.44 min/m². The search rate being below 1 minute/m² is attributed to the abundance of highly unsuitable substrate throughout most of the area and other site characteristics.

3.1 Site Characteristics

3.1.1 Subarea C and D: Near-bank Areas

For 2024 salvage and relocation efforts, representative water chemistry was taken at the downstream end of Subarea C and D. Water chemistry values were deemed typical for the location and season. Fine substrates (e.g., silt) in Subareas C and D created low visibility once disrupted (15–30 cm). Water depth was generally consistent across the transects, averaging 1–3.5 feet, with a maximum depth of 6 feet (Transect 3 near the thalweg) (Table 3). Current and flow were generally consistent and minimal due to proximity of the transects to the banks. Photos of on-site conditions are in Appendix A.

Generally, most transects were dominated by hardpan, reaching as high as 85% composition (Table 1). This hardpan was noted as being calcified, unable to be excavated, and often had a sludge-like appearance but was hard (see Appendix A for photos). For this reason, searches that were initially 1 min/m² were expedited after verifying highly unsuitable substrate and very low mussel abundance. Silt and sand were also abundant (Table 1). Gravel and cobble were present across Subareas C and D, but in lesser amounts. Detritus, primarily large wood debris, was present in most transects and sometimes inhibited successful and safe survey. Representative photographs of large woody debris encountered can be seen in Appendix A.

3.1.2 Subarea E: Blocks E2, E3, and E5

Visibility in Subarea E was generally low (15–30 cm), with the presence of fine substrates (e.g., silt) creating low visibility once disturbed. Water depth was generally

consistent across the surveyable areas of the blocks in Subarea E, averaging 3–3.5 feet, with a maximum depth of 8 feet in E5 (Table 2). Current and flow were high in Subarea E, which resulted in a majority of the area in each block being eliminated from the 2024 survey efforts. Divers could not stay in place safely, even with additional weights. Most surveys were therefore focused on near-bank areas where current was safe for divers and habitat was suitable. These near-bank areas are where the majority of mussels were found during previous mussel efforts in Subarea E. Results in Table 2 are not representative of the entire block, but rather only the areas surveyed. Photos of on-site conditions are in Appendix A.

Generally, most of Subarea E was dominated by hardpan, silt, and sand (Table 2). Similar to Subareas C and D, this hardpan was noted as calcified, unable to be excavated, and often resembling hardened sludge (see Appendix A for photos). Gravel, cobble, and boulders were also present in Subarea E, but in lesser amounts ($\leq 10\%$). Many areas in Subarea E were eliminated due to downed trees and other large wood debris, which sometimes inhibited safe survey because of potential for entanglement.

3.2 Mussel Community

3.2.1 Subarea C and D: Near-bank Areas

A total of 12 live mussels representing four species were found across Subareas C and D. The most abundant species found live across Subareas C and D were White Heelsplitter (*Lasmigona complanata*) and Mucket (*Actinonaias ligamentina*), each at 42% (5/12 each) composition. Other species found live included the species of special concern Creek Heelsplitter (*Lasmigona compressa*; $n=1$) and common species Giant Floater (*Pyganodon grandis*; $n=1$) (Table 3). An additional five species were found as shell-only specimen, including species of special concern Ellipse (*Venustaconcha ellipsiformis*) and Elktoe (*Alasmidonta marginata*), and common species Spike (*Eurynia dilatata*), Plain Pocketbook (*Lampsilis cardium*), and Wabash Pigtoe (*Fusconaia flava*). This brought the site total for species found live or in shell to nine. No endangered or threatened species were found (live or shell) in Subareas C or D.

Of the 15 transects surveyed, only six had live mussels. The most mussels found per transect was three ($n=3$), in Transects 14 and 15, the two most upstream transects (Fig. 1). Transect 14 was the longest transect surveyed at 600 m (Table 1), resulting in a larger area covered than most transects. No more than two species were found in other transects (Table 3).

Mussel lengths across Subarea C and D ranged from 77 mm to 143 mm, with the former being a Creek Heelsplitter and the latter being a White Heelsplitter. Mussel-specific lengths can be provided upon request. Juveniles (<5 years old) and small-bodied individuals (<50 mm) were found within Subarea C and D.

3.2.2 Subarea E: Blocks E2, E3, and E5

A total of 23 live mussels representing eight species was found across Subarea E. The most abundant species found live across Subarea E were White Heelsplitter (n=7) and Creeper (*Strophitus undulatus*; n=6). Other species found live included the species of special concern Creek Heelsplitter (n=1) and Elktoe (n=1) (Table 4). An additional two species were found as shell-only specimen, including species of special concern Ellipse and Paper Pondshell (*Utterbackia imbecillis*), bringing the site total for species found live or in shell to ten (10). No endangered or threatened species were found (live or shell). Live mussels were found in all three blocks in Subarea E, however Block E2 had the highest abundance (n=11) and species richness (six of eight species) (Table 4).

Mussel lengths across Subarea E ranged from 41 mm to 144 mm, with the former being a Wabash Pigtoe and the latter being a White Heelsplitter. Mussel-specific lengths can be provided upon request. Juveniles (<5 years old) and small-bodied individuals (<50 mm) were found across Subarea E.

3.3 Transplant Area

The upstream transplant area, which was also the transplant area utilized in 2020/2021, met all the criteria for a transplant area set by the Michigan mussel protocol (i.e., same river reach, suitable substrate, similar mussel community, no barriers for host fish). During a 60-minute transplant area assessment (meander search), biologists documented similar mussel diversity and abundance to what was found in the mussel relocation footprint, including White Heelsplitter and Mucket. The transplant area had consistent and/or more suitable substrate (50% sand, 30% gravel, 15% cobble, 5% silt) than where most live mussels were found during surveys. The transplant area was mapped with GPS (Fig. 3) and representative photos of the transplant area and its substrate are provided in Appendix A. All live mussels found during 2024 mussel salvage efforts in Subareas C, D, and E, were relocated to this upstream mussel transplant area (Fig. 3).

3.4 Post-Relocation Monitoring

Post-relocation monitoring is not anticipated due to the low number of mussels relocated in 2024 and the lack of T/E species.

4. Summary

During 2024 mussel salvage and relocation efforts, mussel abundance was patchy and low across Subareas C, D, and E. Across all areas surveyed in Area 4 (Subarea C, D, and E) only 35 mussels were found live. A majority of Subarea E was not safe for survey due to swift current and much of the riverbed was considered unsuitable for mussels (Fig. 2). Areas that were able to be surveyed were thoroughly searched and excavated during relocation efforts, with the detection of juvenile and small-bodied mussels evident of effective searches. Despite the unsuitable habitat, nearly 60 hours (3,599 minutes) of search effort was conducted in Area 4.

4.1 Mussel Abundance

Mussel abundance during 2020/2021 mussel efforts showed similar results to what was seen in 2024. Areas in the main channel had low and patchy abundance in 2020/2021, with 196 mussels relocated from a 36,199 m² area (GEI, 2022).

The low 2024 mussel abundance in Area 4 is likely influenced by the mussel relocation effort conducted in Area 4 in 2020/2021, which removed 196 mussels from portions of Subareas C, D, and E and the habitat and substrate observed during surveys. While some areas surveyed in Subarea E had heterogeneous substrate such as sand, gravel, and cobble, calcified hardpan and underwater debris (e.g., large and small woody debris and leaf packs in thick mats) was often present directly underneath. These conditions can make the river bottom impenetrable for mussel burrowing and can obstruct mussels from accessing bottom substrates. Silt and mobile sand were also dominant, which are unstable in high flows, and thus are unsuitable for the settlement of juvenile mussels and mussel community establishment. In fact, in 2021 the LDB of Subarea E had upwards of 24 inches of silt and fine-grained sediment deposited, which had not been observed in 2020 (GEI, 2022). Deposition of sediment can adversely impact mussel populations (Goldsmith et al., 2021). These areas were devoid of mussels in 2021 surveys (GEI, 2022). This deposition was still observed in 2024, and such areas were therefore not surveyed upon confirmation of sustained unsuitable conditions (Fig. 2).

This reach of the Kalamazoo River is subject to variable flows and fluctuating water levels due its proximity to the Trowbridge Dam. Instability in hydrological factors can impact mussel communities (Davis et al., 2013) and may also be a factor contributing to the low mussel density observed site-wide in Area 4 in 2020/2021 and 2024. Of note is that the factors listed above could also impact fish communities in the project area. Impacts to fish communities can influence mussel communities due to mussel-fish host dynamics.

4.2 Species Diversity

Michigan's mussel protocol (MDNR et al., 2021) lists the Kalamazoo River (Allegan County, MI) as a Group 1 stream, supporting common species and species of special concern. This aligned with results of 2024 efforts as no state or federal T/E species were found; all species were either common or of special concern.

All mussel species found in 2024 have been previously documented in the Kalamazoo River during prior mussel surveys (Mulcrone and Mehene, 2001; GEI, 2022; GEI, 2024). Although Creek Heelsplitter had not been previously observed live during recent GEI efforts (GEI, 2022; GEI, 2024), this species has been previously documented in the Kalamazoo River (Mulcrone and Mehene, 2001).

There were a few species that were found in prior surveys that were not re-observed in 2024. For example, Fatmucket (*Lampsilis siliquoidea*), Fluted-shell (*Lasmigona compressa*), and Paper Pondshell (*Utterbackia imbecillis*) were observed in Subarea E in 2020/2021 but were not observed in 2024. However, these species were found in low quantities in 2020/2021 (i.e., ≤ 2 individuals), and therefore their absence in 2024 efforts was not surprising.

The most abundant species found in 2024, White Heelsplitter, was also one of the most abundant species found in past surveys, including near the Trowbridge Dam (Mulcrone and Mehne, 2001), in Area 3 (ESI, 2016 and 2018), and in Area 4 Subareas E, F, and G (GEI, 2022). Area 4 currently exhibits some "impoundment-like" characteristics, which are highly depositional and heavily vegetated, particularly in late summer. While unsuitable for most mussel communities, White Heelsplitter is a species that regularly occurs in these habitats, often found in slow-flowing (or lentic) waters and is common near impoundments (Watters et al, 2009).

5. References

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Tables

Table 1. Substrate and Depth – Kalamazoo River Area 4 Subarea C and D Mussel Relocation 2024 (Plainwell, MI)

Mussel Relocation Report

Kalamazoo River OU5 Areas 2, 3 and 4 Remediation LLC

OU5 Area 4 TCRA

Feature		Transect														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Water Depth (ft)	Average:	1.5	3.0	3.5	2.0	1.0	1.0	2.5	2.5	2.0	2.0	1.5	3.0	2.5	2.0	3.5
	Maximum:	2.0	4.0	6.0	4.0	3.0	2.0	3.5	3.0	3.0	4.0	3.0	5.5	3.5	5.0	5.0
Substrate Type (%)	Silt:	–	15	30	20	55	–	30	60	50	30	50	20	30	30	20
	Detritus:	–	–	–	–	10	–	15	10	5	10	10	5	5	5	–
	Sand:	35	–	5	10	5	95	10	15	40	20	20	20	25	10	20
	Gravel:	65	–	5	10	–	–	–	15	5	–	–	–	–	–	10
	Cobble:	–	–	10	–	–	–	5	–	–	–	–	–	–	–	–
	Hardpan:	–	85	50	60	30	5	40	–	–	40	20	55	40	55	50
Total:		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Prepared by/Date: Meghan Martinski 01/08/2025

Checked by/Date: Ryan Holem 01/28/2025

Notes:

1. Subarea C and D mussel relocation efforts were conducted in near-bank areas where temporary bank stabilization controls may be installed in 2025.
2. The following substrate types were not observed and, therefore, omitted from the table: muck, boulder, bedrock, artificial.
3. The transplant area had similar average water depths and more suitable substrate than observed in Area 4 Subareas C and D.

Table 2. Substrate and Depth – Kalamazoo River Area 4 Subarea E Mussel Relocation 2024 (Plainwell, MI)
Mussel Relocation Report
Kalamazoo River OU5 Areas 2, 3 and 4 Remediation LLC
OU5 Area 4 TCRA

Feature		Block		
		E2	E3	E5
Water Depth (ft)	Average:	3.5	3.0	3.0
	Maximum:	6.0	7.0	8.0
Substrate Type (%)	Silt:	25	30	25
	Detritus:	1	0	0
	Sand:	15	30	30
	Gravel:	10	10	10
	Cobble:	10	10	10
	Boulder:	4	0	5
	Hardpan:	35	20	20
Total:		100	100	100

Prepared by/Date: Meghan Martinski 01/08/2025

Checked by/Date: Ryan Holem 01/28/2025

Notes:

1. The following substrate types were not observed and therefore omitted from the table: muck, bedrock, artificial.
2. The transplant area had similar average water depths and more suitable substrate than what was observed in Area 4 Subarea E.

Table 3. Mussel Summary – Kalamazoo River Area 4 Subarea C and D Mussel Relocation 2024 (Plainwell, MI)
Mussel Relocation Report
Kalamazoo River OU5 Areas 2, 3 and 4 Remediation LLC
OU5 Area 4 TCRA

Scientific Name	Common Name	MI Status ¹	Transect						Total
			3	4	6	12	14	15	
<i>Lasmigona complanata</i>	White Heelsplitter	–	1	–	2	–	2	–	5
<i>Actinonaias ligamentina</i>	Mucket	–	–	1	–	1	1	2	5
<i>Lasmigona compressa</i>	Creek Heelsplitter	SC	–	1	–	–	–	–	1
<i>Pyganodon grandis</i>	Giant Floater	–	–	–	–	–	–	1	1
Total Mussels:			1	2	2	1	3	3	12
Transect Area (m²):			332	500	130	660	1,200	306	4,222
Mussel Density (mussels/m²):			<0.01	<0.01	0.02	<0.01	<0.01	0.01	<0.01

Prepared by/Date: Meghan Martinski 01/08/2025

Checked by/Date: Ryan Holem 01/28/2025

Notes:

1. Subarea C and D mussel relocation efforts were conducted in near-bank areas where temporary bank stabilization controls may be installed in 2025.
2. ¹ = Michigan Status as of 2024; SC = Special Concern.
3. Species found as shell-only specimen in Subareas C and D: Spike (*Eurynia dilatata*), Ellipse (*Venustaconcha ellipsiformis*; SC), Elktoe (*Alasmidonta marginata*; SC), Plain Pocketbook (*Lampsilis cardium*), and Wabash Pigtoe (*Fusconaia flava*).
4. The following transects had zero live mussels and, therefore, were eliminated from this table: 1, 2, 5, 7, 8, 9, 10, 11, 13.

Table 4. Mussel Summary – Kalamazoo River Area 4 Subarea E Mussel Relocation 2024 (Plainwell, MI)
Mussel Relocation Report
Kalamazoo River OU5 Areas 2, 3 and 4 Remediation LLC
OU5 Area 4 TCRA

Scientific Name	Common Name	MI Status ¹	Block			Total
			E2	E3	E5	
<i>Lasmigona complanata</i>	White heelsplitter	–	3	2	2	7
<i>Strophitus undulatus</i>	Creeper	–	3	2	1	6
<i>Fusconaia flava</i>	Wabash pigtoe	–	2	2	0	4
<i>Actinonaias ligamentina</i>	Mucket	–	1	1	0	2
<i>Alasmidonta marginata</i>	Elktoe	SC	0	0	1	1
<i>Lampsilis cardium</i>	Plain Pocketbook	–	0	1	0	1
<i>Lasmigona compressa</i>	Creek Heelsplitter	SC	1	0	0	1
<i>Pyganodon grandis</i>	Giant Floater	–	1	0	0	1
Total Mussels:			11	8	4	23
Transect Area (m²):			1,190	1,120	1,130	3,440
Mussel Density (mussels/m²):			<0.01	<0.01	<0.01	<0.01

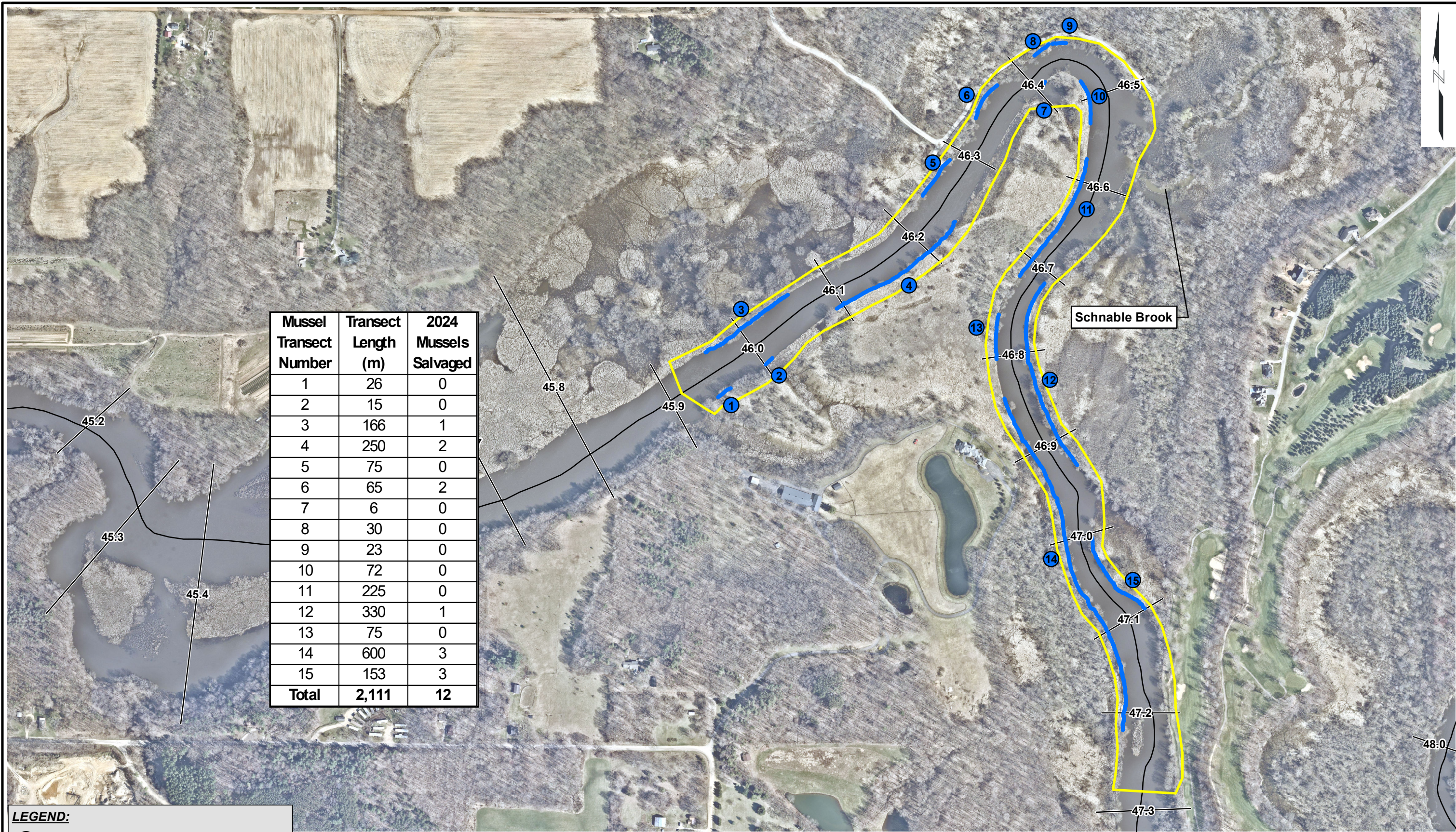
Meghan Martinski 01/08/2025

Ryan Holem 01/28/2025

Notes:

- ¹ = Michigan Status as of 2024; SC = Special Concern.
- Species found as shell-only specimen in Subarea E: Ellipse (*Venustaconcha ellipsiformis*; SC) and Paper Pondshell (*Utterbackia imbecillis*; SC).

Figures



Mussel Transect Number	Transect Length (m)	2024 Mussels Salvaged
1	26	0
2	15	0
3	166	1
4	250	2
5	75	0
6	65	2
7	6	0
8	30	0
9	23	0
10	72	0
11	225	0
12	330	1
13	75	0
14	600	3
15	153	3
Total	2,111	12

LEGEND:

- Transect Number
- Transect Locations Based on Bank Stabilization
- Near-bank Mussel Survey Area
- River Centerline
- 1/10 Mile Marker

NOTES:
1. Near-bank mussel surveys in yellow where temporary bank stabilization controls are proposed.

0 500
SCALE, FEET
Prepared by: AG (01/24/2025)
Checked by: MM (01/24/2025)

OU5 Allied Paper/Portage Creek/Kalamazoo River
Superfund Site
Area 4 TCRA - Allegan County, Michigan

Kalamazoo River Areas 2, 3, and 4 Remediation LLC

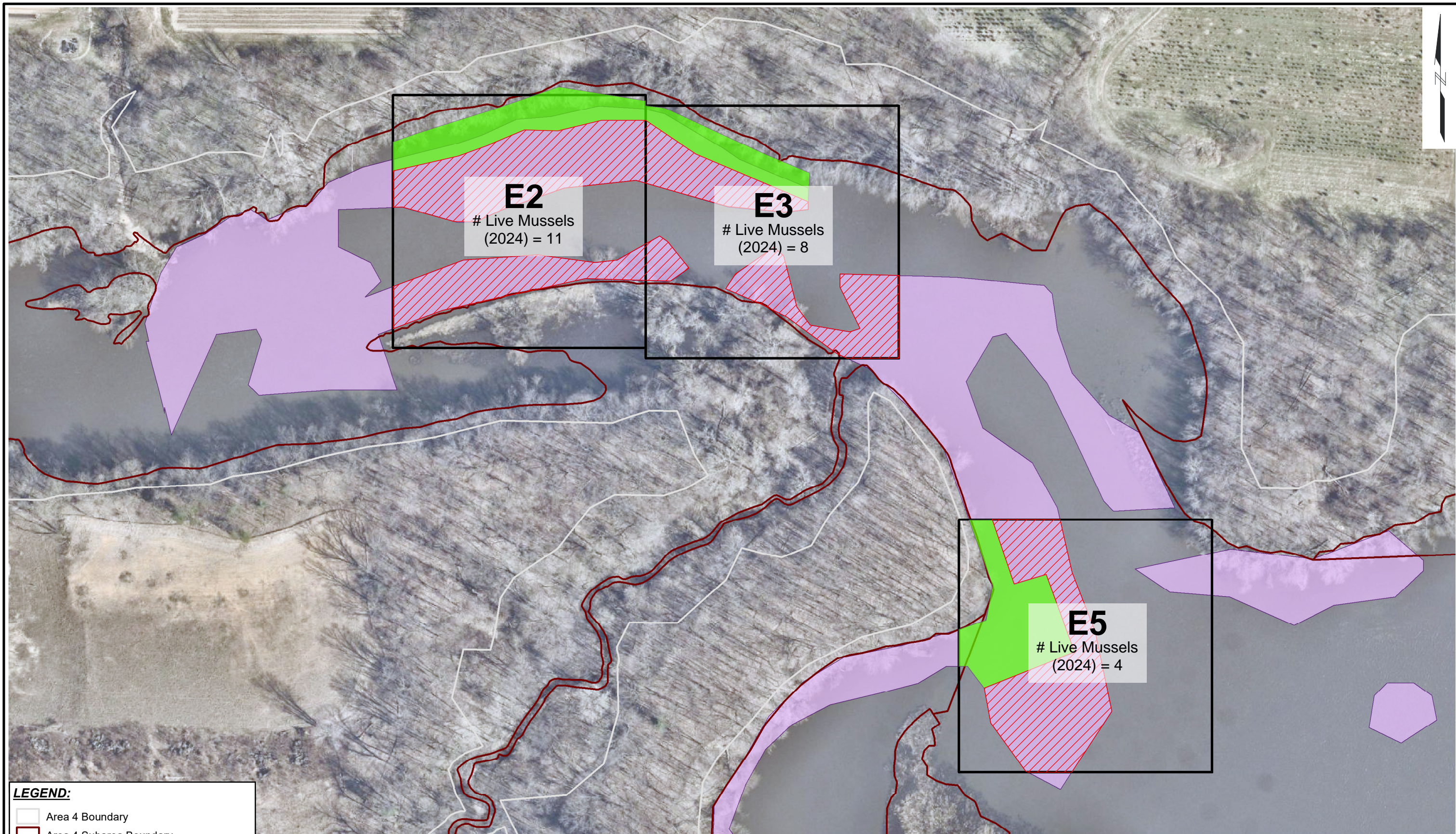


2024 RELOCATION
TRANSECTS IN AREA 4
SUABAREAS C AND D

Project 2000273

February 2025

Fig. 1



LEGEND:

- Area 4 Boundary
- Area 4 Subarea Boundary
- 2024 Mussel Salvage Blocks
- Areas Surveyed in 2024
- Suitable Mussel Habitat (2020/2021)
- Not Surveyed (Unsafe/Unsuitable) in 2024

0 60 120
SCALE, FEET

Prepared by: AG (01/24/2025)
Checked by: MM (01/24/2025)

OU5 Allied Paper/Portage Creek/Kalamazoo River
Superfund Site
Area 4 TCRA - Allegan County, Michigan

Kalamazoo River Areas 2, 3, and 4 Remediation LLC

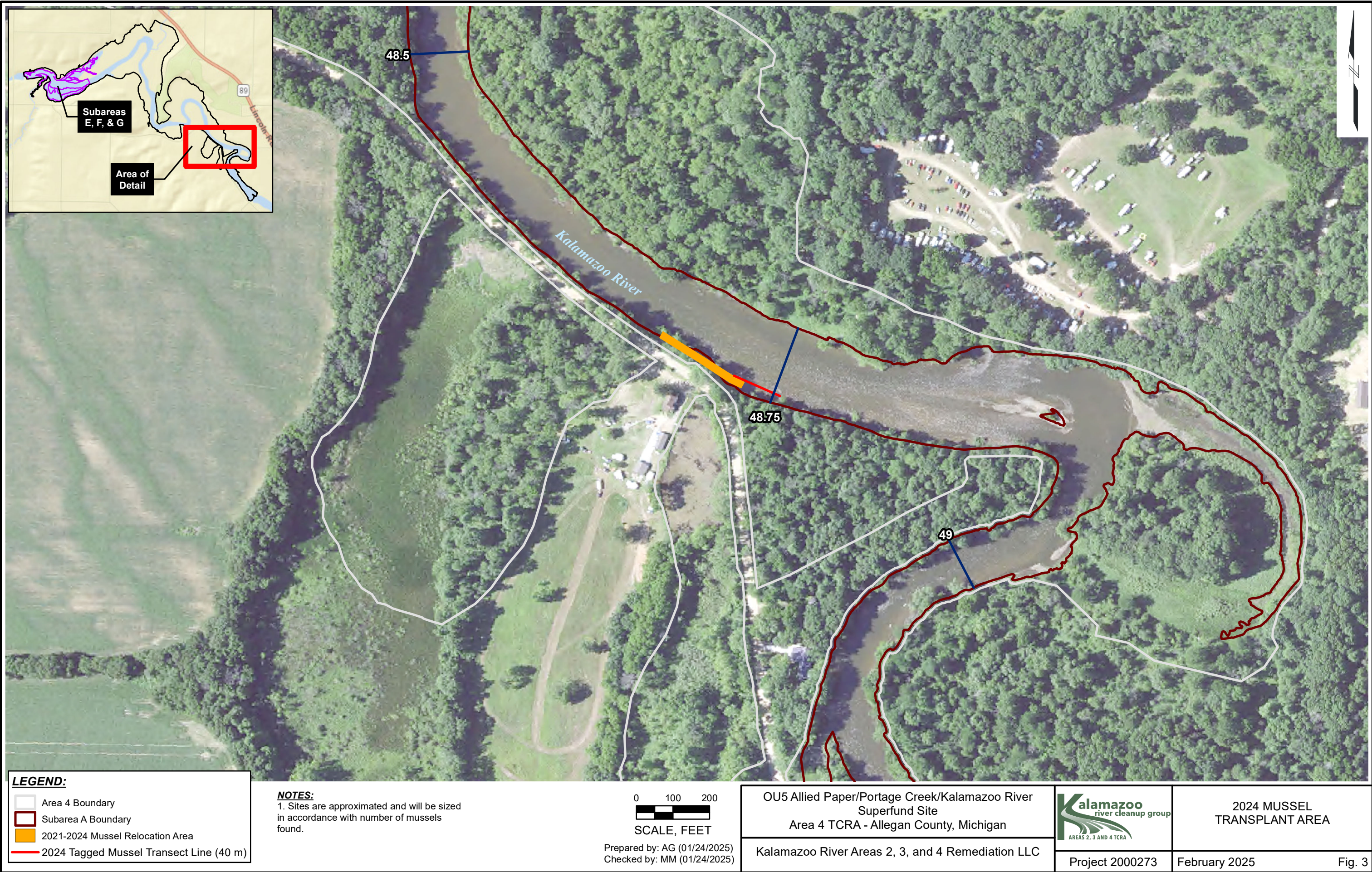
Kalamazoo
river cleanup group
AREAS 2, 3 AND 4 TCRA

Project 2000273

2024 RELOCATION AREA IN
AREA 4 SUBAREA E

February 2025

Fig. 2



Appendix A – Representative Photographs

Representative Mussel Species Photos



Geotechnical
Environmental
Water Resources
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**Area 4 Subarea C, D, E Mussel Relocation
Report
Kalamazoo River at
Plainwell, MI (Kalamazoo County)**

**Date: 7/30/24 – 8/7/24
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Photo 1. White Heelsplitter (*Lasmigona complanata*) – left valve.



Photo 2. White Heelsplitter (*Lasmigona complanata*) – right valve.



Photo 3. White Heelsplitter (*Lasmigona complanata*) – dorsal view.



Photo 4. Mucket (*Actinonaias ligamentina*) – right valve.

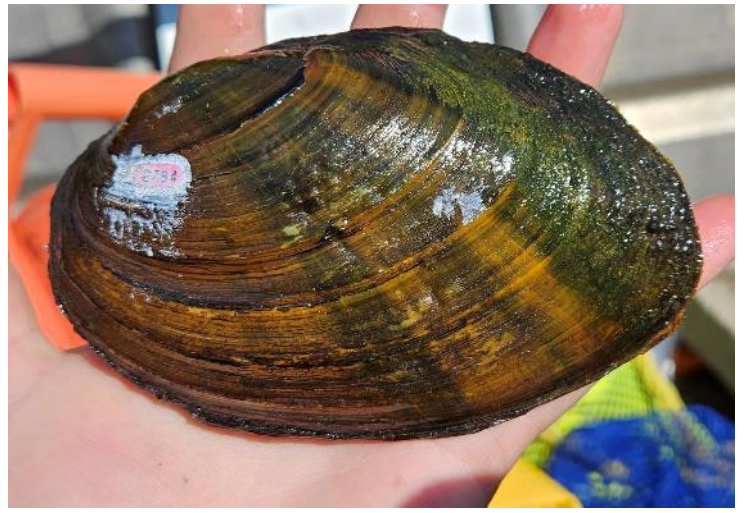


Photo 5 Mucket (*Actinonaias ligamentina*) – left valve.



Photo 6. Mucket (*Actinonaias ligamentina*) – dorsal view.



Photo 7. Creek Heelsplitter (*Lasmigona compressa*; Special Concern) – left valve.

Photo 8. Creek Heelsplitter (*Lasmigona compressa*; Special Concern) – right valve.



Photo 9. Creek Heelsplitter (*Lasmigona compressa*; Special Concern) – dorsal view.

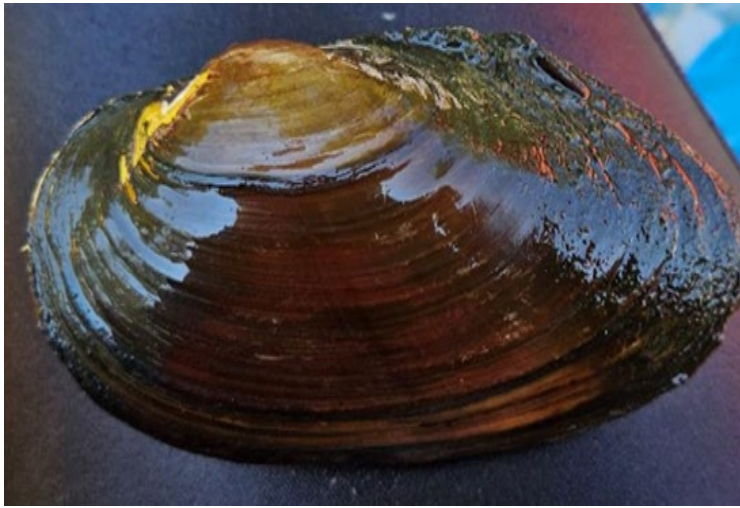


Photo 10. Giant Floater (*Pyganodon grandis*) – left valve.



Photo 11. Giant Floater (*Pyganodon grandis*) – right valve.



Photo 12. Giant Floater (*Pyganodon grandis*) – dorsal view.



Photo 13. Creeper (*Strophitus undulatus*) – right valve.



Photo 14. Creeper (*Strophitus undulatus*) – left valve.



Photo 15. Creeper (*Strophitus undulatus*) – dorsal view.



Photo 16. Wabash Pigtoe (*Fusconaia flava*) – right valve. Photo taken after shellfish tagged.



Photo 17. Wabash Pigtoe (*Fusconaia flava*) – left valve. Photo taken after shellfish tagged.



Photo 18. Wabash Pigtoe (*Fusconaia flava*) – dorsal view. Photo taken after shellfish tagged.



Photo 19. Elktoe (*Alasmidonta marginata*; Special Concern) – right valve.



Photo 20. Elktoe (*Alasmidonta marginata*; Special Concern) – left valve.



Photo 21. Elktoe (*Alasmidonta marginata*; Special Concern) – dorsal view.

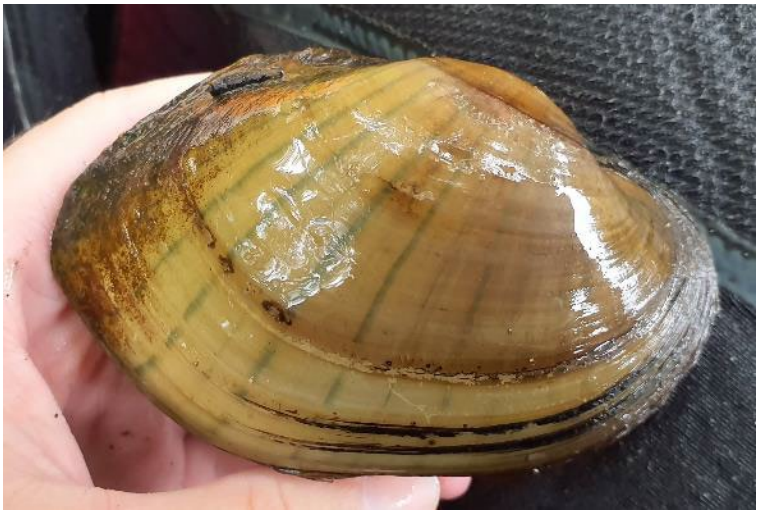


Photo 22. Plain Pocketbook (*Lampsilis cardium*) – right valve.



Photo 23. Plain Pocketbook (*Lampsilis cardium*) – left valve.



Photo 24. Plain Pocketbook (*Lampsilis cardium*) – dorsal view.



Photo 25. Ellipse (*Venustaconcha ellipsiformis*) – shell only.



Photo 26. Spike (*Eurynia dilatata*) – shell only.



Photo 27. Paper Pondshell (*Utterbackia imbecillis*; Special Concern) – shell only.



Photo 28. Rainbow (*Cambarunio iris*) – shell only.

Representative Area 4 Subarea C and D Photos



Geotechnical
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Photo 29. Unsuitable hardpan that is calcified (unable to be excavated) found throughout Sub-Areas C & D.



Photo 30. Cliffs of hardpan/paper sludge found throughout most of Sub-Area C & D.



Photo 31. Swaths of unstable and unsuitable sand observed within some transects in Sub-Area C & D.



Photo 32. Unconsolidated and unsuitable sand found through many transects in Sub-Area C & D.



Photo 33. Small pocket of suitable substrate found occasionally along various transects of Sub-Area C & D.

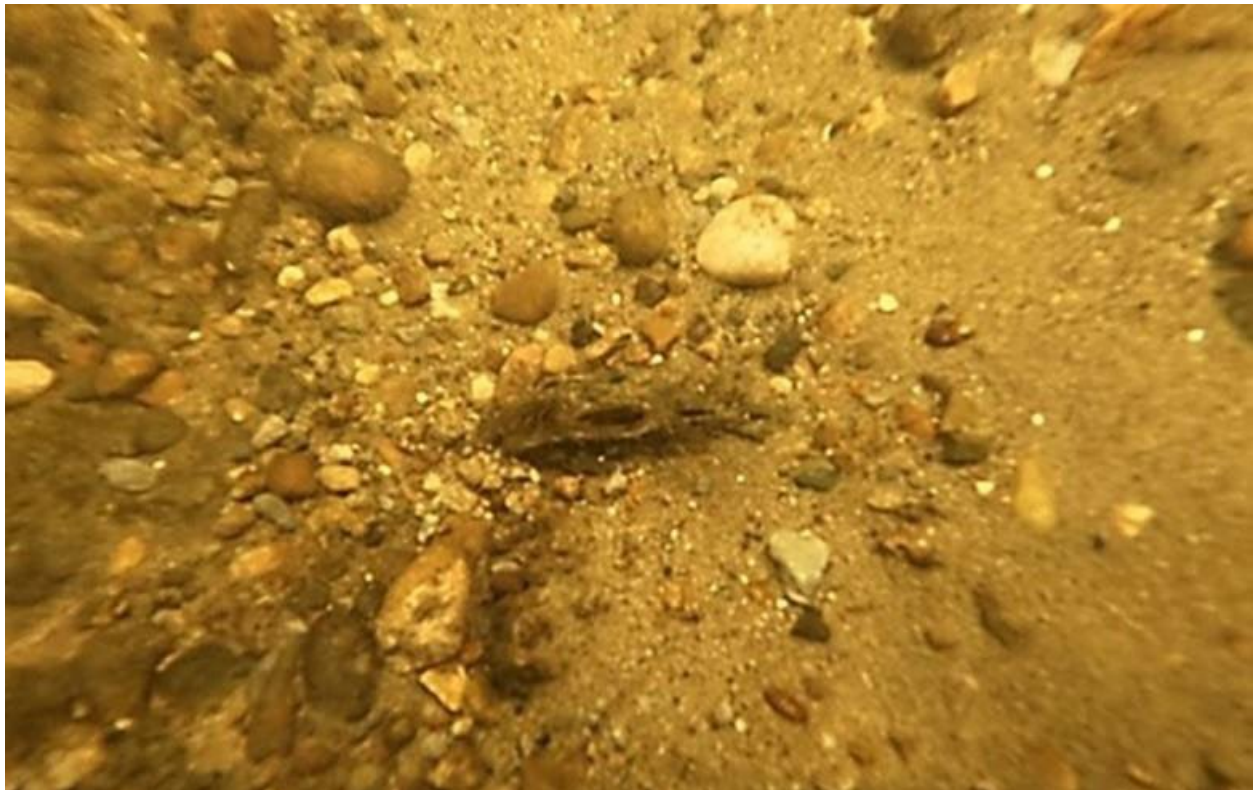


Photo 34. Representative photo of mussel filtering in a pocket of suitable in Sub-Area C & D.



Photo 35. Divers searching for mussels via snorkeling techniques along the left descending bank (LDB) in Sub-Area C and D.



Photo 36. Downstream view along the right descending bank (RDB) in Transect 1, showing divers searching for mussels during bank surveys



Photo 37. Dense coverage of submerged aquatic vegetation along the LDB (e.g., within Transect 10), facing upstream.



Photo 38. Example of large woody debris found along many transects. These areas were searched where safely possible.

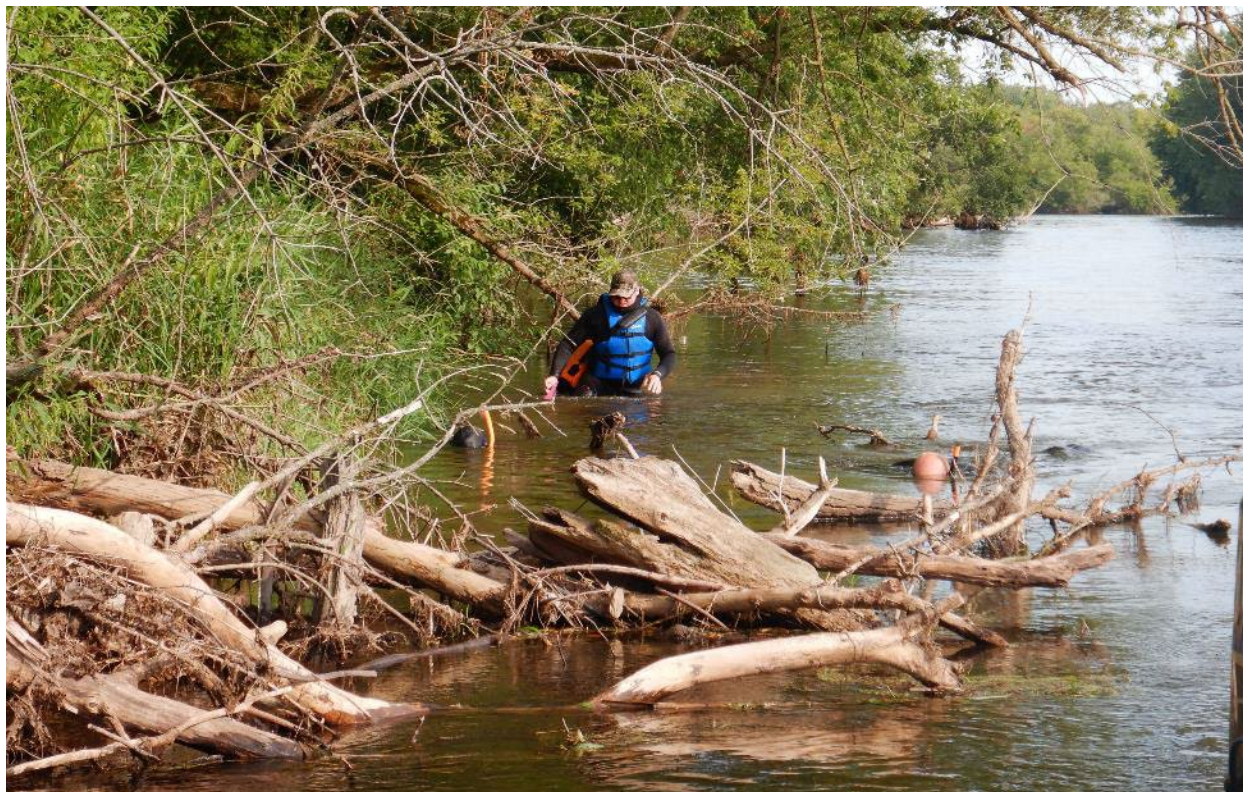


Photo 39. Example of large woody debris encountered on LDB along Transect 14.



Photo 40. Large, active beehive encountered hanging over Transect 11, which created a safety hazard and cause a small section of this transect to be eliminated from survey.

Representative Area 4 Subarea E Photos



Geotechnical
Environmental
Water Resources
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**Area 4 Subarea C, D, E Mussel Relocation
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Photo 41. Representative photo showing unsuitable hardpan that is calcified (unable to be excavated) found throughout E3 and E2.



Photo 42. Cliffs of calcified hardpan found throughout E3 and E2 and out towards thalweg of the river.



Photo 43. Sand-silt substrate observed in large quantities through the center of E5 and on the right descending bank (RDB) of E3 and E2.

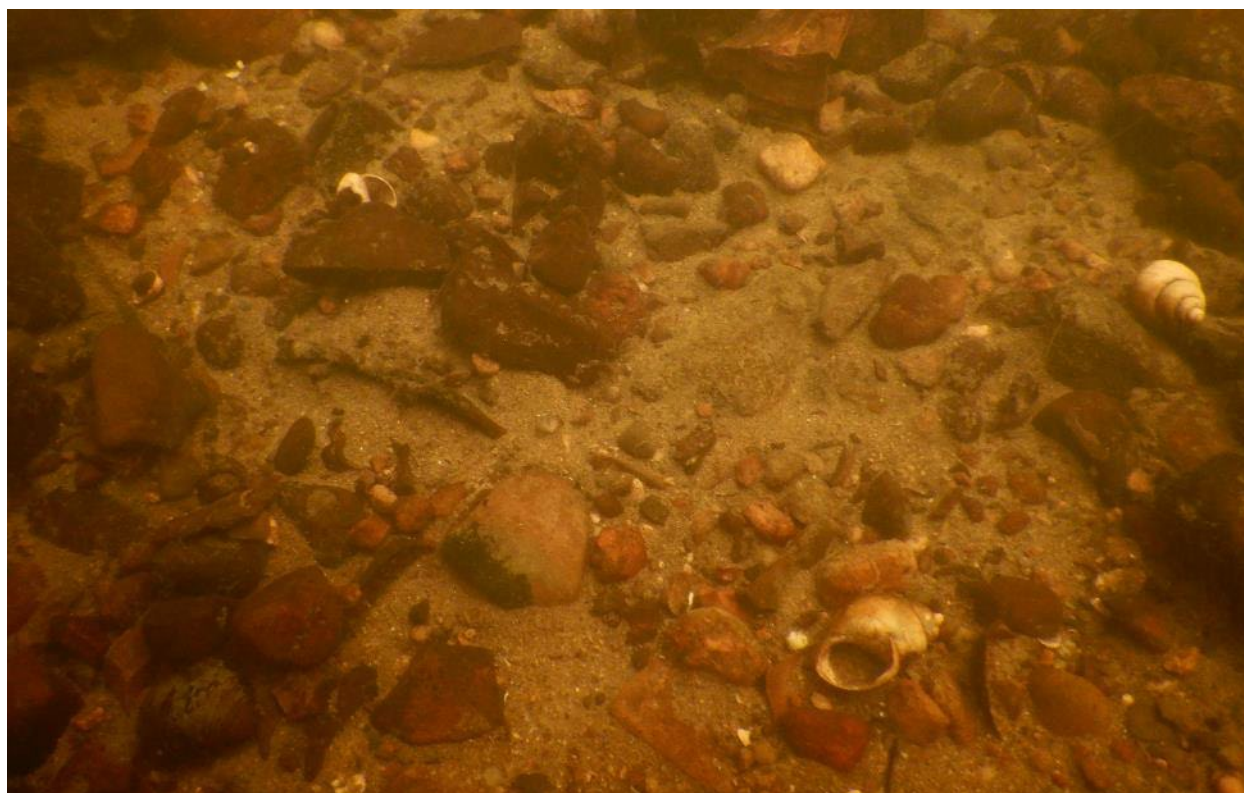


Photo 44. Suitable substrate (sand-gravel) observed in small quantities on RDB of E3 and E2.



Photo 45. Dense patch of emergent & submergent aquatic vegetation found in south-west corner of E5.



Photo 46. Photo of diver setting transects in block E5.



Photo 47. View of left descending bank (LDB) of E5.



Photo 48. Representative photo of south-west corner of E5 that had dense aquatic vegetation, sand, and silt.



Photo 49. Large woody debris (downed willow tree) along right descending bank in E3.



Photo 50. View of LDB of E2 and E3, which was excluded due to unsuitable and shifting-sand substrate along a steep drop off with variable currents.

Representative Transplant Site Photos



Geotechnical
Environmental
Water Resources
Engineering

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Photo 51. Photo of the transplant site standing at the DS end of the tagged mussel transplant line, facing upstream.



Photo 52. Representative photo of river reach US of the transplant site, facing US.



Photo 53. Photo of the transplant site standing at the DS end of the tagged mussel transplant line, facing downstream and the LDB.



Photo 54. Representative photo of transplant site substrate along the tagged mussel transplant line.

Appendix B – Area 4 Mussel Relocation and Survey Plan



July 2, 2024

GEI Project No. 2000273

VIA EMAIL: ruesch.paul@epa.gov

Mr. Paul Ruesch
On-Scene Coordinator
USEPA Region 5
77 W. Jackson Blvd (SR-6J)
Chicago, IL 60604-3507

**Re: Mussel Relocation and Subarea C, D Mussel Survey Work Plan
Kalamazoo River Superfund Site, Operable Unit 5 Area 4 TCRA**

Dear Mr. Ruesch:

The Kalamazoo River Areas 2, 3 and 4 Remediation, LLC is pleased to submit for consideration this Mussel Relocation and Subarea C, D Mussel Survey Work Plan. Our mussel team is available to perform this work in mid-late July, so we are hoping you are able to review the plan quickly.

This document is attached. Please let us know if you have any trouble accessing the file.

We look forward to your feedback on the plan.

Sincerely,

GEI CONSULTANTS OF MICHIGAN, P.C.

Amber Ahles, PMP
Program Manager

Roger Hathaway, P.E.
Program Director

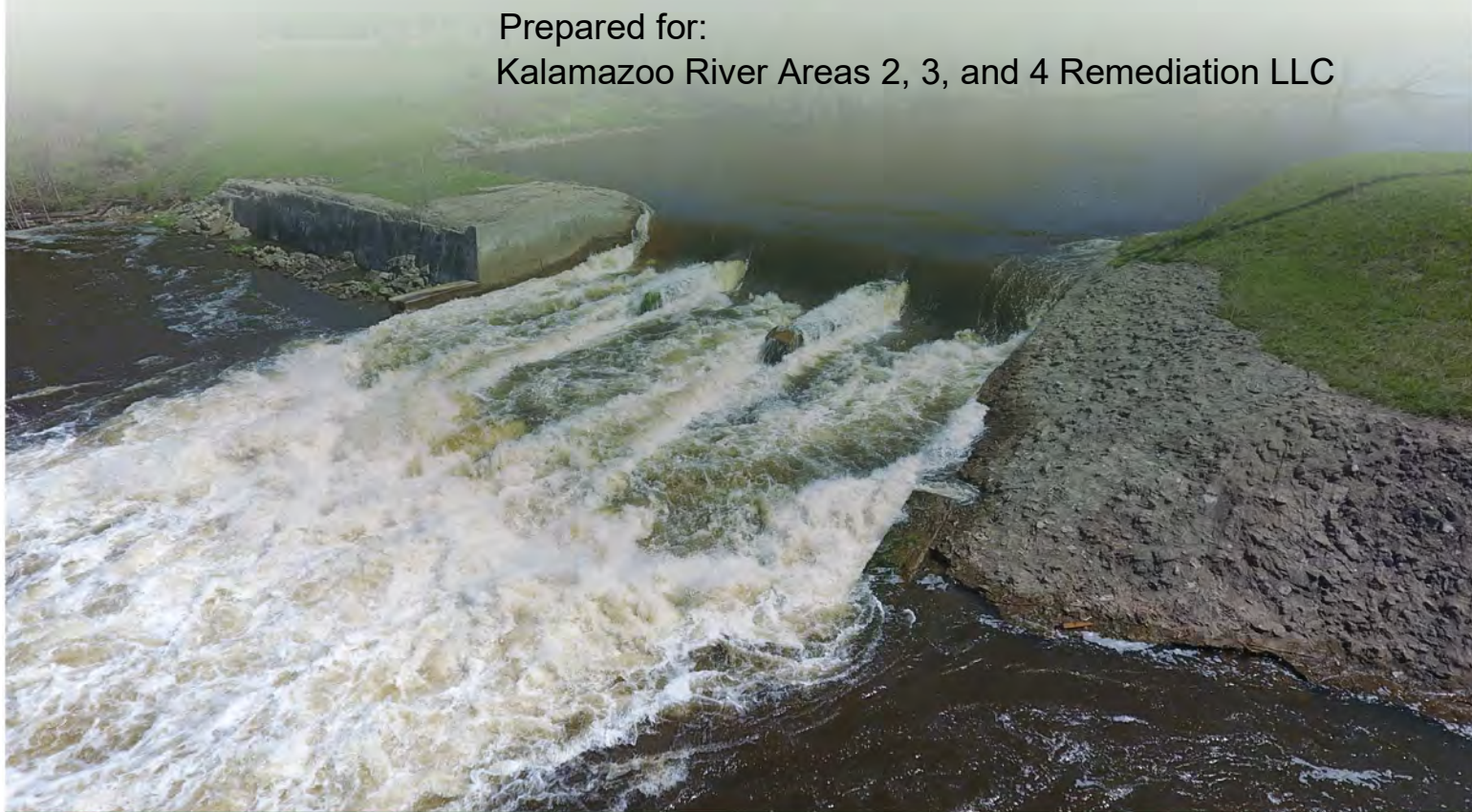
c: John Jolly, NCR Voyix

Attachment: Mussel Relocation and Subarea C, D Mussel Survey Work Plan.

Mussel Relocation and Subarea C, D Mussel Survey Work Plan

OU5 Area 4 Time-Critical Removal Action Allied Paper/Portage Creek/ Kalamazoo River Superfund Site

Prepared for:
Kalamazoo River Areas 2, 3, and 4 Remediation LLC





Mussel Relocation and Subarea C, D Mussel Survey Work Plan

OU5 Area 4 Time-Critical Removal Action Allied Paper/Portage Creek/ Kalamazoo River Superfund Site

Prepared for:
Kalamazoo River Areas 2, 3, and 4 Remediation LLC
864 Spring Street NW
Atlanta, Georgia 30308-1007

Prepared By:
GEI Consultants of Michigan, P.C.
3065 Akers Mill Road, Suite 235
Atlanta, GA 30339

Amber Ahles, VP, PMP
Project Manager

Ryan Holem
Senior Professional

July 2024
GEI Project No. 2000273

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Figures

Figure 1. 2020-2021 A4 Subarea E, F, and G Mussel Salvage Results

Figure 2. Proposed A4 Mussel Relocation and Subarea C, D Mussel Survey Areas

Figure 3. Proposed Mussel Transplant Area

Appendices

Appendix A – Area 4 Mussel Salvage Report (2020/2021)

Appendix B – GEI Permits

Abbreviations and Acronyms

CD	Consent Decree
EPA	United States Environmental Protection Agency
LLC	Kalamazoo River Areas 2, 3, and 4 Remediation LLC
ft	feet
MDNR	Michigan Department of Natural Resources
min	minute
mm	millimeters
m	meter(s)
m ²	square meters
OU5	Operable Unit 5
PCB	Polychlorinated biphenyl
TCRA	Time-Critical Removal Action
T/E	Threatened and Endangered
USFWS	United States Fish and Wildlife Service

1. Introduction

GEI Consultants of Michigan, P.C. (GEI) is pleased to provide this mussel relocation and mussel survey work plan for Area 4 of Operable Unit 5 (OU5) of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. This work will be performed by GEI on behalf of the Kalamazoo River Areas 2, 3, and 4 Remediation LLC (LLC), which NCR Voyix (formerly NCR Corporation) formed to meet certain requirements of the Consent Decree (CD) between NCR Corporation, the United States Environmental Protection Agency (EPA), and the state of Michigan.

The CD was lodged in December 2019 and entered (approved) by the United States District Court for the Western District of Michigan on December 2, 2020 (EPA, 2020). The Statement of Work (SOW) was modified to include Area 3 on October 11, 2023 (EPA, 2023). The CD requires NCR to conduct response activities related to polychlorinated biphenyl (PCB) impacts present in Areas 2, 3, and 4 of OU5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site. Work activities mandated by the CD include performance of a time-critical removal action (TCRA) in Area 4, and remedial design and remedial action in Areas 2 and 3.

Freshwater mussel salvage/relocation efforts were conducted in Subareas E, F, and G in 2020 and 2021 in advance of Area 4 remedial actions (Appendix A). This plan proposes to conduct additional mussel relocation efforts in portions of Subarea E where dredging is planned for 2025. This plan also proposes mussel survey and relocation in Area 4, Subareas C and D, with a focus on near-bank areas where temporary bank stabilization controls are proposed in 2025.

Mussel relocation efforts proposed herein are based on a combination of Michigan mussel survey guidance (MDNR et al., 2021) and methods/results of the 2020/2021 Area 4 mussel salvage/relocation efforts (GEI, 2022; Appendix A). The 2020/2021 mussel salvage/relocation efforts within the main channel documented patchy mussel abundance, with large areas of highly mobile sand, which is generally considered unsuitable habitat for mussels. A total of 196 mussels were relocated from the 36,199 m² area that was surveyed in Subareas E, F, and G, with nine species represented. White Heelsplitter (*Lasmigona complanata*) and Mucket (*Actinonaias ligamentina*) were the most abundant species found. No mussels on the state or federal threatened or endangered species lists were found. All mussel species found in 2020/2021 in Area 4 (Subareas E, F, and G) had been documented in the Kalamazoo River during previous mussel survey efforts that were performed by other biologists between 2001 and 2017.

To conduct this effort GEI will submit this plan to EPA for concurrence. GEI's MDNR Scientific Collector's Permit has been amended to include this project and is included in Appendix B along with GEI's current Threatened and Endangered (T/E) Species Permit. A preliminary sequence/timeline for efforts to be conducted under this Mussel Relocation Work Plan is as follows:

- Submit draft work plan to EPA (July 2024).
- Conduct targeted mussel relocation efforts in Subarea E and mussel survey and relocation in near bank areas of Subarea C and D (target date range July–August 2024).
- Generate mussel summary report (Fall/Winter 2024 and 2025).

2. Methods

Mussel salvage/relocation efforts are proposed to focus on Subarea E Blocks E2, E3, and E5 of the 2020/2021 mussel salvage/relocation effort (outlined in green within Fig. 1). Field efforts would focus on portions of those survey blocks that overlap with areas where dredging is currently proposed for 2025 and where mussels were reasonably abundant during the 2020/2021 mussel salvage efforts (Figs. 1 and 2). Areas of Blocks E2, E3, and E5 that are found to contain unsuitable substrate (e.g., highly mobile sand) upon initiating surveys will not be searched for mussels. Mussel survey and relocation is also proposed near bank areas of Subareas C and D where temporary bank stabilization controls will be installed in 2025 (Fig. 2). In these areas, searches will be conducted 1 to 3 meters (m) from the wetted edge as described in Section 2. All live mussels found in Subareas C, D, and E will be relocated upstream to the mussel transplant area utilized during the 2020/2021 mussel salvage/relocation efforts (Fig. 3).

Mussel survey and/or relocation efforts will only be conducted in areas that are safely accessible and survey is contingent on safe survey conditions (i.e., safe flows and currents) being present during field efforts. Portions of Area 4, Subarea E that were considered not safe for mussel efforts in 2020/2021 (Fig. 1) will not be revisited unless conditions have considerably changed and are now considered safe for mussel-related efforts.

Efforts described herein will be conducted by a team of six to eight biologists and technicians. These efforts will be conducted by personnel who possess, at minimum, a B.S. in biology, natural resources, or a related field, and knowledge of the ecology of freshwater mussels. Survey efforts will be led by persons having passed the Michigan mussel identification exam or accredited alternative (i.e., exams administered by the State of Ohio, USFWS [United States Fish and Wildlife Service], etc.) and with direct experience implementing Michigan's mussel protocol.

2.1 Transplant Area Verification

This plan assumes that suitable conditions still exist in the mussel transplant area used during the 2020/2021 Area 4 mussel salvage/relocation efforts. That area is off River Road approximately 3.5 miles upstream of Trowbridge Dam (Fig. 3; also see GEI, 2022). The transplant area will be visited to verify that suitable conditions still exist prior to moving additional mussels into the area in 2024. The transplant area will be mapped with GPS and representative photos will be taken. GEI will communicate with MDNR to determine a path forward if neither of the transplant areas outlined above are found to be suitable at the time of the relocation effort.

2.2 Site Set Up

2.2.1 Subarea E: Blocks E2, E3, and E5

Upon arrival at the site, water temperature and general water chemistry parameters will be taken with a calibrated water quality probe at least once during the relocation effort. The corners of a given survey block will be marked using a cinder block with a colored buoy attached. Current, visibility, and water depth will be assessed and weighted rope transects, or a 100-square meter (m^2) cell will be set parallel to flow within the block being surveyed. Transects may be set up within a 100 m^2 cell to help guide mussel search efforts. Mussel collection will proceed as outlined in Section 2.3.

2.2.2 Subarea C and D: near bank areas

Near bank areas that are proposed for temporary bank stabilization were estimated to be approximately 1,025 m in total length based on proposed turbidity curtain and project plans. These near bank areas will be located using GPS and the boundaries of the bank stabilization footprint will be flagged. A weighted rope transect will be set 1 to 2 m from the wetted edge of the bank. Transects will be marked at every meter and will have a unique marker every 10 m to denote 10 m segments per transect. Mussel collection along each transect will proceed as outlined in Section 2.3.

2.3 Mussel Collection

The mussel collection process will consist of three basic steps: 1) a visual-tactile search of the surficial substrate, 2) excavation of the substrate (i.e., moving cobble/woody debris out of the way, hand-sweeping away silt, etc.) in the upper 2 to 3 inches of the substrate, and 3) a second visual tactile search in the cleared area. Hand-grubbing may be utilized in lieu of a second visual-tactile search if silt and/or particulate matter impacts water column visibility.

Mussel search rate will be ≥ 1 minute per square meter (min/m^2) in areas with heterogenous, stable substrates. If listed and/or small bodied individuals are found with regularity, search rate will increase to $2 \text{ min}/\text{m}^2$. Search rate may decrease to $< 1 \text{ min}/\text{m}^2$ in areas that are dominated by highly mobile sand or other unsuitable substrate (i.e., bedrock, thick silt). As described previously, mussel data will be recorded for each transect or cell, whichever is being used in a given area. Substrate type/proportions and average/maximum water depth will also be recorded.

Mussel relocation efforts will start at the downstream end of a transect or cell and work upstream. Two to three surveyors will each clear a 1 to 1.5 m area on each side of a transect or within a given block. A minimum of two passes will be made along each

transect. A segment will be considered “cleared” when less than five percent of the mussels (or ≤ 2 individuals) found on the initial pass are found on the follow-up pass (or passes). It should be noted that Blocks E2, E3, and E5 were cleared of mussels in 2020/2021. As such, if mussel abundance is found to be low (e.g., 0.1 mussels/m²) then searches may be expedited. Transects will be repositioned throughout Subarea E blocks and in Subarea C, D near bank areas as needed until the entire target area has been cleared. Searches will not be conducted in any areas deemed unsafe.

Equipment used to conduct the mussel relocation effort is expected to include snorkel gear where water depths are <2.5 feet and visibility allows. Scuba equipment or surface-supplied diving equipment will be used to search areas that are not accessible via snorkeling. Diving activities (scuba and surface-supplied) will be conducted by certified scuba divers. If scuba equipment is employed, one scuba certified diver will remain on shore as safety spotter.

2.4 Mussel Handling & Relocation

All live mussels found during relocation efforts will be extracted from the streambed, placed in flow-through containers (i.e., mesh bags, buckets with holes in them), and kept out of the sunlight. Mussels will be identified by biologists with experience and training in the identification of mussels from Great Lakes states. When warranted, various taxonomic references (Metcalf-Smith et al., 2005; Mulcrone and Rathbun, 2018; Watters et al., 2009) will be consulted to confirm species identification. Efforts will be halted, and personnel from the USFWS notified, if a federally listed mussel species is encountered.

Mussels will be measured to the nearest millimeter (mm) using calipers. If high numbers (≥ 250) of a given non-listed species are found, a subset (no less than 100 of a given species) may be measured to reduce handling stress to mussels. Sex and age status (i.e., juvenile [≤ 5 years] or adult) of T/E specimens will be recorded if determination can be made with confidence. All listed species will be tagged with glue-on shellfish/bee tags. If low numbers of listed mussels are found, then a subset of non-listed mussels may be tagged or marked with a goal being to tag/mark at least 100 mussels (listed and non-listed combined) to provide enough mussels for post relocation monitoring, if required. In lieu of tagging, thick-shelled, non-listed species may be marked with a file or rotary tool.

Representative photographs (i.e., left valve, right valve, beak/umbo) of each species will be taken. Shells from dead specimens (representing species not found live) will also be photographed to generate a sitewide species list inclusive of species for which only shells were found.

Mussels will be relocated at the end of the day unless there are signs of stress in which case mussels would be relocated as soon as reasonably possible. During the relocation, live mussels will be moved to the transplant area in mesh bags or buckets filled with site water, taking care to ensure that fresh river water is exposed to the mussels consistently and that they are not exposed to direct sunlight for extended periods of time. Mussels will be positioned into the transplant area in the proper position (posterior end up) and buried approximately halfway into the sediment or allowed to rebury themselves.

3. Documentation and Reporting

Documentation during the relocation effort will include, but may not be limited to the following:

- Map of mussel clearance areas and areas that were not cleared of mussels due to unsafe conditions, unsuitable substrate, etc.
- Representative photographs of relocation efforts and of the transplant area.
- Live mussels found, substrate data (i.e., type, stability), and water depth for each area cleared of mussels.
- Photographs of all mussel species (live and shell material) found.
- Field condition details, such as visibility, mussel search techniques utilized (i.e., snorkel, viewing buckets, tactile [grubbing]), and weather conditions.

The information above will be compiled into a summary report that will be delivered near the end of 2024 or early 2025. The report will include an overview of methods used, summary of data collected, discussion of the findings, maps indicating general locations of survey areas, and supporting documentation such as photographs of the survey area, each mussel species, and a list of mussel species observed.

4. References

GEI (2022). "Area 4 Mussel Salvage Report (2020/2021), OU5 Area 4 Time-Critical Removal Action Allied Paper/Portage Creek/Kalamazoo River Superfund Site," prepared for Kalamazoo River Areas 2,3, and 4 Remediation LLC, January 2022.

MDNR, MDEQ, MNFI, USFWS, MDOT (2021). "Michigan Freshwater Mussel Survey Protocols and Relocation Procedures for Rivers and Streams, Version 3," May 2021.

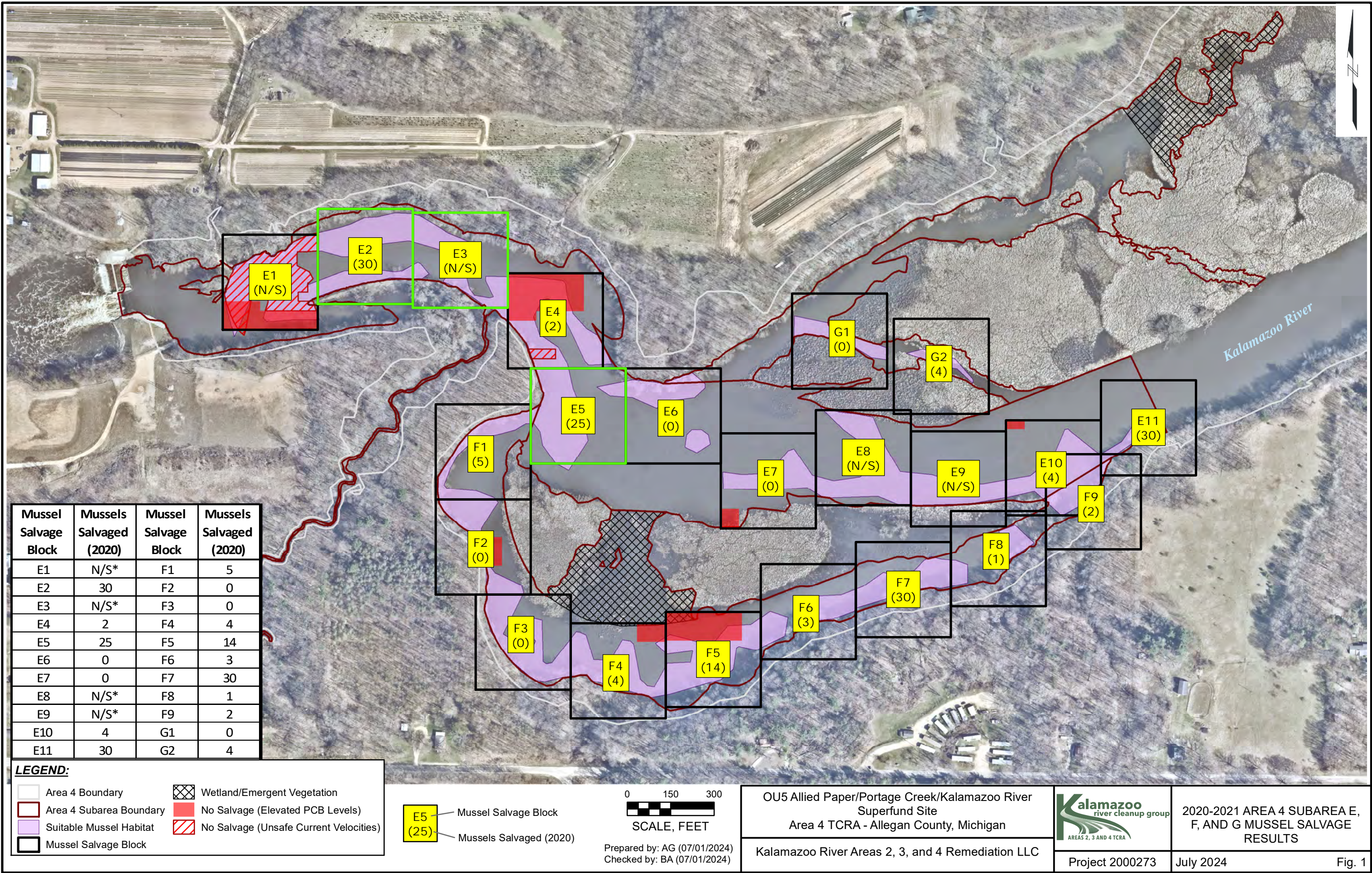
Metcalf-Smith J, MacKenzie A, Carmichael I, and McGoldrick D. (2005). "Photo Field Guide to the Freshwater Mussels of Ontario."

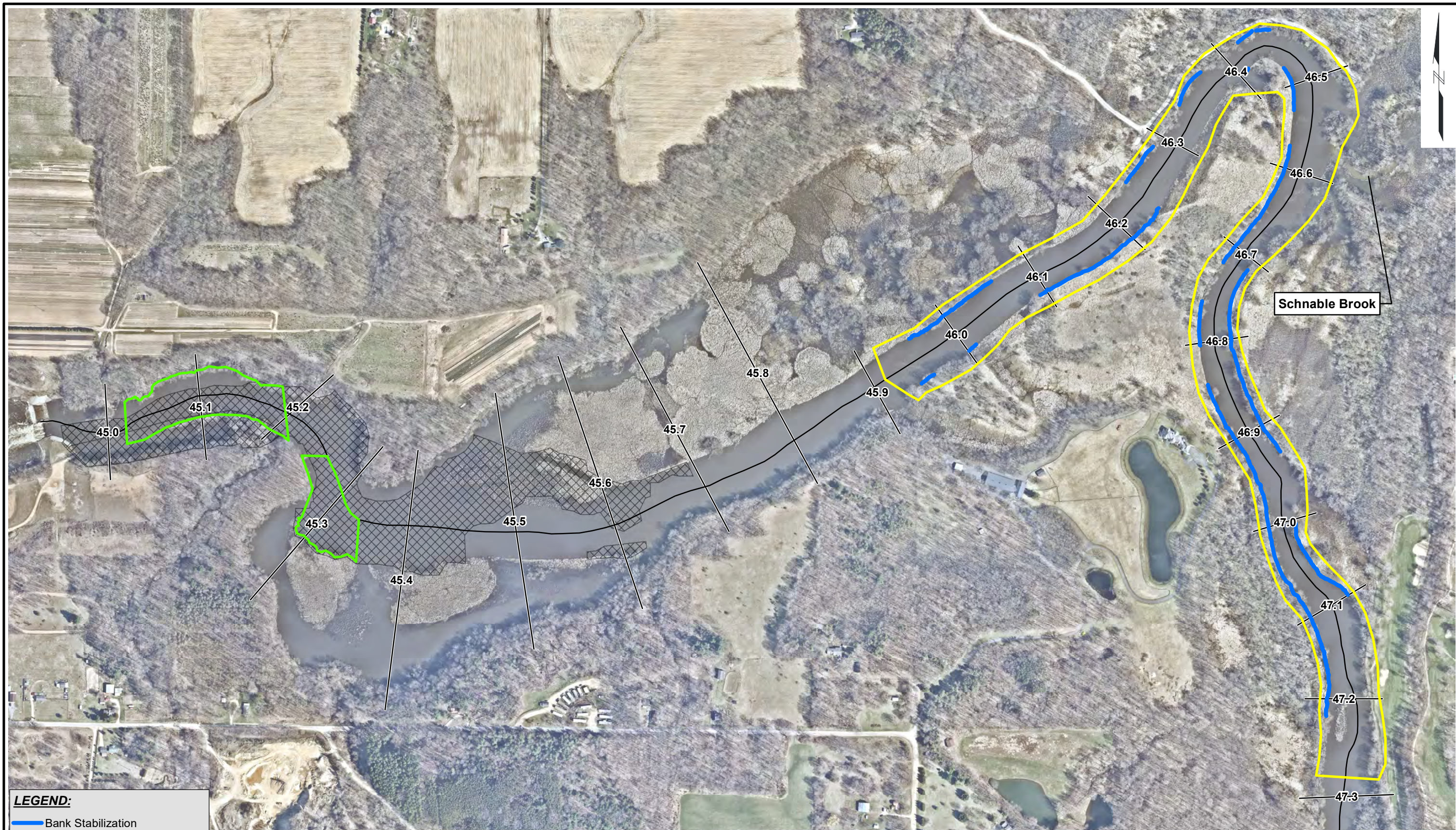
Mulcrone, R S and Mehne C (2001). "Freshwater mussels of the Kalamazoo River, Michigan, from Battle Creek to Saugatuck," prepared for U.S. Fish and Wildlife Service, October 1.

Mulcrone R and Rathbun J (2018). "Pocket Field Guide to the Freshwater Mussels of Michigan." Michigan Department of Natural Resources.

Watters GT, Hoggarth MA, and Stansbery DH. (2009). "The Freshwater Mussels of Ohio." Ohio State University Press.

Figures





LEGEND:

- Bank Stabilization
- Near-bank Mussel Survey Area
- Mussel Relocation Area
- River Centerline
- 1/10 Mile Marker
- Dredge Area

NOTES:
1. Near-bank mussel surveys in yellow where temporary bank stabilization controls are proposed.


0 500
SCALE, FEET
Prepared by: AG (07/01/2024)
Checked by: BA (07/01/2024)

OU5 Allied Paper/Portage Creek/Kalamazoo River
Superfund Site
Area 4 TCRA - Allegan County, Michigan
Kalamazoo River Areas 2, 3, and 4 Remediation LLC

Kalamazoo
river cleanup group
AREAS 2, 3 AND 4 TCRA
Project 2000273

PROPOSED AREA 4 MUSSEL
RELOCATION AND SUBAREA C
AND D MUSSEL SURVEY
AREAS
July 2024
Fig. 2



LEGEND: <div><div></div> Area 4 Boundary</div> <div><div></div> Subarea A Boundary</div> <div><div></div> 2021 Mussel Relocation Area</div>	NOTES: 1. Sites are approximated and will be sized in accordance with number of mussels found.	<div>0 100 200</div> <div>SCALE, FEET</div> <div>Prepared by: AG (07/01/2024) Checked by: BA (07/01/2024)</div>	OU5 Allied Paper/Portage Creek/Kalamazoo River Superfund Site Area 4 TCRA - Allegan County, Michigan	 AREAS 2, 3 AND 4 TCRA	PROPOSED MUSSEL TRANSPLANT AREA
			Kalamazoo River Areas 2, 3, and 4 Remediation LLC		Project 2000273

Appendix A – Area 4 Mussel Salvage Report (2020/2021)

Not included to minimize file size – available upon request.

Appendix B – GEI Permits

**SCIENTIFIC COLLECTOR'S PERMIT***Issued under the authority of Public Act 451 of 1994, Part 487, as amended, section 324.48735.*

Under the provisions of Part 487, Act 451, P.A. 1994, as amended, being section 324.48735, permission is hereby granted to:

Title	First Name Ryan	Last Name Holem
Co-Permittee Meghan Martinski	Co-Permittee Stuart Kogge	Co-Permittee Samuel Prentice
Institution/Affiliation GEI Consultants of Michigan, P.C.		
Mailing Address 401 S Washington Square Suite 103, Lansing, Michigan, 48933		

To survey, handle, take, catch, kill and/or possess species from the waters and land within the jurisdiction of this state, as specified below in the special provisions section. This permit limits the take of the species authorized to the **minimum** number needed.

Prior to field activities occurring on any stream, public lake or public lands under this permit, the permittee **must** **notify** the local fish biologist or Fisheries Division supervisor of the Management Unit where collections will occur. This contact must be made at least 48 hours prior to commencing field work and during normal business hours Monday-Friday between 8 a.m. and 5 p.m. If a set work schedule has been established for the field season, providing a copy to the unit may alleviate the need for additional contacts with a single unit. It is also strongly recommended that the permittee notify the District Law Supervisor for the county where the permit is being used. Failure to notify the law supervisor may result in the disruption of field work. Both contacts can be initiated by calling the appropriate operational service center (map and phone numbers provided separately).

SPECIAL PROVISIONS:

Project #1. Flint River mussel relocation: North Branch, MI (GPS N 43.2239, W-83.3008). MDOT project. Mussel relocation ahead of overpass work. Monitoring of tagged mussels may also be conducted.

Project #2. Tittabawassee River mussel relocation: Midland, MI (GPS N 43.599789, W-84.239322). Finish mussel relocation efforts started in 2023. This relocation ahead of fish passage structure construction. Monitoring of tagged mussels may also be conducted.

Project #3. Michigamme River mussel relocation: Republic, MI (GPS N 46.38908, W 87.98561). Mussel relocation efforts upstream and downstream of the dam following permanent dam opening in fall 2023. All relocation work will be done prior to removal of the dam.

Project #4. UPPCO Stranded Biota Survey and Relocation, Victoria and Main Bond Falls Dams, Ontonagon River: Two sites: 1) Victoria Dam (GPS N 46.697189, W -89.208345); and 2) Main Bond Falls Dam (GPS N 46.415170, W -89.122959). Stranded freshwater mussels will be relocated in conjunction with dam repairs.

Project #5. Red Cedar River mussel monitoring: Williamston, MI (GPS N 42.686919, W -84.229352). A mussel monitoring effort will be conducted.

Project #6. Grand River quantitative mussel survey: Grand Rapids, MI (GPS coordinates are approximated from aerial imagery: N 42.955174, W-85.682317). A quantitative mussel survey at a site being considered for outfall modifications to the Grand River.

Project #7. Red Cedar mussel relocation and monitoring: East Lansing, MI (GPS N 42.7261, W -84.51018). Finish mussel relocation efforts started in 2022 that could not be finished. Monitoring of tagged mussels may also be conducted.

Project #8. Kalamazoo River mussel relocation: Otsego, MI (GPS N 42.482555, W-85.798383), directly downstream of the Trowbridge Dam. Mussel relocation in advance of planned dam modification/removal.

Project #9. Swartz Creek mussel relocation: Flint, MI (GPS N 42.975761, W -83.760480), at the I-69 crossing. Mussel relocation in advance of planned bank armoring.

Project #10. Indiana Northeastern Railroad (INNE) mussel relocation: Four sites near Montgomery, MI: 1) GPS N 41.777544, W -84.809169; 2) GPS N 41.786122, W -84.797361; 3) GPS N 41.795689, W -84.785511; and 4) GPS N 41.797711, W -84.781056. Mussel relocation efforts in advance of maintenance work at these INNE crossing sites.

Project #11. Ox Creek P51 survey: Benton Harbor, MI (GPS N 42.116806, W -86.448558). P51 surveys consistent with workplan.

Project #12. NCR Kalamazoo River Area 2 mussel surveys: Otsego, MI (GPS approximate mid-point N 42.458936, W -85.682020) between the former Plainwell Dam to the Otsego City Dam. Qualitative mussel surveys and substrate evaluation in advance of planned remedial actions.

Project #13. Big Cedar River mussel relocations: Three sites in Stephenson, MI: 1) GPS N 45.43411, W -87.35052; 2) GPS N 45.43555, W -87.35175; 3) GPS N 45.43822, W -87.35588. A mussel relocation effort in advance of stream/equalization culvert replacement.

Project #14. Kalamazoo River Operating Unit 5 mussel relocation: Upstream of the Trowbridge Dam, between Otsego and Allegan, MI (GPS N 42.483409, W-85.793725), in Mussel relocation would take place in advance of planned dredging in Subarea E and along near-bank areas in Subareas C and D where turbidity curtain will be installed in conjunction with planned dredging.

Project #15. Plaster Creek mussel relocation: Grand Rapids, MI (two sites: GPS N 42.917102, W-85.657214 and N 42.910793, W -85.642622). Mussel relocation would take place in advance of improvements to Ken-O-Sha and Plaster Creek Trails, which border Plaster Creek.

Project #16. Tobacco River mussel survey: Clare, MI (GPS N 43.830515, W-84.752482). Semi-quantitative and qualitative mussel survey in the Tobacco River, downstream of Lake Shamrock Dam. Project has not been awarded/contracted yet at the time of permitting.

Project #17. Macatawa River mussel survey: Holland, MI (GPS N 42.796141, W-86.051951). Semi-quantitative and qualitative mussel survey is proposed in advance of planned stream restoration that would impact the riverbed in this stretch.

Project #18. Grand River US-127 mussel relocation: Holland, MI (GPS N 42.117933, W-84.364096). Mussel relocation efforts will be conducted here in advance of potential impacts to the riverbed. This project is for MDOT and has not been awarded/contracted yet at the time of permitting.

General Provisions concerning all mussel projects listed above. Permittees are authorized to collect, identify, enumerate and release freshwater mussels as part of visual and qualitative survey efforts at any of the mussel project locations listed. If live (native) mussels are found, and relocation is necessary, they may be relocated to an MDNR-approved relocation site. The permittees are required to work with the local DNR Fisheries Biologist on project specific survey methodology and if necessary, acceptable stream locations that mussels are to be relocated to. The permittees are authorized to mark or tag mussel mussels when follow-up monitoring is required. These are non-lethal activities and the collection or removal of live voucher specimens is not authorized. The handling and processing of any mussels found must be consistent with guidelines specified in the document titled "Michigan Freshwater Mussel Survey Protocols and Relocation Procedures" (2021, v3) paying particular attention to the minimum and maximum temperature guidelines for handling live animals.

Note: Per protocols, all mussel survey activities in Michigan need to be wrapped up by October 15th.

Finally, the collection or handling of any freshwater mussel, regardless of species, from a waterbody known to be inhabited by a state or federally listed mussel species requires, in addition to this permit, either a State of Michigan T&E Permit, a Federal T&E permit or both. Please review Michigan's Mussel Map Viewer for waterbodies in Michigan with known T&E populations and prepare for your permitting needs accordingly at <https://mnfi.anr.msu.edu/resources/michigan-mussels>.

For State T&E permitting contact DNR-StateTEPermit@michigan.gov. In addition to mussel work, the T&E Unit should be contacted if any other state threatened or endangered species is encountered with the purpose of relocation.

For Federal T&E permitting please contact the regional US Fish and Wildlife Service Office in East Lansing, Michigan.

General Provisions concerning all fish, reptile and amphibian surveys. Permittees are authorized for general survey purposes to collect, identify, enumerate, photograph and release all fish, reptiles and amphibians. These animals may not be marked, clipped or tagged in any way prior to release and overall handling time should be kept to a minimum. The lethal collection of vouchers is not authorized.

Finally, the permittees may also be engaged in macroinvertebrate sampling during field activities.

In response to the VHS virus and other aquatic invasive species in Michigan, the following is required:

- 1) All equipment coming in contact with water including: boat hulls, boat trailers, buckets, waders, nets, etc. must be visually inspected and cleaned by hand picking any attached plants, sediments, or other debris. This should be done immediately upon leaving the water body being worked on.
- 2) All equipment coming in contact with water and/or fish and/or specifically working with aquatic invertebrates including: boat hulls, boat trailers, buckets, waders, nets, etc. must be disinfected using a 1 cup of bleach to 10 gallons of water solution prior to moving between waterbodies. If long periods of time (week or longer) are anticipated in between sampling events, thorough drying of all equipment in the sun is an acceptable alternative to using the bleach solution.
 - a. A 20 min Virkon Aquatic bath can be substituted as a bleach alternative.
 - b. A 20 min 100% vinegar bath can be substituted as a bleach alternative.
- 3) If using a boat, live wells and bilges must be emptied and disinfected with a solution of 1 cup of bleach to 10 gallons of water prior to moving between waterbodies.
 - a. A 20 min Virkon Aquatic bath can be substituted as a bleach alternative.
 - b. A 20 min 100% vinegar bath can be substituted as a bleach alternative.

For more information on VHS or invasive species, go to the Fisheries link on the Department of Natural Resources web site at: <http://www.michigan.gov/dnr>

Permitted collection area:

Project #1. Flint River mussel relocation: North Branch, MI (GPS N 43.2239, W-83.3008). MDOT project.

Project #2. Tittabawassee River mussel relocation: Midland, MI (GPS N 43.599789, W-84.239322).

Project #3. Michigamme River mussel relocation: Republic, MI (GPS N 46.38908, W 87.98561).

Project #4. Two sites: 1) Victoria Dam (GPS N 46.697189, W -89.208345); and 2) Main Bond Falls Dam (GPS N 46.415170, W -89.122959).

Project #5. Red Cedar River mussel monitoring: Williamston, MI (GPS N 42.686919, W -84.229352).

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Project #7. Red Cedar mussel relocation and monitoring: East Lansing, MI (GPS N 42.7261, W -84.51018).

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Project #15. Plaster Creek in Grand Rapids, MI (two sites: GPS N 42.917102, W-85.657214 and N 42.910793, W -85.642622).

Project #16. Tobacco River in Clare, MI (GPS N 43.830515, W-84.752482).

Project #17. Macatawa River in Holland, MI (GPS N 42.796141, W-86.051951).

Project #18. Grand River at US-127 in Holland, MI (GPS N 42.117933, W-84.364096).

Permitted collection gear:

Mussel Surveys – All mussel surveys and relocation efforts authorized above are to be conducted by hand with the aid of mesh bags to carry mussels when necessary.

Fish Surveys – All fish surveys authorized above are to be conducted by electrofishing with hand/dip nets, fyke nets, minnow traps or other methods approved in writing by the local DNR fisheries office. Nets and traps must be checked and cleared of animals once every 36 hours.

Reptile/Amphibian Surveys – By hand with the aid of hand/dip nets, cover boards, snake hook/tongs

Completion of an annual report is required with this permit. It shall be provided to DNR, Fisheries Division using online Collector's Report Form at www.michigan.gov/scientificcollectorspermit.

GENERAL PROVISIONS: This permit must be in permittee's possession during collection in the field or the location where specimens are being held and must be made available upon request of any Department representative. Activities under this permit are limited to species not listed as threatened or endangered unless the permittee(s) is also in possession of the required Threatened and Endangered Species Permit from DNR Wildlife Division for state listed species as well as the proper permit(s) from the US Fish and Wildlife Service for federally listed species. This permit is not transferable. This permit does not provide any authorization to circumvent any federal, state, or local laws and ordinances, including, but not limited to restricted entrance to refuges or other areas closed to the public without written permission of the land administrator.

In addition to this permit, separate DNR Public Land Use permits are required from:

- 1) Parks and Recreation Division for activities in State Parks and Recreation Areas and at the state boat launches;
- 2) Wildlife Division for activities in State Game Areas; and
- 3) Forest Resources Division for activities in State Forests

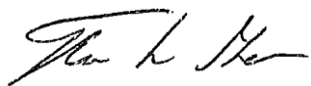
Public Land Use Permit applications can be obtained online at:

https://www.michigan.gov/dnr/0,4570,7-350-79136_79262_80436_85611---,00.html

Permittees are also advised to contact the US Forest Service and/or National Park Service about any permit requirements for activities occurring in Michigan's National Forests and National Parks, respectively.

All sampling gear that is deployed and left unattended in the field by persons permitted under this program must be clearly labeled with the name of the permittee's affiliation (university, zoo, consulting firm, agency, etc.) on the sampling gear itself or on at least one of the buoys or floats used to mark deployed gear that is submerged. Additionally, boats used to conduct permit activities must also be clearly marked on the sides of the vessel with the permittee's affiliation.

Any violation of the conditions of this permit may result in revocation of this permit and misdemeanor penalties of imprisonment for not more than 90 days or a fine of not more than \$500 or all of the above.

FOR DNR USE ONLY		
Permit Number FSCP05102024150248	Issue Date 05/13/2024	Expiration Date 12/31/2024
cc: WLSMU, NLMMU, CLMMU, SLMMU, SLHMU, Threatened & Endangered		
For, Randall Claramunt, Chief, MDNR Fisheries Division		
		



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING



DANIEL EICHINGER
DIRECTOR

February 2, 2022

Ryan Holem
GEI Consultants of Michigan, P.C.
401 South Washington Square, Suite 103
Lansing, MI 48933

Dear Ryan Holem,

This letter is an official attachment to your Threatened and Endangered Species Permit (**TE 029**). Your permit is issued in the *Consultant* category only. Your permit expires on **March 31, 2025**. Renewal information will be sent in December of 2024.

Authorization:

To conduct the scientific activities listed under special conditions on the threatened/endangered species listed below. All activities are subject to the standard permit conditions within this letter.

In addition to the standard requirements listed on the back of this permit:

- This permit provides legal authorization to work with the listed threatened and endangered species, as well as the unintentional and incidental take of those species if done in accordance with this permit.
- This permit does not allow for take or translocation of species to facilitate the completion of a project.
- Additional permits may be required on specific projects that may affect threatened and endangered species. Such permits are negotiated by the Department of Natural Resources and issued to the client or landowner. Additional federal permits may be required for federally listed species.
- Permitted are surveys for listed plant and animal species using standard methods and appropriate timing to ensure a high probability of detecting the presence of the species. Only survey methods that minimize disturbance and risk to the organism or its habitat are to be used. Specific requirements for certain taxa are listed below.
- Subpermittees: Those working under the direction of the permittee.

Plants

- Permitted is the survey of threatened plants for identification and documentation, for environmental impact analysis, and to provide new information on the distribution of listed plant species. Endangered species are not authorized for collection. Use photography or non-destructive collection techniques for documentation whenever feasible (and by limiting collections to leaves, flowers, or fruits). Surveys must be done in a manner that will not cause harm to the population or its habitat.

Mollusks

- Permitted is the collection and temporary holding of mussels for identification. Sampling must be done in a manner that minimizes the amount of time taken from the water and risk to the animals. Animals handled must be returned to the same site where collected, or to a relocation area that has been approved by MDNR.

Insects

- Handling of threatened and endangered insects is permitted when needed for identification and documentation. Surveys must not significantly reduce the size of the local population and must be done in a manner that will not cause harm to the population or its habitat. Use non-lethal survey and capture techniques such as careful capture and release or photography whenever possible.

Fish

- Listed fish species may be humanely captured for identification and released at the same site using standard non-lethal collection techniques. Dead specimens may be salvaged.

Birds

- Capture or collection of listed birds is not permitted. Use non-lethal techniques such as photography or recordings of songs when specific documentation is required.

Reptiles and Amphibians

- Threatened and endangered reptiles and amphibians may be humanely captured for identification and examination and released at the same site.

Mammals

- Rely on the use of sign or other observations to determine the presence of mammals to the extent possible. Small mammals (e.g., bats, shrews, and voles) may be live trapped when needed to determine their presence but must be released on site unharmed. Larger mammals may not be captured.

Standard Permit Conditions

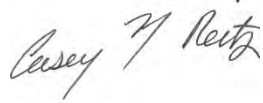
- All specimens authorized for collection under this permit shall be deposited in the collection of an approved public educational or research institution prior to permit expiration.
- None of the specimens collected shall become part of a private collection or private property.
- This permit does not allow or grant the right of trespass. Projects shall not take place on any private or public lands without permission from the owner or administrator of such lands.
- This permit does not provide authorization to circumvent any federal, state, or local laws and ordinances.
- Additionally, federal permits may be required for activities affecting federally listed threatened or endangered species and/or migratory birds. Contact the U.S. Fish and Wildlife Service at 2651 Coolidge Road, East Lansing, MI 48823.
- The activities covered under this permit are not transferable to another person unless specifically authorized.
- Unless otherwise noted, within 10 days of the expiration of this permit, the holder is required to file a report detailing the locations of any threatened and endangered species encountered and the number and disposition of specimens handled. Annual reports for multi-year permits are due at the end of each calendar year.
- A person conducting any activities authorized by this permit shall carry a copy of this permit and shall produce a copy of this permit upon request of a Department of Natural Resources employee or law enforcement officer.

All permits require an annual report unless indicated otherwise. You can use the enclosed report form and submit forms via email to reitzc@michigan.gov. In addition, please report any new occurrences of threatened and endangered species as soon as possible instead of waiting until the end of the year. This will allow new data to be incorporated into the Michigan Natural

Features Inventory database sooner, thus ensuring greater protection for these species and their habitats.

Thank you for helping protect our threatened and endangered species. Feel free to contact me with any questions or concerns.

Sincerely,

A handwritten signature in black ink that reads "Casey M. Reitz". The signature is written in a cursive, flowing style.

Casey M. Reitz, Permit Specialist
DNR-Wildlife Division
Phone: 517-284-6210
Fax: 517-335-6604
reitzc@michigan.gov
www.michigan.gov/wildlifepermits

Appendix C – GEI Permits

**SCIENTIFIC COLLECTOR'S PERMIT***Issued under the authority of Public Act 451 of 1994, Part 487, as amended, section 324.48735.*

Under the provisions of Part 487, Act 451, P.A. 1994, as amended, being section 324.48735, permission is hereby granted to:

Title	First Name Ryan	Last Name Holem
Co-Permittee Meghan Martinski	Co-Permittee Stuart Kogge	Co-Permittee Samuel Prentice
Institution/Affiliation GEI Consultants of Michigan, P.C.		
Mailing Address 401 S Washington Square Suite 103, Lansing, Michigan, 48933		

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Project #8. Kalamazoo River mussel relocation: Otsego, MI (GPS N 42.482555, W-85.798383), directly downstream of the Trowbridge Dam. Mussel relocation in advance of planned dam modification/removal.

Project #9. Swartz Creek mussel relocation: Flint, MI (GPS N 42.975761, W -83.760480), at the I-69 crossing. Mussel relocation in advance of planned bank armoring.

Project #10. Indiana Northeastern Railroad (INNE) mussel relocation: Four sites near Montgomery, MI: 1) GPS N 41.777544, W -84.809169; 2) GPS N 41.786122, W -84.797361; 3) GPS N 41.795689, W -84.785511; and 4) GPS N 41.797711, W -84.781056. Mussel relocation efforts in advance of maintenance work at these INNE crossing sites.

Project #11. Ox Creek P51 survey: Benton Harbor, MI (GPS N 42.116806, W -86.448558). P51 surveys consistent with workplan.

Project #12. NCR Kalamazoo River Area 2 mussel surveys: Otsego, MI (GPS approximate mid-point N 42.458936, W -85.682020) between the former Plainwell Dam to the Otsego City Dam. Qualitative mussel surveys and substrate evaluation in advance of planned remedial actions.

Project #13. Big Cedar River mussel relocations: Three sites in Stephenson, MI: 1) GPS N 45.43411, W -87.35052; 2) GPS N 45.43555, W -87.35175; 3) GPS N 45.43822, W -87.35588. A mussel relocation effort in advance of stream/equalization culvert replacement.

Project #14. Kalamazoo River Operating Unit 5 mussel relocation: Upstream of the Trowbridge Dam, between Otsego and Allegan, MI (GPS N 42.483409, W-85.793725), in Mussel relocation would take place in advance of planned dredging in Subarea E and along near-bank areas in Subareas C and D where turbidity curtain will be installed in conjunction with planned dredging.

Project #15. Plaster Creek mussel relocation: Grand Rapids, MI (two sites: GPS N 42.917102, W-85.657214 and N 42.910793, W -85.642622). Mussel relocation would take place in advance of improvements to Ken-O-Sha and Plaster Creek Trails, which border Plaster Creek.

Project #16. Tobacco River mussel survey: Clare, MI (GPS N 43.830515, W-84.752482). Semi-quantitative and qualitative mussel survey in the Tobacco River, downstream of Lake Shamrock Dam. Project has not been awarded/contracted yet at the time of permitting.

Project #17. Macatawa River mussel survey: Holland, MI (GPS N 42.796141, W-86.051951). Semi-quantitative and qualitative mussel survey is proposed in advance of planned stream restoration that would impact the riverbed in this stretch.

Project #18. Grand River US-127 mussel relocation: Holland, MI (GPS N 42.117933, W-84.364096). Mussel relocation efforts will be conducted here in advance of potential impacts to the riverbed. This project is for MDOT and has not been awarded/contracted yet at the time of permitting.

Project #19. Tittabawassee River-Poseyville Road mussel relocation: Midland, MI (GPS N 43.610039, W -84.242547). Mussel relocation efforts will be conducted here in advance of temporary impacts below the OHWM in conjunction with construction of a pedestrian bridge.

Project #20. St. Joseph River - Upton Drive mussel survey: Benton Harbor, MI (GPS N 42.113586, W -84.478671). Qualitative and semi-quantitative mussel survey efforts to determine mussel species and abundance in advance of a potential project at this location. This project has not been awarded/contracted yet at the time of permitting.

Project #21. Lake Macatawa mussel survey: Holland, MI (GPS N 42.775788°, W - 86.173887°). Semi-quantitative mussel survey is proposed to determine mussel presence/absence, species, and abundance in advance of a proposed dredging project at this location.

Project #22. Thornapple River/Lake mussel relocation: Ada, MI (GPS N 42.944721° and W -85.498607°). A mussel relocation effort is proposed to relocate mussels out of shoreline areas that are proposed for rip-rap installation. The mussel relocation plan for this project is complete.

General Provisions concerning all mussel projects listed above. Permittees are authorized to collect, identify, enumerate and release freshwater mussels as part of visual and qualitative survey efforts at any of the mussel project locations listed. If live (native) mussels are found, and relocation is necessary, they may be relocated to an MDNR-approved relocation site. The permittees are required to work with the local DNR Fisheries Biologist on project specific survey methodology and if necessary, acceptable stream locations that mussels are to be relocated to. The permittees are authorized to mark or tag mussel mussels when follow-up monitoring is required. These are non-lethal activities and the collection or removal of live voucher specimens is not authorized. The handling and processing of any mussels found must be consistent with guidelines specified in the document titled "Michigan Freshwater Mussel Survey Protocols and Relocation Procedures" (2021, v3) paying particular attention to the minimum and maximum temperature guidelines for handling live animals.

Note: Per protocols, all mussel survey activities in Michigan need to be wrapped up by October 15th.

Finally, the collection or handling of any freshwater mussel, regardless of species, from a waterbody known to be inhabited by a state or federally listed mussel species requires, in addition to this permit, either a State of Michigan T&E Permit, a Federal T&E permit or both. Please review Michigan's Mussel Map Viewer for waterbodies in Michigan with known T&E populations and prepare for your permitting needs accordingly at <https://mnfi.anr.msu.edu/resources/michigan-mussels>.

For State T&E permitting contact DNR-StateTEPermit@michigan.gov. In addition to mussel work, the T&E Unit should be contacted if any other state threatened or endangered species is encountered with the purpose of relocation.

For Federal T&E permitting please contact the regional US Fish and Wildlife Service Office in East Lansing, Michigan.

General Provisions concerning all fish, reptile and amphibian surveys. Permittees are authorized for general survey purposes to collect, identify, enumerate, photograph and release all fish, reptiles and amphibians. These animals may not be marked, clipped or tagged in any way prior to release and overall handling time should be kept to a minimum. The lethal collection of vouchers is not authorized.

Finally, the permittees may also be engaged in macroinvertebrate sampling during field activities.

In response to the VHS virus and other aquatic invasive species in Michigan, the following is required:

- 1) All equipment coming in contact with water including: boat hulls, boat trailers, buckets, waders, nets, etc. must be visually inspected and cleaned by hand picking any attached plants, sediments, or other debris. This should be done immediately upon leaving the water body being worked on.
- 2) All equipment coming in contact with water and/or fish and/or specifically working with aquatic invertebrates including: boat hulls, boat trailers, buckets, waders, nets, etc. must be disinfected using a 1 cup of bleach to 10 gallons of water solution prior to moving between waterbodies. If long periods of time (week or longer) are anticipated in between sampling events, thorough drying of all equipment in the sun is an acceptable alternative to using the bleach solution.
 - a. A 20 min Virkon Aquatic bath can be substituted as a bleach alternative.
 - b. A 20 min 100% vinegar bath can be substituted as a bleach alternative.
- 3) If using a boat, live wells and bilges must be emptied and disinfected with a solution of 1 cup of bleach to 10 gallons of water prior to moving between waterbodies.
 - a. A 20 min Virkon Aquatic bath can be substituted as a bleach alternative.

- b. A 20 min 100% vinegar bath can be substituted as a bleach alternative.

For more information on VHS or invasive species, go to the Fisheries link on the Department of Natural Resources web site at: <http://www.michigan.gov/dnr>

Permitted collection area:

Project #1. Flint River mussel relocation: North Branch, MI (GPS N 43.2239, W-83.3008). MDOT project.

Project #2. Tittabawassee River mussel relocation: Midland, MI (GPS N 43.599789, W-84.239322).

Project #3. Michigamme River mussel relocation: Republic, MI (GPS N 46.38908, W 87.98561).

Project #4. Two sites: 1) Victoria Dam (GPS N 46.697189, W -89.208345); and 2) Main Bond Falls Dam (GPS N 46.415170, W -89.122959).

Project #5. Red Cedar River mussel monitoring: Williamston, MI (GPS N 42.686919, W -84.229352).

Project #6. Grand River quantitative mussel survey: Grand Rapids, MI (GPS coordinates are approximated from aerial imagery: N 42.955174, W-85.682317).

Project #7. Red Cedar mussel relocation and monitoring: East Lansing, MI (GPS N 42.7261, W -84.51018).

Project #8. Kalamazoo River mussel relocation: Otsego, MI (GPS N 42.482555, W-85.798383).

Project #9. Swartz Creek mussel relocation: Flint, MI (GPS N 42.975761, W -83.760480), at the I-69 crossing.

Project #10. Four sites near Montgomery, MI: 1) GPS N 41.777544, W -84.809169; 2) GPS N 41.786122, W -84.797361; 3) GPS N 41.795689, W -84.785511; and 4) GPS N 41.797711, W -84.781056.

Project #11. Ox Creek P51 survey: Benton Harbor, MI (GPS N 42.116806, W -86.448558).

Project #12. NCR Kalamazoo River Area 2 mussel surveys: Otsego, MI (GPS approximate mid-point N 42.458936, W -85.682020).

Project #13. Big Cedar River mussel relocations: Three sites in Stephenson, MI: 1) GPS N 45.43411, W -87.35052; 2) GPS N 45.43555, W -87.35175; 3) GPS N 45.43822, W -87.35588.

Project #14. Kalamazoo River upstream of the Trowbridge Dam, between Otsego and Allegan, MI (GPS N 42.483409, W-85.793725).

Project #15. Plaster Creek in Grand Rapids, MI (two sites: GPS N 42.917102, W-85.657214 and N 42.910793, W -85.642622).

Project #16. Tobacco River in Clare, MI (GPS N 43.830515, W-84.752482).

Project #17. Macatawa River in Holland, MI (GPS N 42.796141, W-86.051951).

Project #18. Grand River at US-127 in Holland, MI (GPS N 42.117933, W-84.364096).

Project #19. Tittabawassee River near Poseyville Road in Midland, MI (GPS N 43.610039, W -84.242547).

Project #20. St. Joseph River near Upton Drive in Benton Harbor, MI (GPS N 42.113586, W -84.478671).

Project #21. Lake Macatawa near Holland, MI (GPS N 42.775788°, W - 86.173887°).

Project #22. Thornapple River/Lake near Ada, MI (GPS N 42.944721° and W -85.498607°).

Permitted collection gear:

Mussel Surveys – All mussel surveys and relocation efforts authorized above are to be conducted by hand with the aid of mesh bags to carry mussels when necessary.

Fish Surveys – All fish surveys authorized above are to be conducted by electrofishing with hand/dip nets, fyke nets, minnow traps or other methods approved in writing by the local DNR fisheries office. Nets and traps must be checked and cleared of animals once every 36 hours.

Reptile/Amphibian Surveys – By hand with the aid of hand/dip nets, cover boards, snake hook/tongs

Completion of an annual report is required with this permit. It shall be provided to DNR, Fisheries Division using online Collector's Report Form at www.michigan.gov/scientificcollectorspermit.

GENERAL PROVISIONS: This permit must be in permittee's possession during collection in the field or the location where specimens are being held and must be made available upon request of any Department representative. Activities under this permit are limited to species not listed as threatened or endangered unless the permittee(s) is also in possession of the required Threatened and Endangered Species Permit from DNR Wildlife Division for state listed species as well as the proper permit(s) from the US Fish and Wildlife Service for federally listed species. This permit is not transferable. This permit does not provide any authorization to circumvent any federal, state, or local laws and ordinances, including, but not limited to restricted entrance to refuges or other areas closed to the public without written permission of the land administrator.

In addition to this permit, separate DNR Public Land Use permits are required from:

- 1) Parks and Recreation Division for activities in State Parks and Recreation Areas and at the state boat launches;
- 2) Wildlife Division for activities in State Game Areas; and
- 3) Forest Resources Division for activities in State Forests

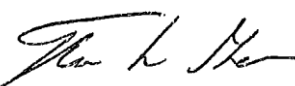
Public Land Use Permit applications can be obtained online at:

https://www.michigan.gov/dnr/0,4570,7-350-79136_79262_80436_85611---,00.html

Permittees are also advised to contact the US Forest Service and/or National Park Service about any permit requirements for activities occurring in Michigan's National Forests and National Parks, respectively.

All sampling gear that is deployed and left unattended in the field by persons permitted under this program must be clearly labeled with the name of the permittee's affiliation (university, zoo, consulting firm, agency, etc.) on the sampling gear itself or on at least one of the buoys or floats used to mark deployed gear that is submerged. Additionally, boats used to conduct permit activities must also be clearly marked on the sides of the vessel with the permittee's affiliation.

Any violation of the conditions of this permit may result in revocation of this permit and misdemeanor penalties of imprisonment for not more than 90 days or a fine of not more than \$500 or all of the above.

FOR DNR USE ONLY		
Permit Number FSCP05102024150248	Issue Date 05/13/2024	Expiration Date 12/31/2024
cc: WLSMU, NLMMU, CLMMU, SLMMU, SLHMU, Threatened & Endangered		
For, Randall Claramunt, Chief, MDNR Fisheries Division 		



GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
LANSING



DANIEL EICHINGER
DIRECTOR

February 2, 2022

Ryan Holem
GEI Consultants of Michigan, P.C.
401 South Washington Square, Suite 103
Lansing, MI 48933

Dear Ryan Holem,

This letter is an official attachment to your Threatened and Endangered Species Permit (**TE 029**). Your permit is issued in the *Consultant* category only. Your permit expires on **March 31, 2025**. Renewal information will be sent in December of 2024.

Authorization:

To conduct the scientific activities listed under special conditions on the threatened/endangered species listed below. All activities are subject to the standard permit conditions within this letter.

In addition to the standard requirements listed on the back of this permit:

- This permit provides legal authorization to work with the listed threatened and endangered species, as well as the unintentional and incidental take of those species if done in accordance with this permit.
- This permit does not allow for take or translocation of species to facilitate the completion of a project.
- Additional permits may be required on specific projects that may affect threatened and endangered species. Such permits are negotiated by the Department of Natural Resources and issued to the client or landowner. Additional federal permits may be required for federally listed species.
- Permitted are surveys for listed plant and animal species using standard methods and appropriate timing to ensure a high probability of detecting the presence of the species. Only survey methods that minimize disturbance and risk to the organism or its habitat are to be used. Specific requirements for certain taxa are listed below.
- Subpermittees: Those working under the direction of the permittee.

Plants

- Permitted is the survey of threatened plants for identification and documentation, for environmental impact analysis, and to provide new information on the distribution of listed plant species. Endangered species are not authorized for collection. Use photography or non-destructive collection techniques for documentation whenever feasible (and by limiting collections to leaves, flowers, or fruits). Surveys must be done in a manner that will not cause harm to the population or its habitat.

Mollusks

- Permitted is the collection and temporary holding of mussels for identification. Sampling must be done in a manner that minimizes the amount of time taken from the water and risk to the animals. Animals handled must be returned to the same site where collected, or to a relocation area that has been approved by MDNR.

Insects

- Handling of threatened and endangered insects is permitted when needed for identification and documentation. Surveys must not significantly reduce the size of the local population and must be done in a manner that will not cause harm to the population or its habitat. Use non-lethal survey and capture techniques such as careful capture and release or photography whenever possible.

Fish

- Listed fish species may be humanely captured for identification and released at the same site using standard non-lethal collection techniques. Dead specimens may be salvaged.

Birds

- Capture or collection of listed birds is not permitted. Use non-lethal techniques such as photography or recordings of songs when specific documentation is required.

Reptiles and Amphibians

- Threatened and endangered reptiles and amphibians may be humanely captured for identification and examination and released at the same site.

Mammals

- Rely on the use of sign or other observations to determine the presence of mammals to the extent possible. Small mammals (e.g., bats, shrews, and voles) may be live trapped when needed to determine their presence but must be released on site unharmed. Larger mammals may not be captured.

Standard Permit Conditions

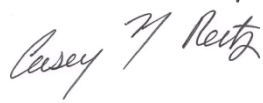
- All specimens authorized for collection under this permit shall be deposited in the collection of an approved public educational or research institution prior to permit expiration.
- None of the specimens collected shall become part of a private collection or private property.
- This permit does not allow or grant the right of trespass. Projects shall not take place on any private or public lands without permission from the owner or administrator of such lands.
- This permit does not provide authorization to circumvent any federal, state, or local laws and ordinances.
- Additionally, federal permits may be required for activities affecting federally listed threatened or endangered species and/or migratory birds. Contact the U.S. Fish and Wildlife Service at 2651 Coolidge Road, East Lansing, MI 48823.
- The activities covered under this permit are not transferable to another person unless specifically authorized.
- Unless otherwise noted, within 10 days of the expiration of this permit, the holder is required to file a report detailing the locations of any threatened and endangered species encountered and the number and disposition of specimens handled. Annual reports for multi-year permits are due at the end of each calendar year.
- A person conducting any activities authorized by this permit shall carry a copy of this permit and shall produce a copy of this permit upon request of a Department of Natural Resources employee or law enforcement officer.

All permits require an annual report unless indicated otherwise. You can use the enclosed report form and submit forms via email to reitzc@michigan.gov. In addition, please report any new occurrences of threatened and endangered species as soon as possible instead of waiting until the end of the year. This will allow new data to be incorporated into the Michigan Natural

Features Inventory database sooner, thus ensuring greater protection for these species and their habitats.

Thank you for helping protect our threatened and endangered species. Feel free to contact me with any questions or concerns.

Sincerely,

A handwritten signature in black ink that reads "Casey M. Reitz". The signature is written in a cursive style with a large, stylized "C" and "R".

Casey M. Reitz, Permit Specialist
DNR-Wildlife Division
Phone: 517-284-6210
Fax: 517-335-6604
reitzc@michigan.gov
www.michigan.gov/wildlifepermits

**APPLICATION FOR A THREATENED/ENDANGERED
SPECIES PERMIT**


By the authority of Part 365, Endangered Species Protection, of the Natural Resource and Environmental Protection Act, Act 451 of 1994, and the rules established thereunder, submittal is required to be considered for a permit.

INSTRUCTIONS: Please type or print all information except the signature and mail with attachments to the Wildlife Division. Federal permits may be required for federally listed or migratory species.

APPLICANT INFORMATION AND PERMIT TYPE

<input type="checkbox"/> New Permit		<input checked="" type="checkbox"/> Renewal Permit		If Renewal, Permit Number: <u>TE 029</u>	
<input checked="" type="checkbox"/> Consultant (provide credentials)		<input type="checkbox"/> Education or Scientific		<input type="checkbox"/> Development	
<input type="checkbox"/> Live Animal Programs/Salvage					
Name of Applicant (Last, First, Middle) Holem, Ryan R.			Applicant's Title (If applicable) Biologist/Toxicologist		
Name of Organization GEI Consultants of Michigan, P. C.			Subpermittee Employees working under permittee's direction		
Address 401 South Washington Square, Suite 103					
City, State, ZIP Code Lansing, MI 48933					
Telephone 517-803-2838			E-Mail Address rholem@geiconsultants.com		

SPECIES INFORMATION

Species (Scientific or common names) All species	
Location (Be specific. Include Michigan county(ies)) All Michigan Counties	
Time period requested (Usually one calendar year) 3 years (if possible)	
Number of plants and/or animals to be handled, collected, relocated, etc. N/A - project specific	
Name and location of public institution where authorized specimens will be placed N/A	
Purpose of project and justification for study, collection, or relocating species (Attach applicable proposals or plans) General protected species surveys throughout the state.	
Proposed methods to mitigate impacts of projects (Attached applicable proposals or plans) N/A	
Signature of Applicant 	Date 1/26/22

Mail completed application and attachments to:

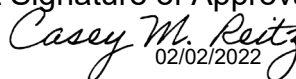
**Wildlife Division
Department of Natural Resources
PO Box 30444
Lansing, MI 48909-7944**

Permit Number: TE 029

Issue Date: 02/02/2022

Expiration Date: 03/31/2025

Permit Specialist Signature of Approval:


02/02/2022