

**TRANSLOCATION OF FRESHWATER MUSSELS
(BIVALVIA: UNIOINIDAE) FROM THE PLAINWELL
DIVERSION DAM AREA ON THE KALAMAZOO
RIVER, MICHIGAN**

Report to the US Fish and Wildlife Service,

Region 3,

East Lansing Field Office

East Lansing, Michigan

Prepared by

Mehne and Associates, Inc.

Kalamazoo, Michigan

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INTRODUCTION/BACKGROUND

In 2009, Georgia-Pacific and their contractor, ARCADIS, initiated a Time Critical Removal Action (TCRA) to remove Polychlorinated biphenyls (PCBs) in the Kalamazoo River in the area of the diversion dam upstream of the city of Plainwell (often termed "Plainwell Dam #2" or "Plainwell Site #2"). The TCRA is the result of an agreement with the U.S. Environmental Protection Agency who is overseeing the project.

TCRA activities will involve excavation of contaminated materials in the banks and channels of this river. Because of these activities, mussel beds could either be directly impacted or subject to siltation or changes in channel morphology that would make the river bed temporarily unstable. Suitable mussel habitat has been recently described as areas that are considered "flow refugia" (Strayer, 1999; 2008), or areas where the substrate is fairly stable as river flow seasonally changes.

On July 17, 2009, Mehne and Associates surveyed the area from Plainwell Dam #2 upstream to the Conrail Railroad bridge (Riverview Avenue to the north and 16th Street to the south) and found two mussel beds in close proximity to Plainwell Site #2 TCRA area. Live elktoe, *Alasmodonta marginata*, were also found in this area. This species is listed as Special Concern in Michigan.

The Michigan Department of Natural Resources and the U.S. Fish and Wildlife Service decided to relocate two main mussel beds in the vicinity of the TCRA area to an area where they would not be affected by excavation activities. This report records the relocation activities from July 28 to September 10, 2009.

METHODS

Four collection visits were made at two sites, hereafter referred to as "upstream site" and "downstream site" (Figure 1). The upstream site was visited July 28 and August 20. Visits were made to the downstream site on September 3 and 10.

At each collection visit mussels were removed from the site by snorkeling, searching by hand or using nets to scoop the substrate (where sites were too deep to dig)(Figure 2). Time spent on searching per person hour was noted to evaluate the catch per unit effort.

Mussels were placed in mesh bags and kept in water until identified and counted. As the mussels were processed, they were kept submerged or wetted (Figures 3 and 4). Mussels were marked with an "x" using a small, battery operated drill to distinguish translocated mussels from resident mussels for future follow-up surveys. Just prior to transport, mussels were placed in containers for moving to relocation sites. Time of transport was less than 15 minutes. Mussels were placed in the river at the translocation site anterior side down (Figure 5), or gently released if water was too deep to place them. Relocation areas for both upstream and downstream sites were picked because 1) they were not expected to be impacted by TCRA activities and 2) live mussels of the same species composition were found in the area, which indicated that the habitat was suitable.

Mussels from the upstream site were placed approximately one half mile up river from where they were collected (Figure 5). This was approximately 1200 feet upstream of the construction site (Figure 1). Mussels collected from the downstream site were placed approximately ¼ mile downstream of where they were collected (Figure 1).

Recruitment was noted for each species if one or more mussels aged at 3 years old or less were found. Mussels can roughly be aged by use of the growth rings on the shell. Juvenile mussels are often very small and difficult to locate. Mussels three years old would indicate the population had successfully reproduced and it is likely suitable host fish are available for metamorphosis.

Shells (remains of previously dead mussels) found at the site were collected for deposition into the University of Michigan Museum of Zoology's Mollusk Division collection.

RESULTS AND DISCUSSION

A total of 1264 mussels were collected and moved, with 967 from the upstream site and 297 mussels from the downstream site (Table 1).

Eleven species were translocated at the upstream site, with the mucket, *Actinonaias ligamentina* making up 78% of the total. The elktoe, *Alasmidonta marginata* and the white heelsplitter, *Lasmigona complanata*, the most common species with each constituting 7% of the mussels found. Other species each accounted for less than 5% of the observations. Recruitment was noted for four species in the upstream site: *A. ligamentina*, *A. marginata*, *L. complanata* and *L. costata*.

At the first visit (July 28), 9.5 person hours were spent collecting the mussels at the upstream site. Twenty-four person hours were spent searching at the second visit (August 20). Catch per unit effort was 45 mussels per person hour searching on July 28, and 22 on August 20.

Six species were translocated at the downstream site (Table 1). *Actinonaias ligamentina* and *L. complanata* were the most common species found, making up 68% and 22% of the mussels found at this site, respectively. *Lampsilis cardium* made up 3% of the mussels found and the three remaining species made up less than 1%. Recruitment was noted for *A. ligamentina* and *L. complanata*.

At the upstream site, 8 person hours were spent collecting mussels on September 3, and 13 person hours were spent on September 10 (Figures 6, 7, 8 and 9). Catch per unit effort was 12 and 15 person-hours for the first and second visits, respectively.

The elktoe, *Alasmidonta marginata* is listed as Special Concern in Michigan. A total of 77 individuals were translocated. The majority of these (69) were collected from the upstream site. This species is listed as Special Concern in Michigan.

Not all mussels in the beds were likely found and removed. Catch per unit effort decreased in the upstream site from the first to second visit, so the first collection effort likely removed a significant portion of the mussels in that bed. At the downstream site, catch per unit effort increased slightly during the second visit (from 12 to 15). Lower water levels and an additional person made collection more efficient on that visit. A third visit was not scheduled because of decreasing water temperatures and the already fairly low catch per unit effort observed.

Table 1. Species collected and translocated from impact area

| Species | Upstream site | | | Downstream site | | |
|---|----------------------|------------------|--------------|------------------------|---------------------|--------------|
| | July 28 | August 20 | Total | September 3 | September 10 | Total |
| Mucket, <i>Actinonaias ligamentina</i> | 344 | 410* | 754 | 67 | 134* | 201 |
| Elktoe, <i>Alasmidonta marginata</i> | 31 | 38* | 69 | 3 | 5 | 8 |
| Cylindrical papershell, <i>Anodontooides ferruscianus</i> | 0 | 4 | 4 | 0 | 0 | 0 |
| Wabash pigtoe, <i>Fusconaia flava</i> | 0 | 2 | 2 | 1 | 0 | 1 |
| Pocketbook, <i>Lampsilis cardium</i> | 16 | 19 | 35 | 9 | 11 | 20 |
| Fragile papershell, <i>Leptodea fragilis</i> | 1 | 0 | 1 | 0 | 0 | 0 |
| White heelsplitter, <i>Lasmigona complanata</i> | 20 | 50* | 70 | 15* | 50* | 65 |
| Creek heelsplitter, <i>Lasmigona compressa</i> | 0 | 4 | 4 | 0 | 0 | 0 |
| Fluted shell, <i>Lasmigona costata</i> | 11 | 9* | 20 | 2 | 0 | 2 |
| Giant floater, <i>Pyganodon grandis</i> | 0 | 1 | 1 | 0 | 0 | 0 |
| Creeper, <i>Strophitus undulates</i> | 7 | 0 | 7 | 0 | 0 | 0 |
| TOTAL | 430 | 537 | 967 | 97 | 200 | 297 |
| Person hours spent searching | 9.5 | 24 | 33.5 | 8 | 13 | 21 |
| Catch per unit effort | 45 | 22 | 29 | 12 | 15 | 14 |

* indicates recruitment was noted by the presence of at least one individual < 3 years old

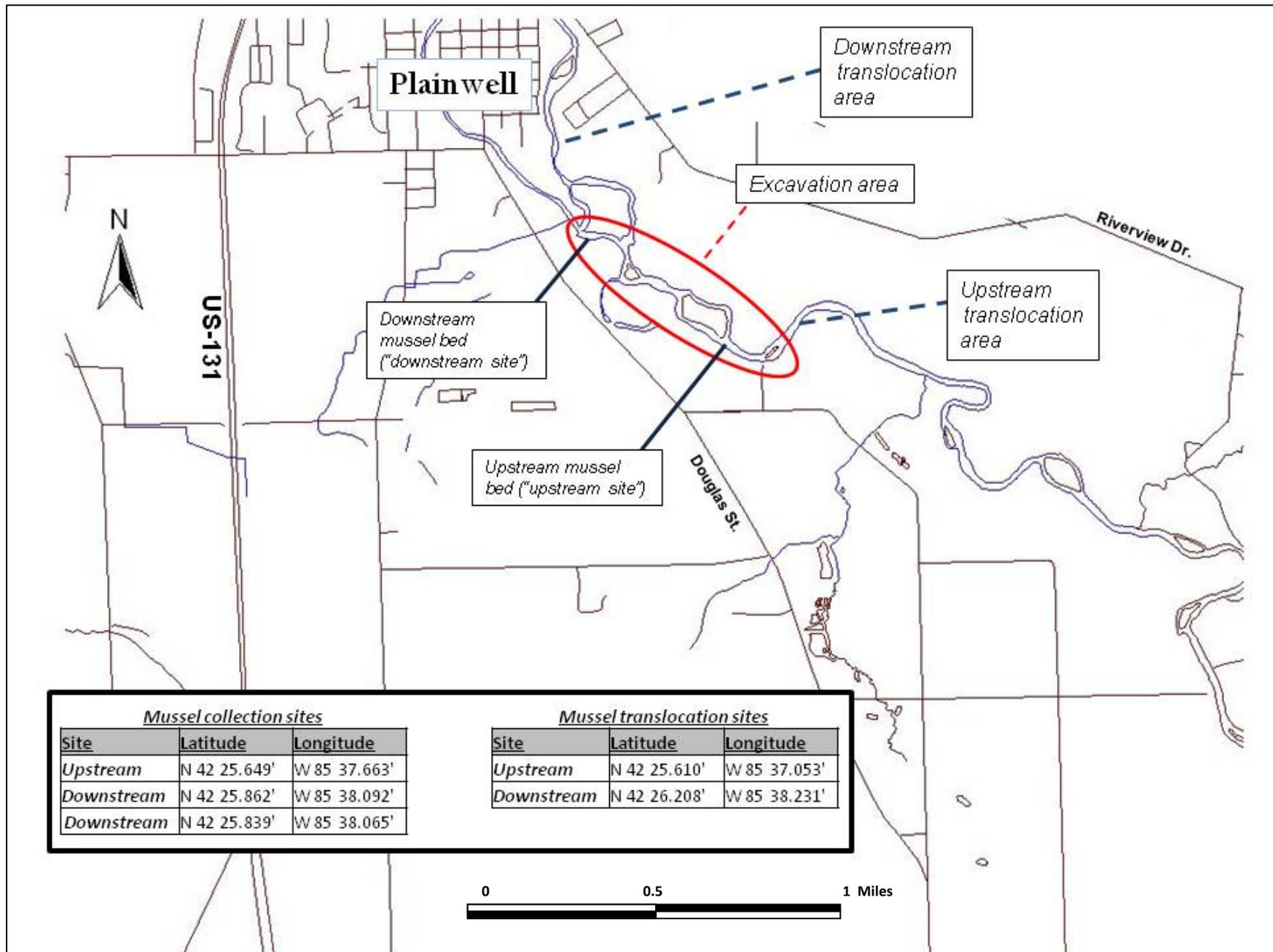


Figure 1. Map showing collection and translocation localities

The substrate where the mussels were translocated consisted of gravel with sand. Flow regimes were expected to be similar to the collection sites. Because the translocation was within the same reach of the river and had a similar habitat, host fish populations necessary for recruitment are likely similar among the sites. Mussels of similar species were found at translocation areas, indicating the sites were suitable. Some level of mortality is expected with translocating mussels (Cope and Waller, 1995 and Newton et al. 2001). For this translocation, mortality rates may be reduced relative to some other studies because the mussels were being relocated to an area with similar habitat and in the same reach of the river using short holding times.

In the future, these mussels may be relocated back to their original sites after construction activities and when the habitat is stable. Although recovery rates of mussels with marked shells is generally lower than for mussels with metal pit tags (Kurth et al., 2007) the areas are accessible, and recapture should be feasible and relocating efficient. GPS readings should help a team retrieve the translocated population. Follow-up visits up to five years post-translocation have been suggested to evaluate the success of the translocation (Cope and Waller, 1995).

LITERATURE CITED

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Figure 2. Mehne and Associates digging for mussels along a transect in the upstream site (June 18)



Figure 3. Mussels recovered from the upstream site (June 18)



Figure 4. Mussels recovered from the upstream site (June 18).



Figure 5. Mussels being placed upstream of the excavation area (June 18)



Figure 6. Area of downstream site (September 10)



Figure 7. Mehne and Associates digging for mussels in the downstream site, (September 10)



Figure 8. Mussels being placed in translocation area, approximately $\frac{3}{4}$ mile downstream from the collection point (September 10)

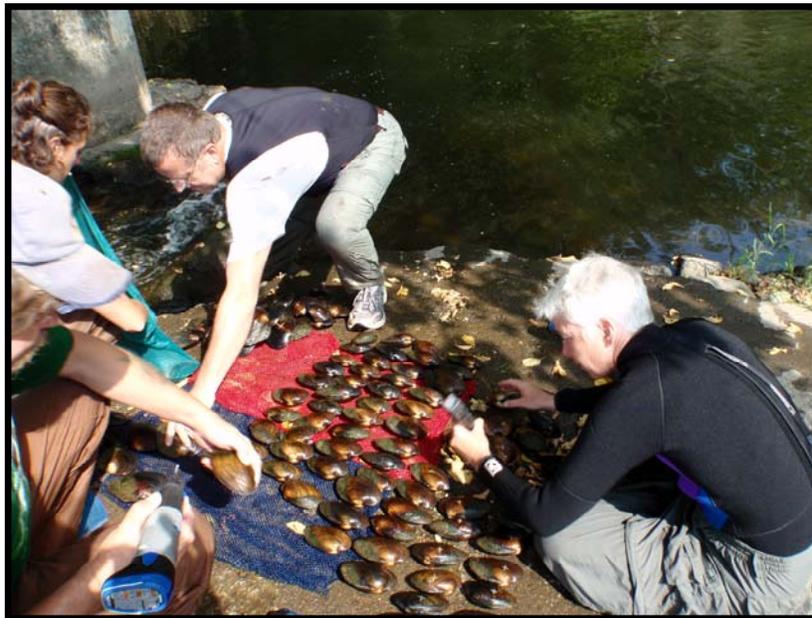


Figure 9. Mussels being identified and marked at downstream site (September 10)