

Evaluation of mussel survival from the former Plainwell Impoundment translocation, 2009

***Addendum* to Translocation of Freshwater mussels
(Bivalvia: Unionidae) from the former Plainwell Impoundment
area on the Kalamazoo River, Michigan**

**Report to the U.S. Fish and Wildlife Service,
Region 3,
East Lansing Field Office
East Lansing, Michigan**

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Introduction

In 2009, 1554 mussels were removed from the area below the former Plainwell Dam on the Kalamazoo River, Michigan. These mussels were removed as the flow of water over the dam had been cut off and the remaining waters below the former dam were becoming stagnant. The mussels were then translocated upstream below the U.S. 131 bridge. A detailed description of activities is given in Mehne and Associates, 2009.

Methods, Results and Conclusions

On July 22 and August 3, 2010, a total of 8.5 person hours were spent collecting marked and unmarked shells to assess and compare mortality of transplanted mussels. Transplanted mussels had been marked with an "X" on the shell to distinguish them from mussels already existing in the translocation area. Mussels were collected, identified, photographed, and returned to the substrate, anterior side down.

A total of 437 live mussels, and 76 shells, representing six species were collected (Table 1, Figures 1-14). Of these, 164 were marked, representing ten percent of transplanted mussels.

Three species of marked shells, *Alasmidonta ligamentina*, *Lasmigona complanata* and *Strophitus undulatus* were recovered. The percent of species recovered reflected the number of transplanted mussels (Table 2). No marked individuals making up less than one percent of the mussels transplanted were found.

Using the percent of shells and live individuals found, mortality was greater in the unmarked shells, at 17 percent. Shells comprised nine percent of the marked shells found.

Previous studies following translocations had mussel mortality rates ranging from 0 to 100 percent with recovery rates of 1-90 percent (summarized in Cope and Waller, 1995). Ten percent of the translocated mussels in this study were recovered with a mortality rate of nine percent. Cope et al. (2003) concluded handling protocol and suitable relocation habitat are important for survival of relocated mussels. Handling times were minimized for this translocation. The high recovery rate of unmarked native mussels suggests the translocation habitat is suitable for recruitment and survival. The translocation areas are also considered more stable areas post-TCRA work (ARCADIS, MDNRE, pers. comm.).

These mussels should continue to be monitored to assess the success of the translocation. Recommendations have been made to monitor for five years post-translocation to evaluate the effectiveness of a translocation (Cope and Waller, 1995).

Although recovery of mussels with marked shells is generally lower than mussels with metal pit tags (Kurth, et al., 2007) previous studies in larger rivers have found mussel migration from translocated areas were fairly low (5%) (Waller et al, 1993). More time could have been spent searching for marked mussels but was beyond the scope of this study.

Table 1. Number of marked and unmarked live mussels and shell recovered July 22 and August 3, 2010.

Species	Marked		Unmarked		Total	
	Number live	Number shells	Number live	Number shells	Number live	Number shells
Mucket, <i>Actinonaias ligamentina</i>	122	14	171	43	293	57
Elktoe, <i>Alasmodonta marginata</i>			3		3	0
Pocketbook, <i>Lampsilis cardium</i>	2		6	3	8	3
Fluted shell, <i>Lasmigona costata</i>			31	1	31	1
White heelsplitter, <i>Lasmigona complanata</i>	25	1	74	14	99	15
Creeper, <i>Strophitus undulatus</i>			3		3	0
TOTAL	149	15	288	61	437	76
Per cent shell	9		17			15

Table 2. Per cent species transplanted in 2009 and recovered in 2010.

Species	Transplanted 2009	Recovered 2010
Mucket, <i>Actinonaias ligamentina</i>	86	83
Cylindrical papershell, <i>Anodontoides ferruscianus</i>	<1	0
Pocketbook, <i>Lampsilis cardium</i>	3	1
Fat mucket, <i>Lampsilis siliquoidea</i>	<1	0
White heelsplitter, <i>Lasmigona complanata</i>	10	16
Fluted shell, <i>Lasmigona costata</i>	<1	0
Creeper, <i>Strophitus undulatus</i>	<1	0

Literature Cited

Cope, W.G. and D.L. Waller, 1995. Evaluation of freshwater mussel relocation as a conservation and management strategy. *Regulated rivers: Research and Management* 11: 147-155.

Cope, W.G., M.C. Hove, D.L. Waller, D.J. Hornbach, M.R. Bartsch, L.A. Cunningham, H.L. Dunn and A.R. Kapuscinski, 2003. Evaluation of relocation of unionid mussels to *in situ* refugia. *Journal of Molluscan Studies* 69: 27-34.

Mehne and Associates, 2009. Translocation of freshwater mussels (Bivalvia: Unionidae) from the former Plainwell Impoundment area on the Kalamazoo River, Michigan. Report to the U.S. Fish and Wildlife Service, Region 3. East Lansing, Michigan. 16 pp.

Waller, D.L., J.J. Rach, W.G. Cope, and J.A. Luoma, 1993. A sampling method for conducting relocation studies with freshwater mussels. *Journal of Freshwater Ecology* 8: 397-399.



Figure 1. Mussels collected July 22, 2010. Mussels placed on the red bag are marked with an "X", indicating they were transplanted from 2009.



Figure 2. Mussels collected July 22, 2010. Mussels on the white bag (center) without marks were surviving in the translocation area.



Figure 3. Mussels collected July 22, 2010. Mussels on the blue bag (center) without marks were surviving in the translocation area.



Figure 4. Unmarked mussel shells collected July 22, 2010.



Figure 5. Second set of mussels collected July 22, 2010. Mussels placed on the red bag (center) are marked with an "X", indicating they were transplanted from 2009.



Figure 6. Second set of mussels collected July 22, 2010. Unmarked mussels are on the white bag (center).



Figure 7. Second set of unmarked mussels collected July 22, 2010.



Figure 8. Second set of unmarked mussel shells collected July 22, 2010.



Figure 9. Mussels collected August 3, 2010. Mussels placed on the red bag (center) are marked with an “X”, indicating they were transplanted from 2009. Shells on the top of the bag were marked.



Figure 10. Mussels collected August 3, 2010. Unmarked mussels are on the white bag (center), and unmarked shells are on the right of the white bag.



Figure 11. Mussels collected August 3, 2010. Marked mussels are on the white bag, along with marked shells found (upper portion of bag).



Figure 12. Mussels collected August 3, 2010. Unmarked mussels are on the blue bag, and unmarked shells are on the upper portion and above the blue bag.



Figure 13. Mussels collected August 3, 2010. Marked mussels are on the left of the white bag, and unmarked mussels are on the right.



Figure 14. Marked and unmarked mussel shells (center and upper right) collected August 3, 2010.