Title: Brown's Creek Habitat Restoration

Michigan 303(d) Number: Brown's Creek is not on Michigan's 303(d) list.

GRTS Number: 975474030 - Project 02

Opening Paragraph: A dilapidated, undersized and poorly positioned culvert resulted in sedimentation problems in Brown's Creek. The culvert was replaced with a bridge, and scores for instream habitat features related to sedimentation improved substantially.

Problem: Brown's Creek is a tributary to Pine Creek in Dickinson County. The creek was obstructed due to a dilapidated, undersized and poorly positioned culvert on the Trepanier Farm, to the point that the majority of the creek's baseflow was passing through the porous road fill around the culverts rather than through the culverts. The stream bottom downstream of the culverts was dominated by fine sandy sediments, and instream habitat features were buried by sand. In 2002 the culverts were replaced by a modular steel bridge that spanned the width of the stream channel and allowed free passage of both baseflows and all but the most extreme storm flows.

Project Highlights: In 2002 the Dickinson County Conservation District replaced the undersized culverts with a modular steel bridge that spanned the stream channel.

Results: In 2002 the culverts were replaced by a modular steel bridge (Figures 1 and 2) that spanned the width of the stream channel and allowed free passage of both baseflows and most storm flows. Stream geomorphology and biological surveys were conducted before and after culvert replacement, in 2002 and 2005, respectively, and showed substantial improvements in instream habitat conditions (Figure 3 and Table 1):

- Scores for instream habitat features related to sedimentation improved substantially.
- Improved water passage under the bridge transported or exposed coarser sediments downstream, as reflected by the D_{84} (the maximum particle size moved by bankfull discharges), which increased from 1.9 mm ("very coarse sand") in 2002 to 12.0 mm ("medium gravel") in 2005.
- Downstream thalweg depth increased 27 percent, from 0.56 feet to 0.71 feet.

Fish and macroinvertebrate communities, however, did not improve during this time (Table 2). The apparent failure of the biological communities to respond to the improved habitat is likely due some combination of insufficient time for colonization, and/or the extended drought that preceded the 2005 sampling. This stream will be surveyed again in 2010.

Partners and Funding: In 1999 MDEQ gave a Clean Michigan Initiative (CMI) nonpoint source grant to the Dickinson County Conservation District to address sedimentation problems in the Pine Creek watershed. Replacing the culverts on Brown's Creek cost $16,606 in CMI funds.

Photos:

Figure 1. Dilapidated Culvert on Brown's Creek, Prior to Replacement.
(*Primary culvert is below water surface; visible culvert is for flood overflows*)

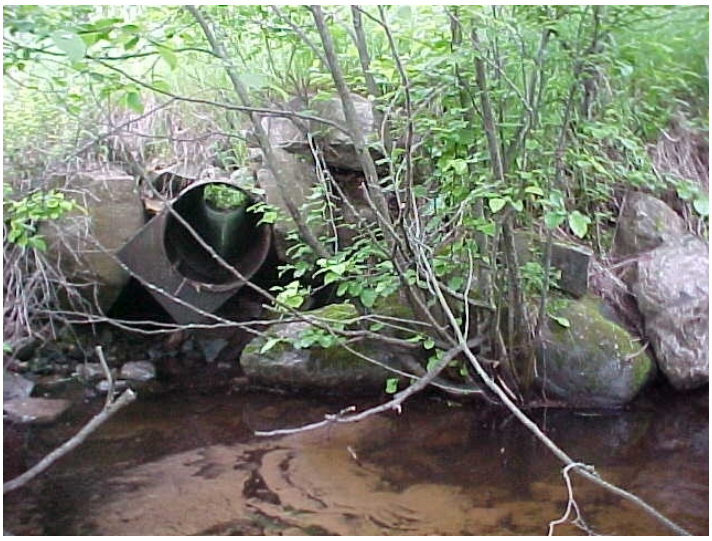

Figure 2. Replacement Bridge.

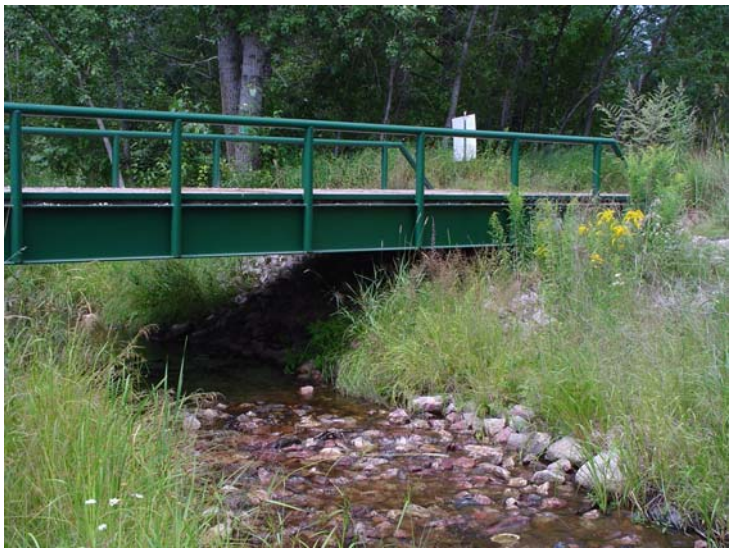

Figure 3. Brown's Creek, 50 Feet Downstream of the Restoration Site.

(*2002 = virtually 100 percent sand; 2005 = more gravel*)

Pre-restoration (2002)

Post-restoration (2005)

Data Tables:

Table 1. Instream Habitat Quality Data Downstream of the Road Crossing, Before and After Culvert Replacement.

Year	Overall Habitat Score*	Substrate & Cover Score*	Embeddedness Score*	Sediment Deposition Score*	D_{84} (mm)
2002	119	5	6	3	1.9
2005	133	9	10	7	12.0

* Higher score = better habitat

Table 2. Biological Data Downstream of the Road Crossing, Before and After Culvert Replacement.

Year	Fish Taxa	Macroinvertebrate Taxa	EPT Taxa	Overall Macroinvertebrate Ranking
2002	5	17	7	Acceptable
2005	5	12	5	Acceptable

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