Title: Carrier Creek Restoration Project

Michigan 303(d) Number: 082812D

GRTS Numbers: 975474030, Project 03 (FY 2000), and 975474040, Project 21 (FY 2002)

Opening Paragraph:

Carrier Creek is a designated drain in a rapidly developing area near Lansing, Michigan. Historic channelization and more recent urban runoff resulted in eroding stream banks, high sedimentation rates, and degraded aquatic habitat and fish and macroinvertebrate communities. Extensive stream restoration and storm water retention activities were initiated in 2001, and the latter are still underway today. Consequently, this is an interim report on the performance of this still-developing project.

Problem:

Carrier Creek, in Eaton County, Michigan, is a tributary to the Grand River. Four miles of the creek are on Michigan's 303(d) list due to degraded macroinvertebrate communities, caused by urban runoff, poor instream habitat and excessive sedimentation.

Carrier Creek is a designated County Drain under the jurisdiction of the Eaton County Drain Commissioner. MDEQ funded stabilization and restoration of five miles of the lower part of the drain and creation of a wetland in the upper part of the watershed to help control events at or greater than a 10 year event. The intent of this work was to stabilize the stream channel by restoring geomorphically sustainable dimensions and detaining runoff.

Several types of stream stabilization BMPs were installed. At the upstream end the channel was narrowed and stream "pattern" was reestablished with meander structures, which are semicircles of stone placed up to the bankfull elevation and alternating from one side of the bank to the other. Throughout most of the rest of the restored reach various structures were installed to stabilize the channel, including crossvanes, J-hooks, lunkers, log revetments and riprap. At points where historical dredge spoils on the bank were separating the stream from the natural floodplain, parts of the dredge spoils were removed. Finally, a segment of the lower reach of the creek was totally reconstructed to provide a stable pattern, cross section and slope.

In addition to the grant-funded work, the Drain Commissioner is enhancing storm water detention and flow control throughout the upper portion of the watershed in order to stablize the channel-forming flow and help reduce erosion downstream as well as reduce the amount of flooding. This work is still ongoing.

Project Highlights:

Two stream restoration projects were funded:

- A stream channel restoration project begun in 2000, that created and stabilized 3,771 linear feet of channel to increased channel stability, improve instream habitat, and reconnect the channel to its floodplain.
- A wetland creation project begun in 2002, that constructed a 32-acre wetland in the headwaters of the creekshed to intercept storm water runoff and decrease stream hydrologic flashiness.

Results:

Although restoration activities funded by the grants ended in 2006, the Drain Commissioner is still performing slight modifications of the channel and wetland. Consequently the data presented here represent an interim assessment of the progress of the project. Pre and post monitoring data were collected by the grantee.

Two locations within the project area have been monitored for fish, macroinvertebrates, and aquatic habitat quality, both before (2000) and after (2006 and 2007) the restoration activities (Table 1). The number of fish taxa has increased at both locations, more than doubling at one site and quadrupling at the other. Macroinvertebrate populations have not responded as quickly, however; neither the total number of taxa nor the number of sensitive taxa (mayflies, stoneflies, and caddisflies; EPTs) had changed substantially as of 2006 (the grantee has not compiled the 2007 data). As of 2006, aquatic habitat was unchanged at one site, and had improved substantially at the other.

Also, a single slippershell mussel (*Alasmidonta viridis*) was found during an informal inspection of the restored reach in 2007 (Figure 2). The slippershell is listed as a Species of Special Concern by the Michigan Natural Features Inventory.

The restoration activities conducted to date, both those funded by the MDEQ and those executed independently by the Drain Commissioner, are believed to have stabilized the stream channel and its hydrology, reduced stream bank erosion, and improved aquatic habitat. Fish and macroinvertebrate communities are beginning to respond, and future monitoring will hopefully show further improvements in the biota.

Partners and Funding:

In 2000 and 2002 MDEQ provided a total of $1,263,555 in Clean Michigan Initiative funds to the Eaton County Drain Commissioner for the stream

restoration and wetland creation projects. The Drain Commissioner provided a total of $653,943 in match.

Photographs:

Figure 1. Pre-BMP Pictures of Carrier Creek.

Note shallow, linear stream channel and lack of instream habitat features	Note erosion of historic dredge spoils and poor instream habitat
	

Figure 2a. Post-BMP Pictures of Carrier Creek.

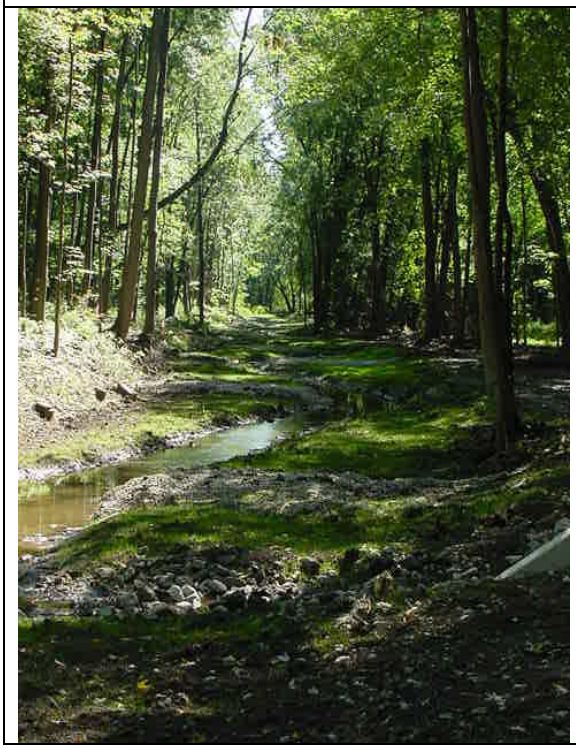
Restored stream meanders	Crossvane
	

Figure 2b. Additional Pictures Post-BMP Pictures of Carrier Creek.

J-Hook	State-listed Slippershell Mussel
	

Data:

Table 1. Fish, Macroinvertebrate and Aquatic Habitat Data From Two Locations Within the Project Area, Before and After Stream Restoration.

Metric	2000 (Pre)		2006 (Post)		2007 (Post)	
	Site 3	Site 5	Site 3	Site 5	Site 3	Site 5
Fish						
No. taxa	5	3	12	9	12	12
Macroinvertebrates						
No. taxa	12	9	9	15	---	---
No. EPT taxa	2	1	1	1	---	---
Rating	Acceptable	Poor	Acceptable	Acceptable	---	---
Habitat						
Ranking	Good	Poor	Good	Excellent	---	---

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