

Title: Cass River and Saginaw Bay Watershed Livestock Exclusion

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

GRTS Number: Not applicable; this project was funded with Clean Michigan Initiative (CMI) funds.

Opening Paragraph: The Cass River and Saginaw Bay Watershed Livestock Exclusion Program addressed livestock access problems throughout the Saginaw Bay Watershed. This program was intended to reduce sediment and nutrient inputs to Saginaw Bay by implementing Best Management Practices with 28 landowners. The specific project described in this success story was on Carrow Creek, where installation of fencing, cattle crossings and alternate watering sources improved riparian vegetation, aquatic habitat, and fish and macroinvertebrate communities.

Problem: Carrow Creek is a tributary to the Cass River, in Sanilac County. Much of the Cass River watershed is rural, and in 1996 MDEQ surveys identified 44 eroding livestock access sites throughout the watershed, including 29 sites that were considered to be severely degraded. Excessive sedimentation negatively impacted instream habitat and the resident fish and macroinvertebrate populations.

Project Highlights: A cooperative effort between the MDEQ Nonpoint Source Program and the USDA's Conservation Reserve Enhancement Program (CREP) improved water quality by reducing nutrient and sediment input into the Cass River by excluding livestock from streams and ditches, providing stable stream crossings, restoring critical areas and providing alternate watering facilities away from water bodies. Specifically, the MDEQ/CREP cooperative project used a \$462,926 CMI-NPS grant to address all 29 of the severely degraded sites mentioned above, by installing 75,668 linear feet of fencing, 20 livestock crossings and 4 alternate watering sources.

One of the 29 severely degraded sites was on the Schunk dairy farm, on Carrow Creek. The CMI-NPS grant spent \$26,870 to install one alternate water source for cattle and three livestock crossings on the farm. This work was completed in June of 2002. Pre-BMP monitoring was performed in September 2001, and post-BMP monitoring was performed in September 2004. All monitoring was supported by Section 319 funds.

Results: Pre- and post-BMP photographs suggested that the BMPs described above improved riparian and instream habitat conditions in this reach of Carrow Creek (photographs, below), and biological monitoring conducted before and after the BMPs were installed confirmed their effectiveness (Tables 1, 2 and 3). Aquatic and riparian habitat features related to bank erosion and sedimentation improved substantially after BMP installation, and this improved habitat was

reflected in the biological data. While the total number of fish and the number of fish species in the sampled reach of this very small stream did not increase substantially, the dominant fish changed from a species tolerant of turbid water, silty sediments and low dissolved oxygen concentrations (central mudminnow) to two species that prefer clear water, stable stream bottoms and higher dissolved oxygen concentrations (creek chub and brook stickleback). Similarly, the total number of macroinvertebrate taxa did not change with BMP installation, but the composition shifted from taxa tolerant of poor water quality to more sensitive taxa (mayflies, caddisflies, and stoneflies).

For the entire Cass River watershed, pollutant control models estimated annual reductions of 11,367 tons of sediment, 22,212 pounds of phosphorus, and 68,471 pounds of nitrogen from the BMPs described above.

Partners and Funding: In 2001 MDEQ provided \$472,000.00 in CMI funds to the Sanilac Conservation District for the livestock exclusion project in the Cass River watershed, including \$26,870 for installation of one alternate water source and 3 livestock crossings on the farm owned by Mr. John Schunk on Carrow Creek.

Photographs:

Before BMP installation

After BMP installation



Data:



Table 1. Instream Habitat Quality Scores Downstream of the Schunk Farm, Before and After BMP Installation. (Higher score = better habitat)

Metric	2001 (Pre-BMP)	2004 (Post-BMP)
<i>Bottom Substrate</i>		
Available Cover	3	8
Embeddedness	2	11
Velocity/Depth	7	11
<i>Channel Morphology</i>		
Bottom Deposition	2	8
Flow Stability	7	8
Pools-Riffle-Run-Bends	5	9
<i>Riparian and Bank Structure</i>		
Bank Stability	5	8
Bank Vegetative Stability	6	10
Stream Cover	4	5
Total Score	41	78
Aquatic Habitat Ranking	Fair	Good

Table 2. Fish Community Data Downstream of the Schunk Farm, Before and After BMP Installation.

Species	2001 (Pre-BMP)	2004 (Post-BMP)
Central mudminnow	20	0
Creek chub	0	10
Brook stickleback	1	15
Total fish taxa	2	2
Total number of fish	21	25

Table 3. Macroinvertebrate Community Data Downstream of the Schunk Farm, Before and After BMP Installation.

Metric	2001 (Pre-BMP)	2004 (Post- BMP)
EPT taxa*	1	3
Percent surface air breathers	18	10
Total taxa	20	20
Overall rating	Poor	Acceptable

*EPT = mayfly, caddisfly and stonefly taxa = sensitive macroinvertebrates

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Title: Iron River Livestock Exclusion Project

Michigan 303(d) Number: This reach of the Iron River is not on Michigan's 303(d) list.

GRTS Number: Grant: 975474010 – Project 40

Opening Paragraph:

The Iron River is a blue ribbon trout stream in southwestern Iron County in Michigan's Upper Peninsula. The watershed is primarily forested (57%), with significant amounts of urban and agricultural development (16% and 12%, respectively). MDEQ provided funding for several BMPs, including livestock exclusion fencing, alternate watering sources, and livestock crossings, which substantially improved macroinvertebrate communities.

Problem:

Stream quality has been impaired by acid mine drainage, waste water treatment effluent, and most recently by sediment and polluted runoff from uncontrolled livestock access.

Project Highlights:

Watershed-wide, this project included the following BMPs:

- Installed 20 alternate livestock watering sources
- Installed 3,600 linear feet of vegetated filter strips
- Installed 53,839 linear feet of livestock exclusion fencing
- Created or restored 546 acres of wetland
- Installed 13 livestock crossings
- Installed 100 linear feet of windbreak

These BMPs reduced annual pollutant loads by 260 tons of sediment, 250 tons of phosphorous, and 500 tons of nitrogen. A subset of BMPs were installed in 2003 on a farm owned by Mr. James Shepich, and consisted of an alternate livestock watering source and 5,000 linear feet of livestock exclusion fencing. The BMPs on this particular farm eliminated 10 tons of sediment, 10 pounds of phosphorus, and 20 pounds of nitrogen. Pre-BMP biological monitoring was conducted at this site in 2000 and post-BMP monitoring in 2007. All monitoring was supported by Section 319 funds.

Results:

Biological sampling at the Shepich Farm in 2007 found substantially improved macroinvertebrate communities compared to 2000 (Table 1, below):

- The total number of macroinvertebrate taxa more than doubled (from 9 to 23 taxa).
- The number of sensitive taxa (mayflies, caddisflies and stoneflies) increased slightly (from 4 to 6 taxa), and their proportion of the overall benthic community almost tripled (from 26% to 77%).
- The proportion of pollution-tolerant midge larvae (Family Chironomidae) decreased substantially (from 58% to 7%).

Partners and Funding:

In 2003 MDEQ provided \$429,217 in Clean Michigan Initiative funds to the Iron County Conservation District, which provided \$157,043 in matching funds. The grant funding included \$10,184 for the installation of an alternate watering source and 5,000 linear feet of livestock exclusion fencing on the Shepich Farm. Mr. Shepich personally provided \$10,475 in matching funds.

Photographs: None.

Data:

Table 1. Macroinvertebrate Community Data in the Iron River at the Shepich Farm, Before and After BMP Installation.

Metric	2000 (Pre-BMP)	2007 (Post-BMP)
Total taxa	9	23
No. EPT* taxa	4	6
Proportion EPT*	26%	77%
Proportion midge larvae	58%	7%

* EPT = mayfly, caddisfly and stonefly taxa = sensitive macroinvertebrates

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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 stabilize 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 (*Alasmodonta 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.

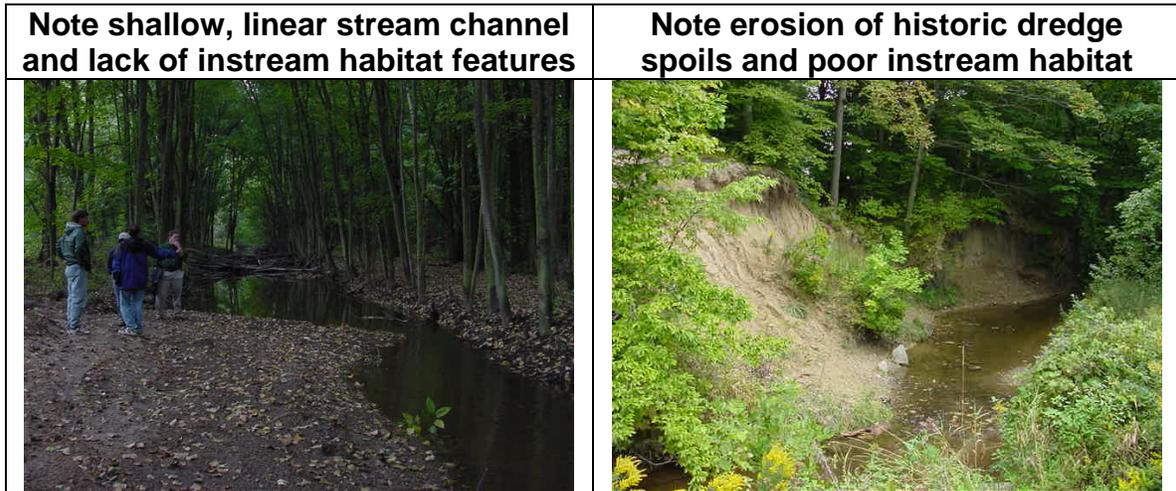


Figure 2a. Post-BMP Pictures of Carrier Creek.

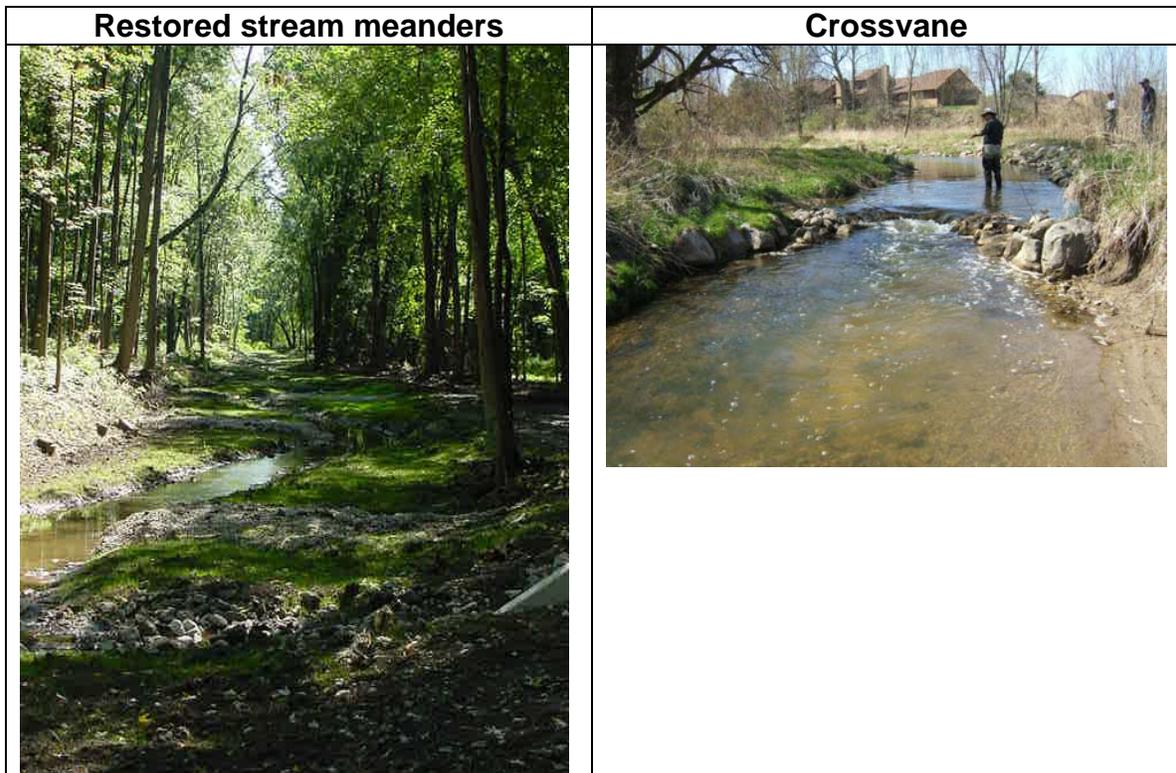


Figure 2b. Additional Pictures Post-BMP Pictures of Carrier Creek.



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
<i>Fish</i>						
No. taxa	5	3	12	9	12	12
<i>Macroinvertebrates</i>						
No. taxa	12	9	9	15	---	---
No. EPT taxa	2	1	1	1	---	---
Rating	Acceptable	Poor	Acceptable	Acceptable	---	---
<i>Habitat</i>						
Ranking	Good	Poor	Good	Excellent	---	---

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