2015 Monitoring Report Year 2
Harmon Property Stream Restoration
Aurora, Ohio

Corps Permit Number 2006-01065

Prepared by:

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Excellence In Any Environment

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Year Ending: December 31, 2015
I. Project Overview

The following information summarizes the 2015 monitoring activities for the restoration of the Harmon Property in Aurora, Ohio, which contains two unnamed tributaries to the Aurora Branch of the Chagrin River, adjacent wetlands and riparian zone. It follows the format of the USACE Regulatory Guidance Letter No. 06-03 dated October 10, 2008, and satisfies the requirements listed in Nationwide Permit 27 issued for restoration activities.

(1) Corps Permit Application Number 2006-01065

Permittee: Ms. Denise Januska
City of Aurora
129 West Pioneer Trail
Aurora, Ohio 44202

Consultant: Joel Bingham EnviroScience, Inc., 5070 Stow Rd, Stow, OH 44224 (330) 688-0111

(2) Monitoring conducted by ES Biologist Jeff Niehaus, with interns Kailey Cooper and Colin Juran; 2015
Monitoring Date: July 20, 2015

(3) The project authorized the restoration of 2,650 linear feet (LF) of an unnamed tributary to the Aurora Branch of the Chagrin River and the restoration of 625 LF of a second unnamed tributary to the Aurora Branch of the Chagrin River. The project also authorized the discharge of fill to 0.013 acres of wetland, and 0.11 acres of a second wetland. The discharge of fill was necessary in the creation of a berm adjacent to and partially within each wetland which increased total wetland acreage and enhanced existing wetland resources on the property.

Past impacts on this 127 acre site include riparian disturbance, hydrological modification, channelization and agricultural practices that have minimized the functionality and quality of this area. Farming and agriculture are the most dominant impacts to the site and valley. In several areas there is evidence of past agricultural impacts, which relocated the stream to the southern valley wall in an effort to create more arable land. The valley slopes are a combination of successional forest and scrub-shrub with a predominance of the invasive Glossy Buckthorn (Rhamnus frangula).

(4) The restoration project is located east of Page Rd and north of Bartlett Rd in Aurora, Ohio within the main valley of the Harmon Property, and extends approximately 2,100 ft to the east from Page Rd. The project area starts at two locations; the first tributary (Stream 1) at approximately 41.281696° N, 81.325653° W, and the second tributary (Stream 2) at approximately 41.283622° N, 81.32585° W. The project area ends at approximately 41.283133° N, 81.318104° W.

From Buffalo, take I-90W to I-271S. Take I-271 south to I-480 E/OH-14 E. Take I-480 E/OH-14 east to Frost Rd exit (Exit 41). Turn left onto Aurora Hudson Rd, then continue onto Frost Rd for 2.5 miles. Turn left onto Page Rd and follow for 1.5 miles. Project area is located just north of Bartlett Rd.

(5) The stream channel subgrading and floodplain excavation work commenced 25 April 2013 and was completed in early June 2013.

(6) Performance standards – Thus far, the stream, floodplain, stream banks and wetlands have performed very well. The project area has experienced some major precipitation events and the stream channel and floodplains are functioning as anticipated. Access to the floodplain is evident by deposition and flow patterns. Eight separate cross sections were performed and analysis indicates a significant entrenchment ratio improvement over the pre-restoration condition. A large amount of native vegetation was installed during the project construction which included seed, wetland plugs, 4-ft trees, and larger 2 inch caliper trees. Bare root seedlings and live stakes were installed in spring 2014, and additional herbaceous wetland plugs have been planted in wetland areas. Additionally, a large amount of effort was taken to enhance the riparian area of the site by removing much of the invasive Buckthorn present. Currently, the site has 100% vegetative coverage due to the success of the native seed. It is anticipated that this will stay at 100% coverage as native vegetation continues to establish.
(7) During the construction activities of 2013, a large amount of effort was taken to enhance the riparian area of the site by removing much of the invasive Buckthorn present. This invasive management effort has continued into 2015.

(8) There are no specific recommendations for additional remedial or corrective actions at this time. Continued monitoring is necessary as required by permits.

II. Requirements

The monitoring reporting requirements are included in Table 1.

Table 1. Summary of Monitoring Reporting Requirements.

<table>
<thead>
<tr>
<th>Monitoring Requirement</th>
<th>Required Date</th>
<th>Date Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison of pre-restoration and post-restoration site conditions</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
<tr>
<td>Longitudinal Profile for Stream 1 and Stream 2</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
<tr>
<td>8 Cross section evaluations</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
<tr>
<td>Minimum of 5 Representative Photographs</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
<tr>
<td>Entrenchment ratios from cross sections</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
<tr>
<td>Percent vegetated coverage of riparian area</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
<tr>
<td>Fish, macro-invertebrate, and other wildlife observations</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
<tr>
<td>Summary of perceived success</td>
<td>31 December 2014</td>
<td>July 20, 2015</td>
</tr>
</tbody>
</table>
III. Summary Data

This section provides information on the current condition, photos and materials that were a result of the monitoring survey. Representative photos at fixed photo locations are presented below and correspond to the locations presented on the photo location map. Attachment A provides cross sections and longitudinal profile. Attachment B (Maps 1-3) provides a site overview and location of pertinent features and photo locations (Map 2).

Photo 1. Cross section 1 (riffle, stream 2) looking downstream.

Photo 2. Cross section 2 (pool, stream 2) looking downstream.

Photo 3. Cross section 3 (pool, stream 1 reach 1) looking downstream.

Photo 4. Cross section 4 (riffle, stream 1 reach 1) looking downstream.
Photo 5. Cross section 5 (riffle, stream 1 reach 2) looking downstream.

Photo 6. Cross section 6 (pool, stream 1 reach 2) looking downstream.

Photo 7. Cross section 7 (riffle, stream 1 reach 3) looking downstream.

Photo 8. Cross section 8 (pool, stream 1 reach 3) looking downstream.

Year 2 Monitoring Report
Harmon Restoration Project
Corps Permit Number 2006-01065

December 31, 2015
Cross sections 1-8 are provided below. Locations of cross sections are shown on the longitudinal profile (Attachment A). Entrenchment ratios are listed for each cross section. The entrenchment ratio quantifies the vertical containment of the stream. It is the value given by the width of the floodprone area divided by the bankfull width. The elevation of the floodprone area is calculated by adding the stream channel’s value of maximum depth at bankfull stage to the bankfull elevation. Entrenchment ratios lower than 1.4 describe a stream as entrenched, and entrenchment ratios above 2.2 are slightly entrenched. Moderate entrenchment exists at values between 1.4 and 2.2. All entrenchment ratios calculated from the cross sections surveyed at the Harmon restoration were well above 2.2. In fact, several cross sections had a floodprone width of over 200 ft. This shows that there is excellent floodplain availability at each constructed reach of the project. In most cases the cross sections below do not show the entire floodprone area due to how large it is relative to the stream channel. However, the values for bankfull width, floodprone width and entrenchment ratios are all listed.

2015 Cross Section 1 - Stream 2

Bankfull width- 4.96 ft
Floodprone width- 330 ft
Entrenchment Ratio- 60.5

2015 Cross Section 2 - Stream 2

Bankfull width- 5.4 ft
Floodprone width- 330 ft
Entrenchment Ratio- 55.6
2015 Cross Section 3 - Stream 1

Bankfull width- 13.35 ft
Floodprone width- 120 ft
Entrenchment Ratio- 9.0

2015 Cross Section 4 - Stream 1

Bankfull width- 12.35 ft
Floodprone width- 85 ft
Entrenchment Ratio- 6.9
2015 Cross Section 5 - Stream 1

Bankfull width - 4.0 ft
Floodprone width - 29.6 ft
Entrenchment Ratio - 7.4

2015 Cross Section 6 - Stream 1

Bankfull width - 10.1 ft
Floodprone width - 150 ft
Entrenchment Ratio - 14.9

Year 2 Monitoring Report
Harmon Restoration Project
Corps Permit Number 2006-01065

December 31, 2015
2015 Cross Section 7 - Stream 1

Bankfull width- 7.42 ft
Floodprone width- 225 ft
Entrenchment Ratio- 30.3

2015 Cross Section 8 - Stream 1

Bankfull width- 13.64 ft
Floodprone width- 675 ft
Entrenchment Ratio- 49.5
IV. Wildlife Observations

Wildlife observed during the monitoring survey included the following:

Birds: Red-tailed hawk, Killdeer, Northern cardinal, Turkey vulture, House sparrow, Mallard, Canada goose, American goldfinch, Black-capped chickadee

Fish: Although a fish survey has not been performed, many fish were observed during the monitoring survey. Visual observations saw the presence of sunfish species, creek chub and white sucker species as well as other minnow species.

Macro-invertebrates: Macro-invertebrates observed included adult and larval stages of various dragonflies and damselflies.

V. Conclusions

Based on observations and data collected from the 2015 monitoring, the Harmon restoration project is performing very well. The stream channel has not adjusted laterally or downcut. Water regularly inundates the floodplain and wetland areas, and cross section evaluations indicate excellent floodplain availability with entrenchment ratios ranging from 6.9 – 49.5. Bankfull widths and entrenchment ratios stayed consistent with previous years’ monitoring data, with some slight adjustments. These slight differences were due mostly to varying degrees of vegetation establishment on the stream banks as they continue to mature. Continued invasive species management will provide more improvements to vegetation in the riparian corridor, and expedite the expansion of the surrounding forest.
ATTACHMENT A

Stream 1 Profile 2015

Elevation (ft)

Distance along stream (ft)

Riffles
Pools
Bankfull points
Water surface points
Cross section locations
Stream bed points

December 31, 2015

Year 2 Monitoring Report
Harmon Restoration Project
Corps Permit Number 2006-01065
Stream 2 Profile 2015

Cross section locations

Riffles

Pools

Bankfull points

Water surface points

Stream bed points

Elevation (ft)

Distance along stream (ft)

December 31, 2015

Year 2 Monitoring Report
Harmon Restoration Project
Corps Permit Number 2006-01065