



Summary of Habitat Inventories and Restoration Sites in the Maumee AOC

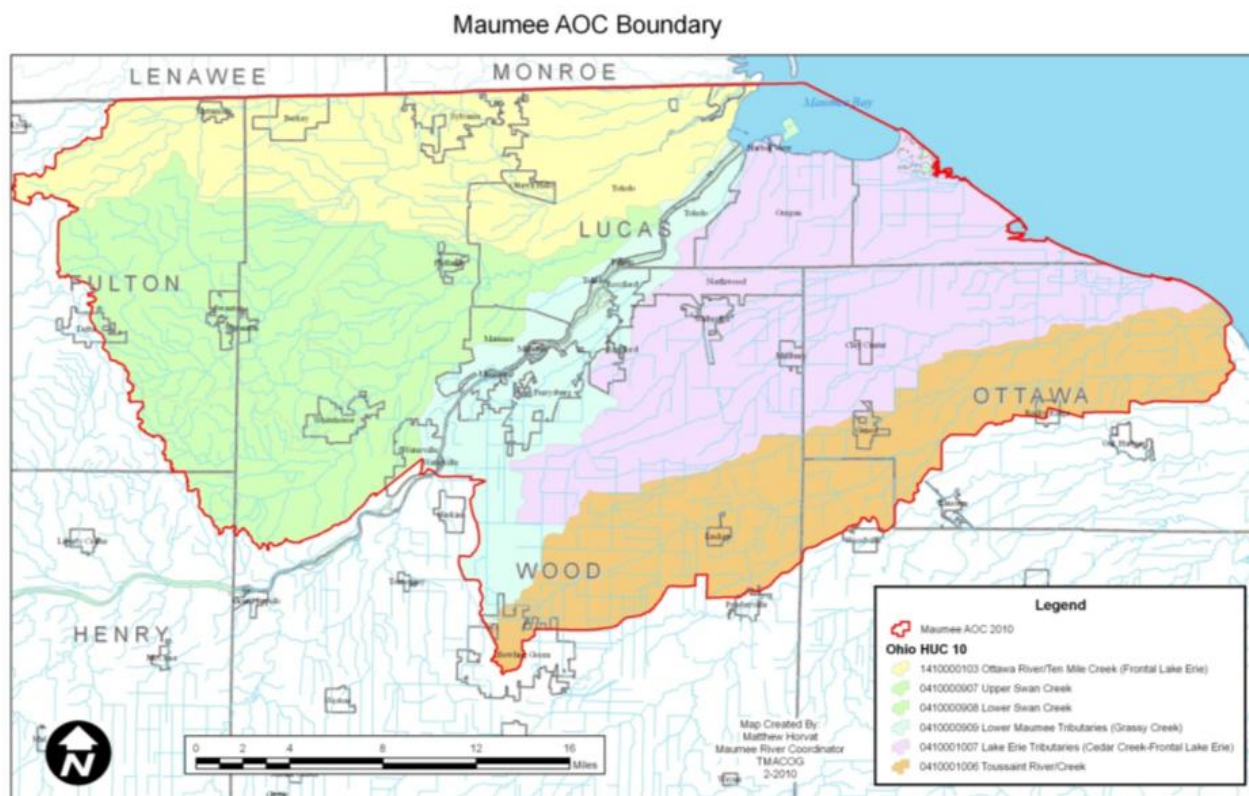
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INTRODUCTION

In 1978 the United States and Canada agreed to cooperate with State and Provincial Governments to ensure that Remedial Action Plans (RAPs) would be developed to improve the quality of our Great Lakes. RAPs were developed at 43 locations known as Areas of Concern (AOC) around the Great Lakes. Of the 43 AOCs, 26 are located entirely within the United States; twelve are located entirely in Canada; and five are shared by both countries. The Maumee AOC covers 878 square miles. It is located at the western end of Lake Erie and includes a portion of Maumee Bay and the lower 22 miles Maumee River as well as all of 11 other watersheds in 6 hydrologic units (HUCs) that all flow to Lake Erie. These watersheds include Swan Creek, Tenmile Creek/Ottawa River, Grassy Creek, Duck Creek, Otter Creek, Wolf Creek, Cedar Creek, Crane Creek, Turtle Creek, Packer Creek and the Toussaint River.

The Maumee AOC is one of the largest and most challenging AOCs for a variety of reasons. The western portion of the Maumee AOC includes the globally rare Oak Openings Region. This region includes more rare and endangered species than any other place in Ohio. The naturally high water table that supports this region is threatened by land use changes, especially impervious surfaces that restrict the amount of ground water recharge by directing water downstream as fast as possible. The watersheds in the eastern portion of the Maumee AOC were once part of the Great Black Swamp. Most of this area has now been drained for alternate land uses, primarily agricultural. With the loss of the majority of the Great Black Swamp and the urbanizing development causing water to run off the land rather than be absorbed, this AOC has lost much of its ability to naturally slow the water and to filter the sediment and nutrients out before they reached Lake Erie.



In order to facilitate the enhancement, protection and restoration of natural habitat in the Maumee AOC, two separate initiatives have been undertaken to develop habitat inventories and concept plans that can facilitate an increase in the wetland, riparian and in-stream habitat found in the Maumee AOC. The desire to complete these inventories arose from the realization that the conversion of land to agriculture, residential, commercial and industrial development has negatively impacted the physical, chemical and biological properties of the aquatic ecosystems within the AOC. While these historic land use changes within the watersheds have negatively impacted the physical, chemical and biological characteristics of the AOC, positive changes could only begin to be realized by restoring or enhancing wetland habitats and stream segments within the watersheds. It was also noted that mitigation funds often become available (as part of the requirement for a new permit, for a road improvement project, or other construction), but unless a list of potential mitigation projects has been prepared, it is difficult to keep the mitigation in the watershed where the impact occurred.

In 2007, Partners for Clean Streams obtained funding from The Joyce Foundation to develop wetland and riparian inventory and restoration plans for the Swan Creek and Ottawa River watersheds. This plan was completed in 2009. In 2010, US EPA directed Great Lakes Restoration Initiative funding to create a complimentary set of plans that would focus on the remaining watersheds in the Maumee AOC including the Maumee River (lower) Tributaries, Lake Erie Tributaries and Toussaint River. This plan was completed in 2012. These two plans (hereafter referred to as “*Inventory Reports*”) are summarized in this report, *Summary of Wetland and Riparian Inventories and Restoration Plans in the Maumee AOC (Summary Inventory Report)*. Since public and protect lands were mostly excluded as sites from the *Inventory Reports* described above, a brief summary of desirable wetland and riparian sites located on public and protect lands have also been included in this *Summary Inventory Report*.

THE INVENTORY REPORTS

The primary objectives for the *Inventory Reports* was to identify specific sites and develop conceptual plans for wetland, riparian and in-stream restoration and enhancement within the watersheds that, once implemented, would have measurable positive impacts on the following beneficial use impairments (BUIs) as identified by the International Joint Commission (IJC), U.S. EPA, and Ohio EPA to delist the Maumee AOC:

- BUI #3 Degradation of fish and wildlife populations
- BUI #6 Degradation of benthos
- BUI #14 Loss of fish and wildlife habitats

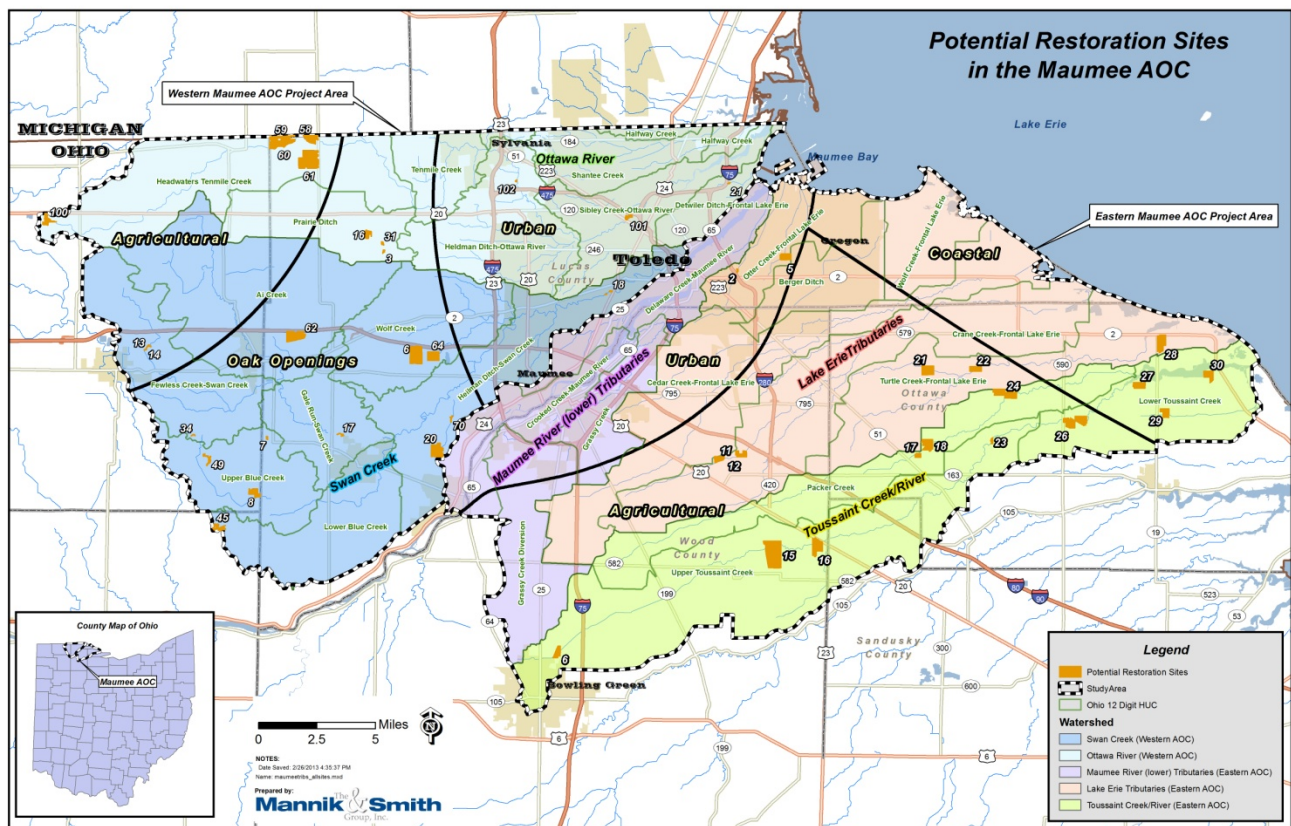
Additional BUIs (i.e. consumption, aesthetics, etc.) could also benefit from the implementation of these plans.

As a secondary objective, these studies were also intended to provide wetland and stream restoration opportunities for permit applicants who are required to mitigate lost wetlands and stream habitat and functions under Sections 404 and 401 of the Clean Water Act and the State of Ohio’s Isolated Wetlands Law. Past experiences have shown that with no local mitigation opportunities readily available, wetland mitigation has oftentimes been accomplished outside of the watersheds where the impacts have occurred, either by restoring wetland habitat on project specific sites, or by purchasing wetland mitigation credits from a wetland mitigation bank that has been approved to service an area that encompasses several watersheds. While such mitigation projects meet the mitigation requirements under Sections 404 and 401 of the Clean Water Act, without the replacement of wetland and stream functions within the watershed where the impacts occur, BUIs 3, 6 and 14 may continue to decline in the Maumee AOC as more wetland and stream impacts occur. In addition to permit actions, the projects that are included within this report may be funded by other means, for example through various grants or with funding obtained from Supplemental Environmental Projects (SEPs).

The *Inventory Reports* identified specific sites based on:

- wetland and riparian condition,
- current and potential wetland or riparian restorability,
- ecological value of restoration,
- habitat function (especially in terms of connecting habitat areas to establish corridors), and
- present land owners and use.

The sites were evaluated for the hydraulics to identify areas that can be restored as wetlands through natural stream flow. The benthos and fish at most sites where streams were located were also evaluated. Based on this information, conceptual restoration plans were created that included rough estimates of restoration, maintenance, and/or monitoring costs. However, more comprehensive and detailed cost estimates should be prepared as each project is carried forward through the process of detailed engineering and design.



Both studies were conducted by local consultant teams with the guidance and assistance of a local project management team (PMT). The PMT was comprised of local land and water conservationists, biologists, and planners along with various government representatives that work on environmental and land planning issues.

The consistency in methodology and procedures for both *Inventory Reports* makes the plans easier to explain and use. The use of geographic information system (GIS) technology along with computer modeling and imagery were the foundation for these studies. This electronic information was verified with field surveys and data collection to make this project the most useable tool possible for all audiences (i.e. implementers,

planners, businesses, etc.). Data can be made available in both electronically and in hard copy for each site; increasing the probability of finding willing implementers for the plans. Data could be easily added to Ohio EPA's mitigation and surface water restoration databases, also increasing the probability of implementation of these plans, provided the landowner is willing.

The modeling and prioritization for these projects was driven by the interest in restoring the beneficial uses of the Maumee AOC through habitat restoration and water quality improvements. Implementation efforts for the sites identified in the *Inventory Reports* is intended to be coupled with other groups interested in restoration and protection of other private lands, as well as those public and protected lands not included in the *Inventory Reports* (i.e. Toledo Metroparks, The Nature Conservancy, Ducks Unlimited, private hunt clubs).

For a complete explanation of the methodologies and procedures used to develop the *Inventory Reports*, please refer to either the *Wetland and Riparian Inventory and Restoration Plans for Swan Creek and the Ottawa River* (2009) or the *Wetland and Riparian Inventory and Restoration Plans for the Eastern Watersheds of the Maumee Area of Concern* (2012).

It should also be noted that the *Inventory Reports* include general restoration concepts based on landscape (i.e. soil types, hydrology, historic land use, etc.). During the course of both studies, it became evident that while site-specific recommendations could be made to restore wetland or stream habitats at numerous locations in the watersheds, general restoration/enhancement concepts could also be applied to more than one site. Therefore, instead of repeating these same general restoration concepts each time they are appropriate for a given site, they were explained in their own section of the *Inventory Reports*. Due to the variation between the two project areas, the general restoration and enhancement concepts are different for each study. The general concepts from the *Wetland and Riparian Inventory and Restoration Plans for Swan Creek and the Ottawa River* (2009) are:

- Historically Channelized Waterways in Sandy Soils
- Historically Channelized Waterways in Clay Soils
- Wetlands on Clay Soils
- Wetlands on Sandy Soils
- Large Streams
- Riparian Buffers

The general concepts from the *Wetland and Riparian Inventory and Restoration Plans for the Eastern Watersheds of the Maumee Area of Concern* (2012) are:

- Historically Channelized Waterways
- Non-Coastal Emergent Wetlands
- Coastal Emergent Wetlands
- Forested Wetlands
- Medium and Large Streams
- Riparian Areas

These general concepts are not included in this *Summary Inventory Report*.

THE SUMMARY INVENTORY REPORT

This *Summary Inventory Report* includes information extracted from the two *Inventory Reports* (explained above) along with information compiled regarding potential restoration projects on public and protected lands. Although these public and protected sites were mostly excluded from the *Inventory Reports*, they are important and necessary sites in the restoration of population, benthos and habitat beneficial uses of the Maumee AOC. This report is not intended to capture all the possible restoration projects that are needed to restore the beneficial uses; however it is a listing of those sites that are known at this time.

Specific Sites in the Inventory Reports

SWAN CREEK AND THE OTTAWA RIVER (WESTERN MAUMEE AOC PROJECT AREA)

The section of the Summary Inventory Report is an extraction of information from the Wetland and Riparian Inventory and Restoration Plans for Swan Creek and the Ottawa River (2009).

The Ottawa River/Tenmile Creek watershed encompasses approximately 221 square miles in portions of Lucas and Fulton counties, Ohio (147 square miles) and Lenawee and Monroe counties, Michigan (74 square miles) (Figure 1-1). Its average gradient is 4 feet per mile. Many miles of smaller streams and ditches drain into the mainstem within this watershed. More prominent tributaries include, from downstream to upstream, Sibley Creek, Heldman Ditch, Hill Ditch, North Tenmile Creek, Prairie Ditch, Zinc Ditch, Wiregrass Ditch, Roberts Ditch and Schmitz Ditch.

The Swan Creek Watershed occupies approximately 204 square miles in portions of Henry, Fulton and Lucas counties, Ohio. Over 200 miles of creeks and ditches drain this watershed (Maumee RAP and Duck & Otter Creeks Partnership, 2006). The mainstem of Swan Creek is only about 40 miles long. More prominent tributaries within this watershed, from downstream to upstream, include Wolf Creek, Cairl Creek, Blue Creek, Gail Run and Ai Creek. It should be noted that both Wiregrass and Prairie Ditches, which are included as tributaries in the Tenmile Creek/Ottawa River watershed, also have the ability to drain into the Swan Creek watershed.

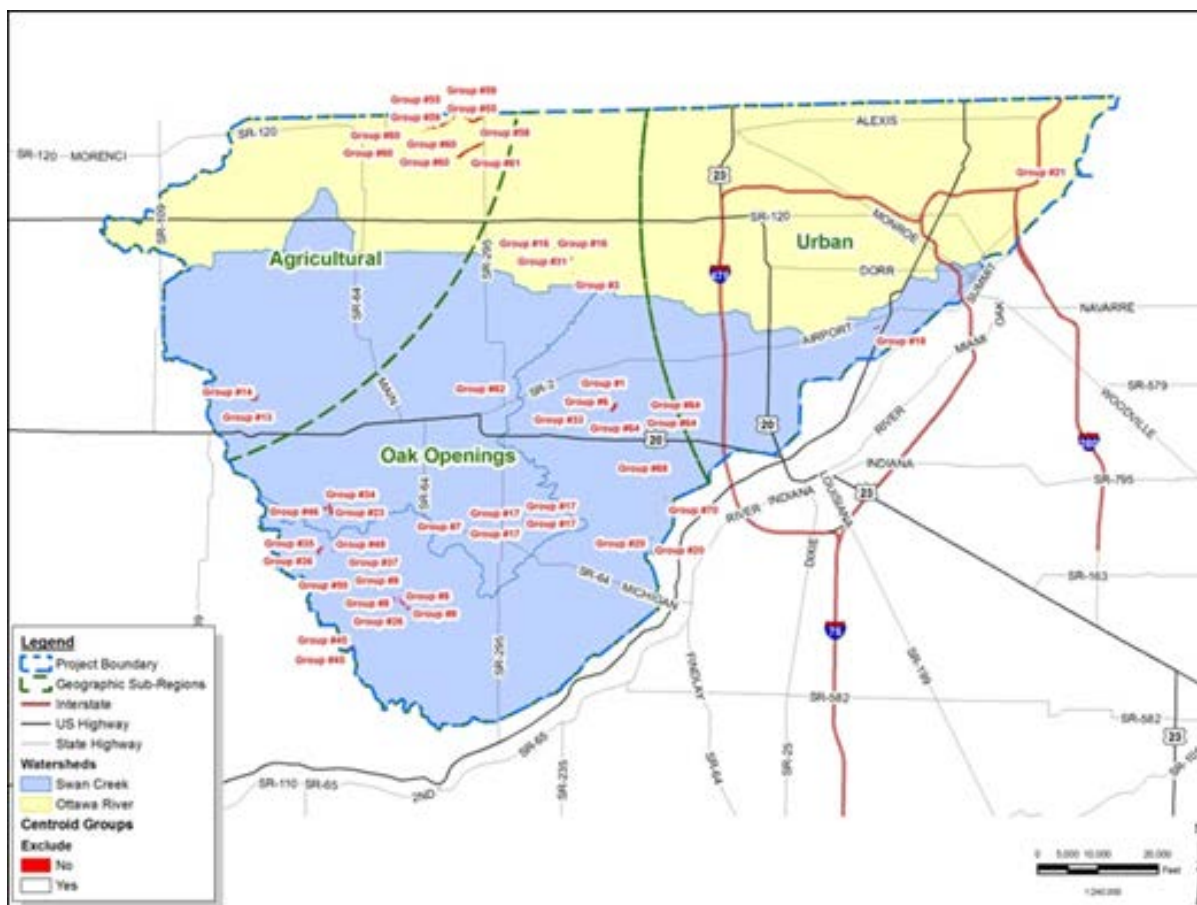
Both watersheds contain three rather distinct subregions, based on general patterns of land use and predominant soil associations. The first is the Agriculture Subregion, where all of the headwater areas in the Tenmile Creek/Ottawa River watershed, and a portion of the Swan Creek Watershed, exist in a predominantly agricultural area of eastern Fulton County and northwestern Lucas County. Here soils consist predominantly of Hoytville-Nappanee-Mermill Association, which is described as a level to gently sloping, very poorly drained and somewhat poorly drained soils that formed in glacial lake sediment (Stone et al, 1980). Tributaries within this portion of both watersheds tend to be low-gradient systems that have historically been channelized and subsequently maintained to promote agricultural drainage. Riparian corridors tend to lack natural woody vegetation. As a result, the streams tend to be fully exposed to sunlight. The majority of wetlands in this area have been eliminated for agricultural purposes.

Downstream of the Agricultural Subregion, a narrow portion of the Tenmile Creek/Ottawa River watershed and a much larger portion of the Swan Creek watershed flow through the Oak Openings Region of Northwest Ohio, one of the most ecologically unique regions of the Midwest United States. Here, soils consist predominantly of a wide band of the Granby-Ottokee-Tedrow Association, characterized by level to gently sloping, poorly drained, moderately well drained and somewhat poorly drained soils that formed in sandy material. Agriculture is still present in this subregion, but to a lesser extent due to the lower fertility of the sandy soils. After leaving the Oak Openings Subregion, both streams and their tributaries flow through the urbanized, densely populated area of eastern Lucas County. Here soils consist of the Urban Land Association which is most prevalent in the Urban Subregion, followed by the Bixler-Dixboro Association and then the Del Rey-Lenawee Association. Within this subregion, the Granby-Ottokee- Tedrow Association is limited to the northwest corner of the Ottawa River watershed.

Agriculture is for the most part absent in Urban Subregion of the Tenmile Creek/Ottawa River and Swan Creek watersheds, being replaced by residential, commercial and industrial development. Within this subregion, the Ottawa River passes through the City of Sylvania, the Sylvania Country Club, the Camp

Miakonda Boy Scout Camp, Wildwood Metropark, the Village of Ottawa Hills, The University of Toledo, Ottawa and Jermain Parks and then an industrial corridor that contains numerous capped and abandoned landfills. At its most downstream end, east of Interstate 75, the river widens and is bordered by private properties, public marinas, yacht clubs and restaurants before emptying into the Maumee Bay and the western basin of Lake Erie.

In the Urban Subregion, Swan Creek passes through the Village of Whitehouse and Monclova Township, where it winds its way through Brandywine Country Club. Once it crosses I-475/US 23, the creek passes residential and commercial areas before flowing through Swan Creek Metropark. After leaving the metropark, the river continues through residential areas of increasing density, until entering the urban core of the City of Toledo. Here the creek continues past numerous businesses and warehouses, until it empties into the Maumee River. Over the years, the Tenmile Creek/Ottawa River and Swan Creek watersheds have experienced numerous alterations that have impacted the physical, chemical and biological properties of the mainstems and their numerous tributaries. The ditching and tiling of agricultural land in the upper reaches of both streams, combined with increased development in the middle and lower reaches of both watersheds have caused the flow regimes to become more erratic in both watersheds. This has caused increased erosion along the banks of the main channels, which in turn has caused increases in turbidity and embeddedness of substrate within the stream channels. Removal of streamside vegetation has contributed to the problem of increased erosion, and also caused an increase in the temperature of waters and reduced oxygen concentrations. These changes have selected for species of aquatic macroinvertebrates and fish that are more tolerant to these types of environmental conditions.



Map of the original 21 sites (groups) within Western Inventory Plan (Swan Creek and Ottawa River).

Below is a comparative matrix of all the sites in the *Wetland and Riparian Inventory and Restoration Plans for Swan Creek and the Ottawa River (2009)*. Each site is listed in the order it appears in the full report and includes detailed information, concept plans and rough cost estimates for each site. This *Summary Inventory Report* only includes basic background information about the site and a cost estimate. Please refer to the full report for more details.

Site	Wetland Restoration (acres)	Wetland Enhancement (acres)	Native upland Enhancement (acres)	Riparian buffer Enhancement (acres)	Streambank Enhancement (linear feet)	In-stream/Ditch Enhancement (linear feet)	Estimated cost
OR-21	-	1.35	-	-	-	1250	\$81,400
OR-101	17.12	0.29	-	0.52	-	-	\$262,930
OR-102	-	1.42	-	-	-	-	\$23,760
SC-18	-	3.93	-	-	150	-	\$16,500
OR-3	3.37	-	0.54	0.33	-	700	\$69,930
OR-16	27.33	0.90	-	6.45	-	900	\$488,670
OR-31	4.74	-	0.60	-	-	650	\$84,410
SC-6	95.51	-	101.14	15.60	6800	-	\$1,999,160
SC-7	3.84	-	-	0.27	-	250	\$62,870
SC-8	55.06	0.84	3.95	11.12	2400	-	\$1,065,070
SC-17	1.06	-	-	2.14	-	1500	\$75,880
SC-20	97.83	-	45.27	12.49	-	2500	\$2,371,060
SC-34	-	-	-	-	-	900	\$22,500
SC-45	44.66	-	6.79	-	-	-	\$645,610
SC-49	9.87	1.39	-	6.91	2600	-	\$297,810
SC-62	109.34	-	36.66	7.50	1600	-	\$1,825,360
SC-64	81.30	-	13.75	10.33	-	2200	\$1,958,085
SC-70	1.95	-	-	3.11	-	250	\$63,190
OR-58	52.53	-	30.42	10.17	-	2100	\$1,595,250
OR-59	72.45	-	-	13.35	1000	-	\$1,247,790
OR-60	115.00	-	32.83	7.99	3200	-	\$1,922,860
OR-61	332.68	-	-	19.97	-	2500	\$5,744,490
OR-100	46.10	1.73	1.02	9.71	-	2600	\$889,510
SC-13	1.88	-	0.62	0.16	-	-	\$30,390
SC-14	3.19	-	-	-	-	-	\$46,450
Totals	1,176.81	10.5	273.59	138.12	17,750	17,050	\$22,809,535



Urban



Agricultural



Oak Openings

Site OR-21

Non-Isolated Wetland Restoration

Mud Creek

Site OR-21 Background Information

Project Description:

Remove accumulated sediments
Create 2-Stage Channel over 1,250 feet of stream
Enhance 1.35 acre of existing wetland

Potential Measurable Improvements:

Increase in the HHEI score by 15 to 20 points
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways in Clay Soils

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.52 sq. mi.

County: Lucas

Location: 83°30' 0.14"W 41°41' 42.82N

Stream: Mud Creek (HHEI=34)

12 Digit Watershed: Detwiler Ditch-Frontal Lake Erie (041000010309)

Wetland: Wetland OR-21-1 (palustrine emergent) on left bank

Stream buffers: Wide, low quality scrub/young woods

Surrounding land use: Urban and residential

Field-estimated Gradient (% Slope): <0.1%

Ownership: private



Existing wetland on left bank of Mud Creek



View of Mud Creek, facing upstream

Estimated cost summary in 2009				
Project	Quantity	Unit	Unit Cost	Total cost
Channel Cleanout & Two-Stage Channel	1250	Linear foot	\$50	\$62,500
Wetland Enhancement of 1.35-Acre Wetland	1.35	Acre	\$14,000	\$18,900
Total estimated construction cost				\$81,400

Site OR-101

Non-Isolated Wetland Restoration

Ottawa River

Site OR-101 Background Information

Project Description:

Create 15.3 acres of palustrine wetland on hydric soil
Enhance 0.29 acres of emergent wetland
Plant 0.52 acres of riparian corridor
Create 1.9 acre of emergent wetland

Potential Measurable Improvements:

Increase in the QHEI score by 4 to 6 points
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Wetland Restoration Enhancement on Clay Soils
Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 156 sq. mi.

County: Lucas

Location: 83°34' 58.74W 41°40' 24.72N

Stream: Ottawa River (QHEI = 67)

12 Digit Watershed: Sibley Creek-Ottawa River (041000010308)

Wetland: OR-101-1 (forested/emergent) (ORAM = 67);

OR-101-2 (palustrine emergent) (ORAM = 32.5)

Stream buffers: Narrow, quality woodland or large old field

Surrounding land use: Residential and urban

Field-estimated Gradient (% Slope): 5 feet per mile, low

Ownership: City of Toledo



Old field area growing on fill



Patch of Carex hyalinolepis within the forested portion of Wetland OR-101-1

Estimated Cost Summary in 2009				
Project Type	Quantity	Unit	Unit Cost	Total Cost
Emergent (Area A)	6.38	acre	\$14,000	\$89,600
Deep Water Emergent (Area A)	4.9	acre	\$15,000	\$73,500
Floating-leaved Emergent (Area A)	2.14	acre	\$18,000	\$37,800
Forested Wetland (Area A)	1.82	acre	\$16,000	\$28,120
Wetland Enhancement	0.29	acre	\$3,000	\$870
Emergent Wetland (Area B)	1.88	acre	\$14,000	\$26,320
Riparian Buffer (Area B)	0.52	acre	\$11,000	\$5,720
Total estimated construction cost				\$262,930

Stream and Non-Isolated Wetland Restoration

Site OR-102 Background Information

Project Description:

Enhance 1.42 acres of existing wetlands by modifying hydrology with weir
Restore and stabilize 800 feet of streambank to prevent river breaking through to lake

Potential Measurable Improvements:

Increase in the ORAM score of Wetland OR-102
Reduce sediment and nutrient loading to river
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement of Large Streams
Wetland Restoration/Enhancement on Clay Soils

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthic invertebrates
BUI #14: Loss of stream and wetland habitat

Drainage Area: 127.46 sq. mi.

County: Lucas

Location: 83°41' 30" W 41°41' 42" N

Stream: Ottawa River (QHEI=64)

12 Digit Watershed: Hellinon Ditch-Ottawa River (041000010307)

Wetland: Wetland OR-102-1 (palustrine emergent wetland)

Stream buffers: Wide to very wide; good to excellent quality (wooded)

Surrounding land use: Camp Miakonda - Boy Scout Camp and residential

Field-estimated Gradient (% Slope): <0.1%

Ownership: Boy Scouts of America



Ottawa River Large Erosion Area

Estimated Cost Summary in 2009

Project	Quantity	Unit	Cost per unit	Total Cost
Root Wad/Log Vane/J-Hook Installation	2	each	\$5,000	\$10,000
Bank Restoration and Vegetation	1	each	\$1,500	\$1,500
Design/Install J-Hooks	4	each	\$1,500	\$6,000
Stop-log Structure	1	each	\$2,000	\$2,000
Wetland Enhancement	1.42	acre	\$3,000	\$4,260
Total estimated construction cost				\$23,760

Site SC-18

Stream Restoration / Enhancement

Swan Creek

Site SC-18 Background Information

Project Description:

Stabilize 150 linear feet of streambank on outside of left bank meander
Hydrologic enhancement of 4 acres of wooded wetlands by notching levies

Potential Measurable Improvements:

Increase in the ORAM score in Wetland SC-18-1 and SC-18-2
Reduce sediment and nutrient loading to stream
Increase in the QHEI score
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement of Large Streams

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 190 sq. mi.

County: Lucas

Location: 83°35' 51.47"W 41°37' 36.85"N

Stream: Swan Creek (QHEI=60.5)

12 Digit Watershed: Heilman Ditch-Swan Creek (041000090804)

Wetland: Wetland SC-18-1 and Wetland SC-18-2

Stream buffers: Moderate to wide, wooded

Surrounding land use: Urban and residential

Field-estimated Gradient (% Slope): 0.05%

Ownership: private



Swan Creek, facing downstream



Swan Creek, facing upstream

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Root Wad/Log Vane/J-Hook Installation	1	each	\$5,000	\$5,000
Bank Restoration and Vegetation	1	each	\$1,500	\$1,500
Design/Install J-Hooks	4	each	\$1,500	\$6,000
Wetland Enhancement	2	each	\$1,000	\$2,000
Remove Old Headwall	1	each	\$2,000	\$2,000
Total estimated construction cost				\$16,500

Non-Isolated Wetland Restoration

Site OR-3 Background Information

Project Description:

Restore 3.37 acres of palustrine wetland on hydric soil
 Restore native vegetation to 700 feet of watercourse
 Restore 0.33 acre of riparian buffer to ditch
 Enhance 0.54 acre of upland area

Potential Measurable Improvements:

Increase in the ORAM and VIBI score in Wetland OR-3-1
 Reduce sediment and nutrient loading to stream
 Increase in the QHEI score by 2 to 3 points
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Wetland Restoration/Enhancement on Sandy Soils
 Restoration/Enhancement of Riparian Buffers
 Historically Channelized Waterway

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.37 sq. mi.

Location: 83°47' 04.22"W 41°39' 00.86"N

12 Digit Watershed: Prairie Ditch (041000010303)

Wetland: OR-3-1 (palustrine scrub/shrub and emergent) (ORAM=86)

Stream buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Residential to west; high quality wetland to south; vacant land to east

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per hundred feet), low

Ownership: Metroparks of Toledo Area



Channel of Wiregrass Ditch facing south

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wiregrass Ditch Enhancement	700	linear foot	\$25	\$17,500
Emergent Wetland Area A	2.8	acre	\$14,000	\$33,600
Emergent Wetland Area B	0.37	acre	\$14,000	\$5,180
Emergent Wetland Area C	0.2	acre	\$14,000	\$2,800
Riparian Enhancement	0.33	acre	\$11,000	\$3,630
Wildlife Enhancement (upland)	0.54	acre	\$3,000	\$1,620
Total estimated construction cost				\$64,330

Stream and Non-Isolated Wetland Restoration

Site OR-16 Background Information

Project Description:

Create 27.33 acres palustrine of wetland on hydric soil
 Enhance 0.9 acre of pastured wetland
 Plant 0.06 acres of riparian corridor
 Enhance 900 feet of Prairie Ditch

Potential Measurable Improvements:

Increase in the ORAM and VIBI score in Wetland OR-16-1 & OR-16-2
 Reduce sediment and nutrient loading to stream & increase flood retention in floodplain
 Increase in the QHEI score by 5 to 7 points
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways in Sandy Soils
 Wetland Restoration/Enhancement on Sandy Soils
 Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 10.6 sq. mi.

County: Lucas

Location: 83°47' 52.36"W 41°39' 38.71N

Stream: Hughes Ditch & Prairie Ditch (QHEI=21.5)

12 Digit Watershed: Prairie Ditch (041000010303)

Wetland: OR-16-1 (linear drainage swale); OR-16-2 (palustrine emergent); combined (ORAM=27.5)

Stream buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Row crop, horse pasture, Secor Metropark to east

Field-estimated Gradient (% Slope): <0.1% (0.1 feet per hundred feet), low

Ownership: private



Prairie Ditch through narrow wooded corridor

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Enhancement: Site OR-16-1	0.06	acre	\$14,000	\$840
Wetland Enhancement: Site OR-16-2	0.84	acre	\$14,000	\$11,760
Wetland Restoration: Site OR-16-A	1.53	acre	\$14,000	\$21,420
Wetland Restoration: Site OR-16-B	2.67	acre	\$14,000	\$37,380
Riparian Buffer Enhancement	6.45	acre	\$11,000	\$70,950
Wetland Restoration: Site OR-16-C	23.13	acre	\$14,000	\$323,820
Prairie Ditch Enhancement	900	linear foot	\$25	\$22,500
Total Estimated Construction Cost				\$488,670

Site OR-31

Non-Isolated Wetland Restoration

Wiregrass Ditch

Site OR-31 Background Information

Project Description:

Create 4.74 acres of palustrine wetland on hydric soil
Plant 650 (0.39 acre) feet of riparian corridor
Enhance 0.6 acre of wildlife habitat

Potential Measurable Improvements:

Reduce erosion and sediment loading to stream
Increase in the QHEI score by 5 to 7 points
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways on Sandy Soils
Wetland Restoration/Enhancement on Sandy Soils

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.61 sq. mi.

County: Lucas

Location: 83°47' 08.05"W 41°39' 18.67"N

Stream: Wiregrass Ditch (QHEI=26)

12 Digit Watershed: Prairie Ditch (041000010303)

Wetland: None

Stream buffers: Wide, low to moderate (wooded) quality

Surrounding land use: Row crop, commercial property

Field-estimated Gradient (% Slope): <0.1% (0.1 feet per hundred feet), low

Ownership: Ohio Department of Natural Resources



Wet swamp forest along western side of Wiregrass Ditch, Irwin Prairie State Nature Preserve

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Restoration	4.74	acre	\$14,000	\$66,360
Wildlife Enhancement (upland)	0.6	acre	\$3,000	\$1,800
Wiregrass Ditch Enhancement	650	linear foot	\$25	\$16,250
Total Estimated Construction Cost				\$84,410

Non-Isolated Wetland Restoration

Site SC-6 Background Information

Project Description:

Create up to 96 acres of palustrine wetland on hydric soil
 Plant 6800 feet of riparian corridor
 Enhance 101 acres of upland habitat for wildlife
 Enhance 15.6 acres of riparian buffer along Cairl Ditch

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 7 points in Cairl Ditch & HHEI score by 6 to 9 points in Unnamed Tributary
 Reduce sediment and nutrient loading to stream & increase flood retention in floodplain
 Reduce erosion and sediment loading to stream
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways in Sandy Soils
 Wetland Restoration/Enhancement on Sandy Soils
 Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat



Cairl Ditch facing downstream

Drainage Area: 1.09 sq. mi.

County: Lucas

Location: 83°45' 23.71"W 41°35' 20.76"N

Stream: Cairl Ditch (QHEI=37); Unnamed Tributary (HHEI=56)

12 Digit Watershed: Wolf Creek (041000090803)

Wetland: None

Stream buffers: Narrow, low quality

Surrounding land use: Row crop

Field-estimated Gradient (% Slope): 0.5% to 0.1% (0.05 to 0.01 feet per 100 feet), low

Ownership: private

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Streambank Slope Reduction/Stabilization	6800	linear foot	\$25	\$170,000
Riparian Buffer Enhancement	15.6	acre	\$11,000	\$171,600
Wildlife Enhancement (upland)	101.14	acre	\$3,000	\$303,420
Wetland Restoration A	15.95	acre	\$14,000	\$223,300
Wetland Restoration B	19.28	acre	\$14,000	\$269,920
Wetland Restoration C	26.91	acre	\$14,000	\$376,740
Wetland Restoration D	33.37	acre	\$14,000	\$467,180
Stream Maintenance	3400	linear foot	\$5	\$17,000
Total Estimated Construction Cost				\$1,999,160

Site SC-7

Non-Isolated Wetland Restoration

Unnamed Ditch

Site SC-7 Background Information

Project Description:

Create 3.84 acres of palustrine wetland hydric soil
Plant 250 feet of riparian corridor
Enhance 0.27 acre of riparian buffer along unnamed ditch

Potential Measurable Improvements:

Increase in the QHEI score by 2 to 4 points in Unnamed Tributary
Increase in the ORAM score for Wetland SC-7-1
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Wetland Restoration/Enhancement on Sandy Soils
Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.19 sq. mi.

County: Lucas

Location: 83°52' 42.17"W 41°0.76"N

Stream: Unnamed Ditch (HHEI=31)

12 Digit Watershed: Upper Blue Creek (041000090801)

Wetland: Wetland SC-7-1 (palustrine forest/palustrine emergent) (ORAM=47)

Stream buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Forested, horse farms, residential

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet), low

Ownership: private



Forested wetland of SC 7-1

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Restoration: Area A	3.84	acre	\$14,000	\$53,760
Unnamed Tributary Enhancement	250	linear foot	\$25	\$6,250
Riparian Buffer Enhancement	0.27	acre	\$11,000	\$2,860
Total Estimated Construction Cost				\$62,870

Site SC-8

Non-Isolated Wetland Restoration

Blue Creek & Unnamed Tributary

Site SC-8 Background Information

Project Description:

Restore 55 acres of emergent Oak Openings Wetland and Enhance 0.84 acre of existing wetland
Enhance 3.95 acres of existing upland and Plant 11.12 acres of wooded riparian buffer
Stabilize 2400 linear feet of streambank

Potential Measurable Improvements:

Increase in the QHEI score by 3 to 5 points in Blue Creek & HHEI by 3 to 5 points in Unnamed Tributary
Increase in the ORAM score for Wetland SC-8-1
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways in Sandy Soils
Restoration/Enhancement of Riparian Buffers
Wetland Restoration/Enhancement on Sandy Soils

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat



Unnamed Tributary to Blue Creek,
Upstream Sample Reach

Drainage Area: 10.3 sq. mi. (Blue Creek); 1.92 sq. mi. (Unnamed Tributary)

County: Fulton

Location: 83°53' 17.02"W 41°29' 58.10"N

Stream: Blue Creek (QHEI=45) & Unnamed Tributary (HHEI=56)

12 Digit Watershed: Upper Blue Creek (041000090801)

Wetland: SC-7-1 (ORAM=63)

Stream buffers: None

Surrounding land use: Row crop agriculture, residential

Field-estimated Gradient (% Slope): 0.05%

Ownership: private

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Sediment Removal	1100	cubic yard	\$10	\$11,000
Streambank Slope Reduction/Stabilization	2400	linear foot	\$25	\$60,000
Riparian Buffer Enhancement	11.12	acre	\$11,000	\$122,320
Rip Rap Removal	50	cubic yard	\$20	\$1,000
Stream Maintenance	2400	linear foot	\$5	\$12,000
Wetland Enhancement	0.84	acre	\$3,000	\$2,520
Wetland Restoration A – forested	17.69	acre	\$16,000	\$283,040
Wetland Restoration B – emergent	9.51	acre	\$14,000	\$133,140
Wetland Restoration C – forested	8.60	acre	\$16,000	\$137,600
Wetland Restoration D – forested	6.93	acre	\$16,000	\$110,880
Wetland Restoration E – forested	3.55	acre	\$16,000	\$56,800
Wetland Restoration F – emergent	4.08	acre	\$14,000	\$57,120
Wetland Restoration G – emergent	4.70	acre	\$14,000	\$65,800
Wildlife Enhancement	3.95	acre	\$3,000	\$11,850
Total Estimated Construction Cost				\$1,065,070

Site SC-17 Stream Restoration

Swan Creek & Unnamed Tributary

Site SC-17 Background Information

Project Description:

Create 3.20 acres of wetland on hydric soil
Plant 1500 feet of riparian corridor

Potential Measurable Improvements:

Increase in the QHEI score by 3 to 5 points
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Wetland Restoration/Enhancement on Sandy Soils
Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 68.7 sq. mi.

County: Lucas

Location: 83° 09' 01.79" W 41° 32' 10.13" N

Stream: Swan Creek; unnamed tributary to Swan Creek (HHEI=48)

2-D Wetland: Gale Run-Swan Creek (041000090703)

Wetland: SC-17-1 (palustrine forest/emergent/shrub) (ORAM=71)

Stream Buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Residential, row crops

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet)

Ownership: private



Riparian corridor south side of stream

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Swan Creek Instream Restoration	1500	linear foot	\$25	\$37,500
Swan Creek Buffer Restoration	2.14	acre	\$11,000	\$23,540
Wetland Restoration Wetland A	1.06	acre	\$14,000	\$14,840
Total Estimated Construction Cost				\$75,880

Site SC-20 Background Information

Project Description:

Restore 2500 linear feet of stream channel
 Restore up to 80 acres of emergent wetland
 Restore up to 18 acres of forested wetland
 Plant 12.49 acres of wooded riparian corridor
 Enhance 45.27 acres of upland buffer

Potential Measurable Improvements:

Increase in the QHEI score by 10 to 14 points
 Increase in the IBI score by 3 to 6 points
 Reduce wind and soil erosion
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement of large Streams
 Restoration/Enhancement of Riparian Buffers
 Wetland Restoration/Enhancement on Sandy Soils

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 5.62 sq. mi.

County: Lucas

Location: 83°44' 17.78"W 41°31'37.74"N

Stream: Unnamed Tributary to Swan Creek (QHEI=39.5)

12 Digit Watershed: Heilman Ditch-Swan Creek (041000090804)

Wetland: None

Surrounding land use: Row crop agriculture

Ownership: private

Stream buffers: None

Field-estimated Gradient (% Slope): 0.1%



Unnamed Tributary to Swan Creek, facing downstream; rock dam visible



Unnamed Tributary to Swan Creek, facing upstream

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Natural Channel Restoration	2500	linear foot	\$275	\$687,500
Riparian Buffer Enhancement	12.49	acre	\$11,000	\$137,390
Wildlife Enhancement (upland)	45.27	acre	\$3,000	\$135,810
Annual Maintenance (natural channel)	2500	linear foot	\$2	\$5,000
Wetland Restoration Wetland A - emergent	65.91	acre	\$14,000	\$922,740
Wetland Restoration Wetland B – forested	17.87	acre	\$16,000	\$285,920
Wetland Restoration Wetland C – emergent	14.05	acre	\$14,000	\$196,700
Total Estimated Construction Cost				\$2,371,060

Non-Isolated Wetland Restoration

Site SC-34 Background Information

Project Description:

Restore 900 feet of riparian corridor

Potential Measurable Improvements:

Increase in the HHEI score by 3 to 5 points

General Restoration/Enhancement Concept:

Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #6: Degradation of benthos

BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.13 sq. mi.

County: Fulton

Location: 83°56' 21.66"W 41°32' 04.27"N

Stream: Unnamed Tributary (HHEI=46)

10 Digit Watershed: Fewless Creek-Swan Creek (041000090702)

Wetland: SC-34-1 (palustrine forest) (ORAM=49.5); SC-34-2 (palustrine emergent) (ORAM=33)

Stream buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Residential, row crops

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet), low

Ownership: private



Wetland SC-34-2

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Unnamed Tributary to Fewless Creek Enhancement	900	linear foot	\$25	\$22,500
Total Estimated Construction Cost				\$22,500

Isolated Wetland Restoration

Site SC-45 Background Information

Project Description:

Restore 44.66 acres of palustrine wetland on hydric soil
Enhance 6.79 acres of upland buffer

Potential Measurable Improvements:

Increase in the ORAM score
Reduce wind and soil erosion

General Restoration/Enhancement Concept:

Wetland Restoration/Enhancement on Sandy Soils Concept

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: NA

County: Henry

Location: 83°55' 01.29"W 41°28'39.28"N

Stream: None

12 Digit Watershed: Lower Blue Creek (041000090802)

Wetland: SC-45-1 (palustrine emergent) (ORAM=53.5)

Stream buffers: NA

Surrounding land use: Row crop, and Maumee State Forest to the north and east

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet), low

Ownership: private



Agricultural field of Area 45-B facing south toward Rails to Trails

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Restoration: Site SC-45-A	17.66	acre	\$14,000	\$247,240
Wetland Restoration: Site SC-45-B	27.00	acre	\$14,000	\$378,000
Wildlife Enhancement (upland)	6.79	acre	\$3,000	\$20,370
Total Estimated Construction Cost				\$645,610

Isolated Wetland Restoration

Site SC-49 Background Information

Project Description:

Restore 9.87 acres of palustrine wetland on hydric soil
 Enhance 1.39 acres of emergent wetland
 Restore 6.91 acres of riparian corridor
 Restore 2400 feet (6.91 ac) of stream bank

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 7 points
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways in Sandy Soils
 Wetland Restoration/Enhancement on Sandy Soils
 Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.42 sq. mi.

County: Fulton

Location: 83°55' 35.97"W 41°31' 11.01"N

Stream: Blue Creek (QHEI=26); Unnamed tributary to Blue Creek (HHEI=32)

12 Digit Watershed: Upper Blue Creek (041000090801)

Wetland: SC-49-1 (palustrine emergent) (ORAM=34.5)

Stream Buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Row crop, and forest to the north

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet), low

Ownership: private



Sand barren along eastern edge of agricultural field

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Enhancement: Site SC-49-1	1.39	acre	\$14,000	\$19,460
Wetland Restoration: Site SC-49-A	0.74	acre	\$14,000	\$10,360
Wetland Restoration: Site SC-49-B	5.19	acre	\$14,000	\$71,820
Wetland Restoration: Site SC-49-C	1.18	acre	\$14,000	\$16,520
Wetland Restoration: Site SC-49-D	2.76	acre	\$14,000	\$38,640
Riparian Buffer Enhancement:	6.91	acre	\$11,000	\$76,010
Blue Creek Enhancement	2600	linear foot	\$25	\$65,000
Total Estimated Construction Cost				\$297,810

Site SC-62

Stream Restoration

Unnamed Tributary to Prairie Ditch

Site SC-62 Background Information

Project Description:

Enhance 1600 linear feet of streambank
Restore up to 109 acres of emergent wetlands
Enhance 0.54 acres of existing floodplain wetland
Plant 7.5 acres of wooded riparian corridor
Enhance 36.66 acres of upland buffer

Potential Measurable Improvements:

Increase in the QHEI score by 3 to 5 points
Increase flood retention on the site
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways in Sandy Soils
Wetland Restoration/Enhancement on Sandy Soils
Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.13 sq. mi.

County: Lucas

Location: 83°51' 24.12"W 41°35' 48.77"N



Unnamed Tributary to Prairie Ditch, facing downstream

Stream: Unnamed Tributary to Prairie Ditch(QHEI=32.5)

12 Digit Watershed: Ai Creek (041000090701)

Wetland: SC-62-1 (palustrine/emergent) (ORAM=28)

Stream buffers: None

Surrounding land use: Row crop and pasture

Field-estimated Gradient (% Slope): <0.1%

Ownership: private

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Streambank Slope	1600	linear foot	\$25	\$40,000
Riparian Buffer Enhancement	7.5	acre	\$11,000	\$82,500
Stream Maintenance	1600	linear foot	\$5	\$8,000
Wetland Restoration A – emergent	39.76	acre	\$14,000	\$556,640
Wetland Restoration B – forested	14.14	acre	\$16,000	\$226,240
Wetland Restoration C – emergent	38.08	acre	\$14,000	\$533,120
Wetland Restoration D – forested	12.11	acre	\$16,000	\$193,760
Wetland Restoration E – emergent	0.52	acre	\$14,000	\$7,280
Wetland Restoration F – emergent	1.81	acre	\$14,000	\$25,340
Wetland Restoration G – emergent	2.20	acre	\$14,000	\$30,800
Wetland Restoration H – emergent	0.72	acre	\$14,000	\$10,080
Wetland Enhancement: Site SC-62-1	0.54	acre	\$3000	\$1,620
Wildlife Enhancement	36.66	acre	\$3,000	\$109,980
Total Estimated Construction Cost				\$1,825,360

Site SC-64

Stream Restoration

Stone Ditch

Site SC-64 Background Information

Project Description:

Restore 2200 linear feet of stream channel
 Restore up to 81 acres of emergent wetland
 Plant 10.33 acres of wooded riparian buffer
 Plant 13.75 acres of upland buffer enhancement

Potential Measurable Improvements:

Increase in the QHEI score by 10 to 14 points
 Increase in the IBI score by 3 to 6 points
 Reduce sediment and nutrient loading to river
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement of Large Stream
 Wetland Restoration/Enhancement on Sandy Soils
 Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 7.91 sq. mi.

County: Lucas

Location: 83°44' 33.04"W 41°35' 08.72"N

Stream: Stone Ditch (QHEI=30.5)

12 Digit Watershed: Wolf Creek (041000090803)

Stream buffers: None

Field-estimated Gradient (% Slope): 0.1%

Wetland: None

Surrounding land use: Row Crop

Ownership: private



Stone Ditch, facing upstream



Existing buffer community on Stone Ditch

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Natural Channel Restoration	2200	linear foot	\$275	\$605,000
Riparian Buffer Enhancement	10.33	acre	\$11,000	\$113,630
Annual Maintenance (natural channel)	2200	linear foot	\$2	\$4,400
Annual Maintenance (riparian buffer)	5	acre	\$25	\$125
Wetland Restoration A – emergent	53.56	acre	\$14,000	\$749,840
Wetland Restoration B – forested	17.60	acre	\$16,000	\$281,600
Wetland Restoration C – forested	5.47	acre	\$16,000	\$87,520
Wetland Restoration D – forested	4.67	acre	\$16,000	\$74,720
Wildlife Enhancement	13.75	acre	\$3,000	\$41,250
Total Estimated Construction Cost				\$1,958,085

Site SC-70

Stream Restoration

Blystone Ditch

Site SC-70 Background Information

Project Description:

Restore 1.95 acres of palustrine wetland on hydric soil
Enhance 3.11 acres of riparian corridor
Plant 250 feet of vegetative swale

Potential Measurable Improvements:

Increase in the QHEI score by 10 to 14 points
Increase in the IBI score by 3 to 6 points
Reduce sediment and nutrient loading to river
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Wetland Restoration/Enhancement on Clay Soils
Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 7.62 sq. mi.

County: Lucas

Location: 83°43' 36.37"W 41°32' 50.70"N

Stream: Blystone Ditch (QHEI=37)

12 Digit Watershed: Heilman Ditch-Swan Creek (041000090804)

Wetland: None

Stream buffers: Very narrow wooded quality

Surrounding land use: Row crop

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet)

Ownership: private



End of QHEI facing upstream



Start of QHEI facing downstream

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Ditch Restoration – Emergent Wetland	0.12	acre	\$14,000	\$1,680
Wetland Restoration: Site SC-70-A	1.95	acre	\$14,000	\$27,300
Riparian Buffer Enhancement: Site SC-16-C	3.11	acre	\$11,000	\$34,210
Total Estimated Construction Cost				\$63,190

Stream and Non-Isolated Wetland Restoration

Site OR-58 Background Information

Project Description:

Restore 2100 linear feet of stream channel
 Create up to 53 acres of emergent wetland
 Plant 10.17 acres of wooded riparian corridor
 Plant 30.42 acres of upland buffer enhancement

Potential Measurable Improvements:

Increase in the QHEI score by 10 to 14 points
 Increase in the IBI score by 3 to 6 points
 Reduce siltation and embeddedness to stream
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement Large Streams
 Restoration/Enhancement of Riparian Buffers
 Wetland Restoration/Enhancement on Clay Soils

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 29.2 (Tenmile Creek) and 0.27 (Unnamed Tributary) sq. mi.

County: Lucas

Location: 83°50' 44.71"W 41°43' 09.87"N

Stream: Tenmile Creek (QHEI=49 & 57.5); Unnamed Tributary to Tenmile Creek (HHEI=52)

12 Digit Watershed: Headwaters Tenmile Crk (041000010304) **Wetland:** None

Stream buffers: None

Surrounding land use: Row crop

Field-estimated Gradient (% Slope): 0.1%

Ownership: private



Tenmile Creek facing upstream; west of Berkey-Southern Road

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Natural Channel Restoration	2100	linear foot	\$275	\$577,500
Riparian Buffer Enhancement	10.17	acre	\$11,000	\$111,870
Wildlife Enhancement	30.42	acre	\$3,000	\$91,260
Repair Damage from Equipment Crossing	50	linear foot	\$1,500	\$75,000
Annual Maintenance (natural channel)	2100	linear foot	\$2	\$4,200
Wetland Restoration A – emergent	24.25	acre	\$14,000	\$339,500
Wetland Restoration B – emergent	8.97	acre	\$14,000	\$125,580
Wetland Restoration C – emergent	7.48	acre	\$14,000	\$104,720
Wetland Restoration D – emergent	2.35	acre	\$14,000	\$32,900
Wetland Restoration E – emergent	9.48	acre	\$14,000	\$132,720
Estimated Total Construction Cost				\$1,595,250

Stream and Non-Isolated Wetland Restoration

Site OR-59 Background Information

Project Description:

Stabilize 1000 linear feet of streambank
 Restore up to 73 acres of palustrine wetlands
 Plant 13.35 acres of wooded riparian corridor

Potential Measurable Improvements:

Increase in the QHEI score
 Reduce siltation and embeddedness to stream
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement Large Stream
 Wetland Restoration/Enhancement on Clay Soils
 Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 28.1 sq. mi.

County: Lucas

Location: 83°51' 54.12"W 41°43' 05.07"N

Stream: Tenmile Creek (QHEI=68)

12 Digit Watershed: Headwaters Tenmile Creek (041000010304)

Wetland: None

Stream buffers: None

Surrounding land use: Row crop

Field-estimated Gradient (% Slope): 0.05% to 0.1%

Ownership: private



Tenmile Creek facing upstream

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Design and Install J-Hooks	20	each	\$1,500	\$30,000
Streambank Restoration and Vegetation	10	each	\$2,500	\$25,000
Riparian Buffer Enhancement	13.35	acre	\$11,000	\$146,850
Wetland Restoration A – emergent	56.63	acre	\$14,000	\$782,820
Wetland Restoration B – forested	15.82	acre	\$16,000	\$253,120
Estimated Total Construction Cost				\$1,247,790

Stream and Non-Isolated Wetland Restoration

Site OR-60 Background Information

Project Description:

Enhance 3200 linear feet of streambank
 Enhance 32.83 acres of upland buffer
 Create up to 115 acres of palustrine wetland
 Plant 7.99 acres (L bank only) of wooded riparian corridor

Potential Measurable Improvements:

Increase in the QHEI score by 3 to 5 points
 Reduce sediment and nutrient loading to river
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement of Large Streams
 Wetland Restoration/Enhancement on Clay Soils
 Restoration/Enhancement of Riparian Buffers



Wetland OR-60-2

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 25.9 sq. mi.

County: Lucas

Location: 83°52' 28.45"W 41°43' 00.87"N

Stream: Tenmile Creek (QHEI=51)

12 Digit Watershed: Headwaters Tenmile Creek (041000010304)

Wetland: OR-60-1 (palustrine emergent) (ORAM=43); OR-60-2 (palustrine emergent)(ORAM=41); OR-60-3 (palustrine emergent/shrub)(ORAM=39); OR-60-4 (palustrine emergent/shrub)(ORAM=36)

Stream buffers: Moderate; low to moderate (wooded) quality

Surrounding land use: Row crop and residential

Field-estimated Gradient (% Slope): 0.1%

Ownership: private

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Remove Left-Bank Levy	3200	linear foot	\$5	\$16,000
Design and Install J-Hooks	20	each	\$1,500	\$30,000
Streambank Restoration and Vegetation	10	each	\$2,500	\$25,000
Riparian Buffer Enhancement	7.99	acre	\$11,000	\$87,890
Wetland Restoration A – emergent	87.26	acre	\$14,000	\$1,221,640
Wetland Restoration B – forested	27.74	acre	\$16,000	\$443,840
Wildlife Enhancement (upland)	32.83	acre	\$3,000	\$98,490
Estimated Total Construction Cost				\$1,922,860

Stream and Non-Isolated Wetland Restoration

Site OR-61 Background Information

Project Description:

Restore up to 333 acres of palustrine wetland
 Restore 2500 feet of stream channel
 Plant 20 acres of riparian corridor

Potential Measurable Improvements:

Increase in the QHEI score by 10 to 14 points
 Increase in the IBI score by 3 to 6 points
 Reduce soil erosion and siltation in stream
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement of Large Streams
 Wetland Restoration/Enhancement on Clay Soils
 Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 68.7 sq. mi.

Location: 83°50' 50.38"W 41°42' 22.23"N

12 Digit Watershed: Headwaters Tenmile Crk (041000010304)

Wetland: None

Stream buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Residential, row crops

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet), low

Ownership: private



Schmidt Ditch downstream sample reach and stream bank community

County: Lucas

Stream: Schmidt Ditch (QHEI=39.5)

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Natural Channel Restoration	2500	linear foot	\$275	\$687,500
Riparian Buffer Enhancement	19.97	acre	\$11,000	\$219,670
Annual Maintenance (natural channel)	2500	linear foot	\$2	\$5,000
Wetland Restoration A – emergent	148.56	acre	\$14,000	\$2,079,840
Wetland Restoration B – forested	57.56	acre	\$16,000	\$920,960
Wetland Restoration C – forested	29.84	acre	\$16,000	\$477,440
Wetland Restoration D – emergent	80.22	acre	\$14,000	\$1,123,080
Wetland Restoration E – forested	16.50	acre	\$14,000	\$231,000
Estimated Total Construction Cost				\$5,744,490

Stream, Isolated and Non-Isolated Wetland Restoration

Site OR-100 Background Information

Project Description:

Restore 46.1 acres of palustrine wetland
 Enhance 1.73 acres of emergent wetlands
 Plant 9.71 acres of riparian corridor
 Enhance 2600 feet of Tenmile Creek
 Enhance 1.02 acres of upland buffer

Potential Measurable Improvements:

Increase in the HHEI score by 5 to 9 points
 Reduce soil erosion and siltation in stream
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Historically Channelized Waterways in Sandy Soils
 Wetland Restoration/Enhancement on Sandy Soils

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.19 sq. mi.

Location: 84°03'03" 46.74"W 41°39' 57.93"N

12 Digit Watershed: Headwaters Tenmile Crk (041000010304)

Wetland: OR-100-1 (invasive-dominated emergent); OR-100-2 (invasive-dominated emergent); OR-100-3 (invasive-dominated emergent); OR-100-4 (invasive-dominated emergent); OR-100-5 (invasive-dominated emergent and forested); OR-100-6 (forested depression); OR-100-7 (forested depression); (combined ORAM=27.5)

Stream buffers: Narrow, low to moderate (wooded) quality

Field-estimated Gradient (% Slope): 0.1% (0.1 ft per 100 ft)

County: Fulton

Stream: Unnamed Tributary (QHEI=21.5)

Surrounding land use: Row crop, residential

Ownership: private



Old field area intermixed with small wetlands

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Enhancement: SC-100-1 to SW-100-4	1.73	acre	\$14,000	\$24,220
Headwater Stream Enhancement	2600	linear foot	\$25	\$65,000
Riparian Buffer Enhancement	9.71	acre	\$11,000	\$106,810
Wetland Restoration A – Emergent	19.17	acre	\$14,000	\$268,380
Wetland Restoration A – Deep Water Emergent	10.84	acre	\$15,000	\$162,600
Wetland Restoration A – Forested	16.09	acre	\$16,000	\$257,440
Wildlife Enhancement (upland)	1.02	acre	\$3,000	\$3,060
Estimated Total Construction Cost				\$887,510

Stream and Non-Isolated Wetland Restoration

Site SC-13 Background Information

Project Description:

Restore 1.88 acres of palustrine wetland
 Stabilize 0.62 acres of eroding bank
 Plant 900 feet (0.16 ac) of riparian corridor

Potential Measurable Improvements:

Increase in the HHEI score by 5 to 7 points
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Restoration/Enhancement of Large Streams
 Wetland Restoration/Enhancement on Clay Soils
 Restoration/Enhancement of Riparian Buffers

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 9.69 sq. mi.

County: Fulton

Location: 83°58' 45.47"W 41°35' 15.27"N

Stream: Swan Creek (QHEI=43.5)

12 Digit Watershed: Fewless Creek-Swan Creek (041000090702)

Wetland: None

Stream buffers: Narrow, low to moderate (wooded) quality

Surrounding land use: Row crop, small forested area

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet)

Ownership: private



Non-flowing water upstream from dam



*Swan Creek through thinly forested corridor;
start of QHEI*

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Restoration: Deep Water	0.45	acre	\$15,000	\$6,750
Wetland Restoration: Emergent	1.43	acre	\$14,000	\$20,020
Riparian Buffer Enhancement: Site SC-13	0.16	acre	\$11,000	\$1,760
Slope Stabilization (wildlife enhancement)	0.62	acre	\$3,000	\$1,860
Estimated Total Construction Cost				\$330,390

Stream and Non-Isolated Wetland Restoration

Site SC-14 Background Information

Project Description:

Create 3.19 acres of palustrine wetland on hydric soil

Potential Measurable Improvements:

Increase in the HHEI score by 5 to 9 points

Reduce soil erosion and siltation in stream

Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Wetland Restoration/Enhancement on Clay Soils

Restoration/Enhancement of Large Streams

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #6: Degradation of benthos

BUI #14: Loss of fish and wildlife habitat

Drainage Area: 9.56 sq. mi.

County: Fulton

Location: 83°58' 36.76"W 41°35' 21.33"N

Stream: Swan Creek (QHEI=33.5)

12 Digit Watershed: Fewless Creek-Swan Creek (041000090702)

Wetland: SC-14-1 (palustrine forested) (ORAM=48.5)

Stream buffers: Narrow, low to moderate (wooded) old field, residential quality

Surrounding land use: Row crop, small forested

Field-estimated Gradient (% Slope): 0.1% (0.1 feet per 100 feet)

Ownership: private



Rip-rap along west side of driveway.

Estimated Cost Summary in 2009				
Project	Quantity	Unit	Unit Cost	Total Cost
Wetland Restoration: Deep Water	0.71	acre	\$15,000	\$10,650
Wetland Restoration: Forested	0.27	acre	\$18,000	\$4,860
Wetland Restoration: Emergent	2.21	acre	\$14,000	\$30,940
Estimated Total Construction Cost				\$46,450

EASTERN WATERSHEDS OF THE MAUMEE AOC (EASTERN MAUMEE AOC PROJECT AREA)

The section of the Summary Inventory Report is an extraction of information from the Wetland and Riparian Inventory and Restoration Plans for the Eastern Watersheds of the Maumee Area of Concern (2012).

The eastern watersheds of the Maumee AOC encompass approximately 420 square miles in portions of Lucas, Ottawa, Sandusky and Wood counties in Ohio (Figure 1-1). Average gradient in these watersheds is 3.25 feet per mile. Many miles of smaller streams and ditches drain into the mainstems of larger streams in this watershed that mostly flows directly into Maumee Bay or Lake Erie. Notable streams and tributaries in the project area are Amlosch Ditch, Cedar Creek, Crane Creek, Duck Creek, Maumee River, Otter Creek, Packer Creek, Turtle Creek and Toussaint Creek/River.

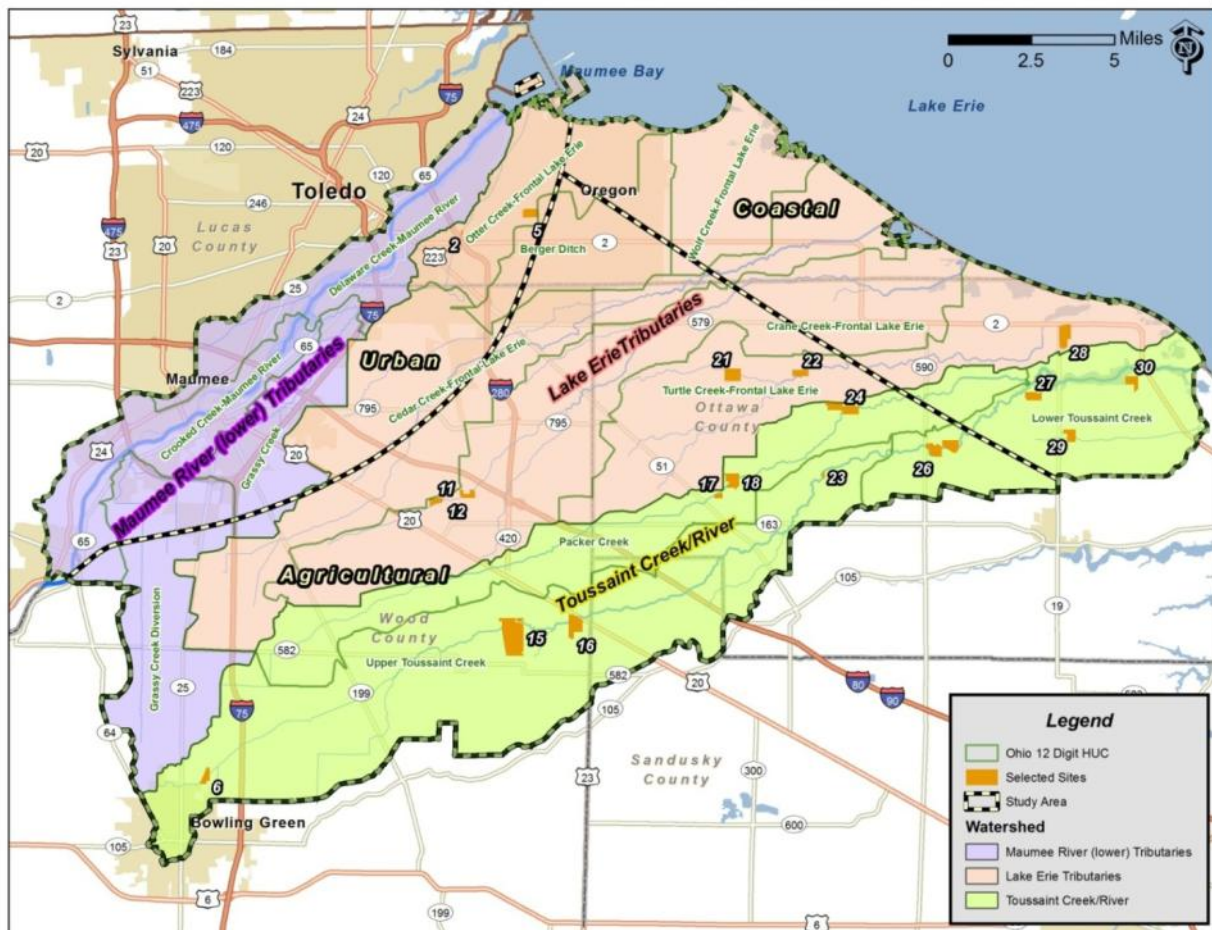
For this project the study area was divided into three subregions on the basis of general patterns of land use and geographic location. The first is the Urban Subregion, which encompasses an area of eastern Lucas County and northern Wood County. All or portions of the cities of Northwood, Oregon, Perrysburg, Rossford and Toledo are in this subregion. The largest streams in this subregion are Amlosch Ditch, Cedar Creek, Dry Creek, Delaware Creek, Duck Creek, Grassy Creek and Otter Creek. This area contains a mix of agricultural, commercial, industrial and residential land uses. The agricultural lands exist primarily in the eastern portion of this subregion. The most predominant soil types in the Urban Subregion are Urban Lands (Ur), Udorthents (Uo), Latty (LdA) and Hoytville (HgA). Streams in this subregion tend to be low-gradient systems that have some history of channelization, with some streams regularly maintained to promote storm water and some agricultural drainage. Riparian corridors tend to be narrow and lack a buffer of natural herbaceous or woody vegetation. Historically, much of this area had wetlands that have been filled or drained for development and agricultural purposes.

South and east of the Urban Subregion is the Agricultural Subregion, which is the largest subregion in the study area. The largest streams in this subregion consist of Ayers Creek, Cedar Creek, Crane Creek, Henry Creek, Packer Creek, Turtle Creek and Toussaint Creek. Soils in this subregion consist predominantly of Hoytville (HvA & Hy), Nappanee (NpA) and Toledo (To). Most of these soils are somewhat poorly drained to poorly drained, with high amounts of silt and clay material. Agriculture is the dominant land use in this subregion, but some small areas of commercial, industrial and residential development exist. The towns of Curtice, Genoa, Graytown, Luckey, Milbury and the northern portion of Bowling Green are in this subregion.

The Coastal Subregion is at the downstream or northeastern portion of the study area. In this subregion the gradient is very low, and the flow can be negligible at times because sections of the streams become *lacustrary*, which means the level and flow is often controlled by Lake Erie. Some of the streams are bordered on one or both sides by large earthen berms that were constructed to maintain water levels for large public and private marsh complexes. As sections of the streams widen out before emptying into Maumee Bay or western basin of Lake Erie, public and private marinas, yacht clubs and boat clubs are prevalent.

Soils in the Coastal Subregion are very poorly drained and primarily clay or silty clay loam. The soils here are dominated by Nappanee (NpA), Latty (Lc) and Toledo (To & Tp) soil types. Most of the land in this subregion is very close to the Ordinary High Water Mark (OHWM) elevation of Lake Erie (575 feet above sea level [USGS]), which makes draining these lands for agriculture very difficult. Often, farmers employ electric or gas pumps to pull water off their fields, so that they can be used for agricultural purposes.

For well over 100 years, the watersheds in the eastern portion of the Maumee AOC have experienced numerous alterations that have affected the physical, chemical and biological properties of the mainstems and their tributaries. The ditching and tiling of agricultural land throughout most of this area, combined with increased development in the western portion has caused flow regimes to become flashier in these watersheds. This rapid increase and decrease of flow in the streams has caused some erosion in the upper reaches of the watersheds. The high amount of field tiling in the middle and lower portion of the watersheds has resulted in high turbidity, increased sediment input and deposition. Removal of streamside vegetation has contributed to the problem of increased erosion and caused an increase in the temperature of waters and reduced oxygen concentrations. These changes have resulted in the presence of aquatic macroinvertebrates and fish species that are more tolerant to these types of affected environmental conditions.



Map of the 18 selected sites for concept plan development.

Below is a comparative matrix of all the sites in the *Wetland and Riparian Inventory and Restoration Plans for the Eastern Watersheds of the Maumee Area of Concern* (2012). Each site is listed in the order it appears in the full report. The full report includes detailed information, concept plans and rough cost estimates for each site. This *Summary Inventory Report* only includes basic background information about the site and a cost estimate. Please refer to the full report for more details.

Site	Wetland Restoration (acres)	Wetland Enhancement (acres)	Native upland Enhancement (acres)	Riparian buffer Enhancement (acres)	Streambank Enhancement (linear feet)	In-stream Enhancement (linear feet)	Estimated cost
2	1.29	0.11	0.49	-	176	690	\$221,500
5	21.01	-	9.96	3.72	1,652	1652	\$704,000
11	19.96	-	27.00	-	2,167	-	\$540,000
12	21.00	2.50	6.00	5.00	2,693	-	\$846,000
21	36.00	0.14	15.00	13.75	-	3,071	\$1,022,000
22	-	-	-	2.30	-	150	\$386,000
28	114.60	17.61	14.10	-	-	-	\$3,853,000
17	22.00	-	9.85	1.08	-	-	\$835,000
18	72.49	-	20.11	8.30	-	-	\$2,898,000
24	11.35	3.11	-	4.55	1,708	3,116	\$511,000
6	20.82	0.69	-	6.78	-	60	\$320,000
15	212.22	57.80	-	28.00	3,976	-	\$4,742,000
16	4.47	1.63	1.86	11.40	-	60	\$415,000
23	3.00	0.45	-	2.30	-	-	\$142,000
26	13.87	16.26	15.81	11.25	-	75	\$845,000
27	62.50	0.87	6.79	2.15	-	-	\$2,684,000
30	47.36	1.50	-	-	-	-	\$1,614,000
29	24.62	2.50	10.69	3.10	1,400	-	\$432,000
Totals	708.56	105.17	137.66	103.68	13,772	8,874	\$23,010,500

Urban
 Agricultural
 Coastal

Stream and Non-Isolated Wetland Restoration

Site 2 Background Information

Project Description:

Restore 1.29 acres of palustrine wetland on hydric soil
 Create 0.49 acre of native upland habitat
 Enhance 0.11 acre of Category 2 wetland
 Enhance 176 feet of large stream channel
 Create 690 feet of large stream channel

Potential Measurable Improvements:

Increase in the QHEI score by 10 to 15 points
 Increase flood retention in floodplain
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetland Restoration and Enhancement
 Medium and Large Stream Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 6.39 sq. mi.

Location: 83° 27' 9.38" W, 41° 39' 0.13" N

12 Digit Watershed: Otter Creek-Frontal Lake Erie (041000100702)

Stream buffers: Narrow, low (tree lawn)

Gradient (% Slope): 1.3

County: Lucas

Stream: Otter Creek (QHEI = 32.5)

Wetland: 1 forested (ORAM = 43.5)

Surrounding land use: Residential

Ownership: City of Oregon



Ditch flowing after a heavy rain

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$33,000
Total wetland restoration		\$13,000
• Materials only	\$3,000	
• Excavation only	\$4,000	
• Labor	\$6,000	
Stream restoration		\$145,000
Total upland restoration		\$500
• Materials only	\$250	
• Labor	\$250	
Monitoring (*This is an average cost for a 5-year period)		\$30,000*
Total estimated cost		\$221,500

Stream and Non-Isolated Wetland Restoration

Site 5 Background Information

Project Description:

Restore 21.01 acres of palustrine wetland on hydric soil

Restore 3.72 acres of riparian buffer

Enhance 2.94 acres of stream bank

Enhance 1,652 feet of stream channel

Enhance 9.96 acres of upland habitat

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 12 points

Increase flood retention in floodplain

Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement

Forested Wetland Restoration and Enhancement

Historically Channelized Waterways Restoration and Enhancement

Riparian Area Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #6: Degradation of benthos

BUI #14: Loss of fish and wildlife habitat

Drainage Area: 1.97 sq. mi.

County: Lucas



Stretch of ditch in the northern QHEI after heavy

Location: 83° 29' 32.09" W 41° 38' 28.37" N

Stream: Amlosch Ditch (QHEI = 21.25, 24)

12 Digit Watershed: Otter Creek-Frontal Lake Erie
(041000100706)

Wetland: None

Stream buffers: Narrow agricultural

Surrounding land use: Row crop in area

Gradient (% Slope): 0

Ownership: City of Oregon

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$114,000
Total wetland restoration		\$270,000
• Materials only	\$70,000	
• Excavation only	\$102,000	
• Labor	\$98,000	
Stream restoration		\$180,000
Total riparian restoration		\$90,000
• Materials only	\$28,000	
• Labor	\$62,000	
Total upland restoration		\$10,000
• Materials only	\$5,000	
• Labor	\$5,000	
Monitoring (*This is an average cost for a 5-year period)		\$40,000*
Total estimated cost		\$704,000

Stream and Non-Isolated Wetland Restoration

Site 11 Background Information

Project Description:

Restore 20 acres of palustrine wetland on hydric soil
 Improve 2,167 feet of stream bank
 Enhance 27 acres of upland grassland

Potential Measurable Improvements:

Increase in the QHEI score by 6 to 9 points
 Increase upland habitat for wildlife
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetland Restoration and Enhancement
 Historically Channelized Waterways Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 4.75 sq. mi.

County: Wood

Location: 83° 30' 21.09" W 41° 31' 27.37" N

Stream: Henry Creek (QHEI = 48.5)

12 Digit Watershed: Crane Creek-Frontal Lake Erie (041000100702)

Wetland: None

Stream buffers: Narrow, low to moderate (old field, agricultural)

Surrounding land use: Row crop

Gradient (% Slope): 0.2

Ownership: Ohio Department of Natural Resources



Brome-goldenrod dominated upland meadow



Henry Creek facing northeast (upstream) in the restoration site

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$90,000
Total wetland restoration		\$240,000
• Materials only	\$53,000	
• Excavation only	\$73,000	
• Labor	\$114,000	
Stream restoration		\$170,000
Monitoring (*This is an average cost for a 5-year period)		\$40,000*
Total estimated cost		\$540,000

Stream and Non-Isolated Wetland Restoration

Site 12 Background Information

Project Description:

Restore 5 acres of riparian buffer
 Create 21 acres of palustrine wetland on hydric soil
 Preserve 2.5 acres of palustrine wetland
 Improve 2,693 feet of stream bank
 Enhance 6 acres of upland grassland

Potential Measurable Improvements:

Increase in the QHEI score by 6 to 9 points and increase upland habitat
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetland Restoration and Enhancement
 Historically Channelized Waterways Restoration and Enhancement
 Riparian Area Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 4.75 sq. mi.

County: Wood

Location: 83°29' 14.00" W 41°31' 38.39" N



Wetland 2 facing north

Stream: Henry Creek (QHEI = 47)

12 Digit Watershed: Crane Creek-Frontal Lake Erie
 (041000100702)

Wetland: 2 emergent and forested (ORAM = 32 and 53)

Stream buffers: Narrow, low to moderate (new field, agricultural, forest)

Surrounding land use: Row crop, forest and residential

Gradient (% Slope): 0.8

Ownership: Private

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$136,000
Total wetland restoration		\$340,000
• Materials only	\$81,000	
• Excavation only	\$121,000	
• Labor	\$138,000	
Stream restoration		\$190,000
Total riparian restoration		\$130,000
• Materials only	\$40,000	
• Labor	\$90,000	
Total upland restoration		\$5,000
• Materials only	\$3,000	
• Labor	\$2,000	
Monitoring <i>(*This is an average cost for a 5-year period)</i>		\$45,000*
Total estimated cost		\$846,000

Stream, Riparian and Wetland Restoration

Site 21 Background Information

Project Description:

Restore 36 acres of palustrine forest on hydric soil
 Create 13.75 acres of riparian corridor
 Improve 3,071 feet of stream channel
 Create 15 acres of upland wildlife habitat
 Enhance 0.14 acres of palustrine wetland

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 10 points
 Increase flood retention on the site
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetland Restoration and Enhancement
 Medium and Large Stream Restoration and Enhancement
 Riparian Area Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 9.1 sq. mi.

County: Ottawa

Location: 83° 20' 3.32" W 41° 34' 50.14" N



Buffer along the south side of the creek

Stream: North Branch of Turtle Creek (QHEI = 39 and 42.5)

12 Digit Watershed: Turtle Creek-Frontal Lake Erie
 (041000100701)

Wetland: 2 emergent (ORAM = 31.5 and 42.5)

Stream buffers: Narrow, low (agricultural) with small forested area

Surrounding land use: Row crop in area of enhancement

Gradient (% Slope): 1.1

Ownership: Private

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$167,000
Total wetland restoration		\$340,000
• Materials only	\$99,000	
• Excavation only	\$83,000	
• Labor	\$158,000	
Stream restoration		\$119,000
Total riparian restoration		\$340,000
• Materials only	\$102,000	
• Labor	\$238,000	
Total upland restoration		\$16,000
• Materials only	\$10,000	
• Labor	\$6,000	
Monitoring (<i>*This is an average cost for a 5-year period</i>)		\$40,000*
Total estimated cost		\$1,022,000

Site 22

Stream and Riparian Restoration

Turtle Creek

Site 22 Background Information

Project Description:

Restore/Enhance 150 feet of medium stream channel
Create 2.3 acres of riparian buffer

Potential Measurable Improvements:

Increase in the QHEI score by 6 to 10 points
Increase in the IBI score by 4 to 6 points
Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Riparian Area Restoration and Enhancement
Medium and Large Stream Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 24 sq. mi.

County: Ottawa

Location: 83°17' 41.72" W 41°34' 54.22" N

Stream: Turtle Creek (QHEI = 31)

12 Digit Watershed: Turtle Creek-Frontal Lake Erie (041000100701)

Wetland: 1 forested (ORAM = 44)

Stream buffers: Narrow on left bank, wide buffer on right bank

Surrounding land use: Row crop, forest

Gradient (% Slope): 0.9

Ownership: Private



View of Turtle Creek and the narrow buffer on the west bank

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$26,000
Stream restoration		\$33,000
Total riparian restoration		\$71,000
Monitoring <i>(*This is an average cost for a 5-year period)</i>		\$30,000*
Total estimated cost		\$160,000

Site 28

Coastal Wetland Restoration

Turtle Creek-Frontal Lake Erie

Site 28 Background Information

Project Description:

Restore approximately 115 acres of coastal wetland
Creation of 14 acres of upland buffer
Enhance 17.61 acres of emergent & scrub/shrub wetlands

Potential Measurable Improvements:

Increase in the ORAM score by 15 to 20 points
Increase FQAI scores
Increase upland habitat for wildlife

General Restoration/Enhancement Concept:

Coastal Emergent Wetlands Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #14: Loss of fish and wildlife habitat

Drainage Area: None

County: Ottawa

Location: 83°8' 31.06" W 41°35' 56.19" N

Stream: None

12 Digit Watershed: Turtle Creek-Frontal Lake Erie (041000100701)

Wetland: 5 emergent (ORAM = 18.5, 26.5, 28, 25, 18.5)

Stream buffers: None

Surrounding land use: Row crop, small scrub/shrub forest fringe

Gradient (% Slope): 0

Ownership: Private



View of the wetland in the southwest corner of the site

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$639,000
Total wetland restoration		\$3,163,000
• Materials only	\$419,000	
• Excavation only	\$2,462,000	
• Labor	\$282,000	
Total upland restoration		\$11,000
• Materials only	\$7,000	
• Labor	\$4,000	
Monitoring (*This is an average cost for a 5-year period)		\$40,000*
Total estimated cost		\$3,853,000

Stream, Riparian and Wetland Restoration

Site 17 Background Information

Project Description:

Restore approximately 22 acres of Non-Coastal Emergent Wetland
 Create 1.08 acres of riparian buffer
 Create 9.85 acres of upland habitat and buffer

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 6 points
 Increase FQAI scores

General Restoration/Enhancement Concept:

Riparian Area Restoration and Enhancement
 Non-Coastal Emergent Wetland Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 24.3 sq. mi.

County: Ottawa

Location: 83°20' 29.95" W 41°31' 40.03" N

Stream: Packer Creek (QHEI = 56.5)

12 Digit Watershed: Packer Creek (041000100602)

Wetland: None

Stream buffers: Narrow on left bank, wide buffer on right bank

Surrounding land use: Row crop & narrow riparian forest buffer

Gradient (% Slope): 0

Ownership: Private



View of the existing buffer



View of Packer Creek

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$138,000
Total wetland restoration		\$632,000
• Materials only	\$107,000	
• Excavation only	\$220,000	
• Labor	\$305,000	
Total riparian restoration		\$27,000
• Materials only	\$8,000	
• Labor	\$19,000	
Total upland restoration		\$8,000
• Materials only	\$5,000	
• Labor	\$3,000	
Monitoring (*This is an average cost for a 5-year period)		\$30,000*
Total estimated cost		\$835,000

Site 18

Wetland and Riparian Restoration

Packer Creek

Site 18 Background Information

Project Description:

Restore approximately 72 acres of Non-Coastal Emergent Wetland
Restore approximately 20 acres of upland prairie habitat
Create 8.3 acres of riparian buffer

Potential Measurable Improvements:

Increase in the QHEI score by 4 to 6 points
Increase FQAI scores

General Restoration/Enhancement Concept:

Riparian Area Restoration and Enhancement
Non-Coastal Emergent Wetland Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 24.5 sq. mi.

County: Ottawa

Location: 83°20' 0.98" W 41°32' 6.62" N

Stream: Packer Creek (QHEI =56)

12 Digit Watershed: Packer Creek (041000100602)

Wetland: None

Stream buffers: Narrow on right and left bank

Surrounding land use: Row crop, forest

Gradient (% Slope): 0

Ownership: Private



View of the agriculture field



View of Packer Creek

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and Permitting		\$480,000
Total Wetland Restoration		\$2,159,000
• Materials only	\$428,000	
• Excavation only	\$785,000	
• Labor	\$946,000	
Total Riparian Restoration		\$203,000
• Materials only	\$61,000	
• Labor	\$142,000	
Total Upland Restoration		\$16,000
• Materials only	\$10,000	
• Labor	\$6,000	
Monitoring (*This is an average cost for a 5-year period)		\$40,000*
Total estimated cost		\$2,898,000

Stream, Riparian and Wetland Restoration

Site 24 Background Information

Project Description:

Restore 11 acres of palustrine wetland on hydric soil
 Preserve 1,599 feet of large stream channel
 Preserve 3.114 acres of Category 2 wetland
 Restore 1,926 feet of headwater stream channel
 Create 4.55 acres of riparian buffer
 Enhance 1,708 feet of headwater stream channel
 Restore 1,190 feet of large stream channel

Potential Measurable Improvements:

Increase in the QHEI score by 6 to 10 points
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetland Restoration and Enhancement
 Medium and Large Stream Restoration and Enhancement
 Riparian Area Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 32.1 sq. mi.

County: Ottawa

Location: 83°16' 13.15" W 41°33' 59.61" N



Agricultural field north of Packer Creek- Restoration area for streamside wetlands

Stream: Packer Creek (QHEI = 47.5)

Unnamed Tributary to Packer Creek (QHEI = 27)

12 Digit Watershed: Packer Creek (041000100602)

Wetland: 12 forested (ORAM = 54, 54, 37, 37, 33, 37, 37, 45, 45, 45, 50, 50)

Stream buffers: Narrow, low (agricultural) some forested

Surrounding land use: Row crop in area of enhancement

Gradient (% Slope): 1.3

Ownership: Private

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and Permitting		\$80,000
Total Wetland Restoration		\$169,000
• Materials only	\$44,000	
• Excavation only	\$66,000	
• Labor	\$59,000	
Stream Restoration		\$110,000
Total Riparian Restoration		\$112,000
• Materials only	\$34,000	
• Labor	\$78,000	
Monitoring (*This is an average cost for a 5-year period)		\$40,000*
Total estimated cost		\$511,000

Stream, Riparian and Wetland Restoration

Site 6 Background Information

Project Description:

Create/Restore 20.82 acres of palustrine wetland on hydric soil
 Create 6.78 acres of riparian buffer
 Enhance 0.69 acre of emergent wetland
 Enhance 60 linear feet of stream

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 10 points
 Increase ORAM score by 25 to 30 points
 Increase IBI score by 3 to 4 points
 Increase FQAI scores

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
 Riparian Area Restoration and Enhancement
 Historically Channelized Waterway Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 3.02 sq. mi.

Location: 83°38' 12.86" W 41°24' 11.07" N

12 Digit Watershed: Upper Toussaint Creek (041000100601)

Stream buffers: Narrow on right bank, some on left bank

Gradient (% Slope): 0

County: Wood

Stream: Toussaint Creek (QHEI = 36)

Wetland: 1 emergent (ORAM = 13)

Surrounding land use: Agricultural

Ownership: Private



Emergent wetland in agricultural field at Site 6

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$50,000
Total wetland restoration		\$170,000
• Materials only	\$53,000	
• Excavation only	\$52,000	
• Labor	\$65,000	
Stream restoration		\$60,000
Total upland restoration		\$10,000
• Materials only	\$3,400	
• Labor	\$6,600	
Monitoring (*This is an average cost for a 5-year period)		\$30,000*
Total estimated cost		\$320,000

Stream and Non-Isolated Wetland Restoration

Site 15 Background Information

Project Description:

Restore 28 acres of riparian buffer

Restore 212 acres of palustrine forest and emergent wetlands on hydric soil

Preserve 57 acres of Category 2 and 3 forested wetland

Enhance up to 3,976 lineal feet of stream channel

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 10 points

Increase flood retention on the site

Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement

Forested Wetland Restoration and Enhancement

Medium and Large Stream Restoration and Enhancement



Wetlands at Site 15

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #14: Loss of fish and wildlife habitat

Drainage Area: 39.3 sq. mi.

Location: 83° 27' 40.87" W 41° 28' 28.29" N

12 Digit Watershed: Upper Toussaint Creek (041000100601)

Stream buffers: Medium, low (agricultural) some forested areas

Surrounding land use: Row crop in area of enhancement

Gradient 9% Slope): 0.5

County: Wood

Stream: Toussaint River (QHEI = 44.25)

Wetland: 3 forested (ORAM = 76, 54, 76)

Ownership: Private

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$820,000
Total wetland restoration		\$3,400,000
• Materials only	\$705,000	
• Excavation only	\$71,000	
• Labor	\$2,624,000	
Stream restoration		\$190,000
Total riparian restoration		\$282,000
• Materials only	\$206,000	
• Labor	\$76,000	
Monitoring (*This is an average cost for a 5-year period)		\$50,000*
Total estimated cost		\$4,742,000

Stream, Riparian and Wetland Restoration

Site 16 Background Information

Project Description:

Restore 4.47 acres of emergent wetland
 Create 11.4 acres of riparian buffer
 Restore 1.86 acres of native upland
 In-stream enhancement of 60 linear feet
 Enhance 1.63 acres of wetlands

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 8 points
 Increase in the ORAM score by 8 to 12 points
 Increase flood retention on the site
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Riparian Area Restoration and Enhancement
 Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetlands Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 45 sq. mi.

County: Wood

Location: 83°25' 27.49" W 41°28' 14.68" N

Stream: Toussaint Creek (QHEI = 47)

12 Digit Watershed: Upper Toussaint Creek (041000100601)

Wetland: 4 emergent & forested (ORAM = 32, 18.5, 37, 35. 5)

Stream buffers: Vary between wide and narrow on both bank

Surrounding land use: Row crop, forest

Gradient (% Slope): 0.7-1.6

Ownership: Private



View of the existing emergent wetland

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$68,000
Total wetland restoration		\$18,000
• Materials only	\$6,000	
• Excavation only	\$11,000	
• Labor	\$1,000	
Stream restoration		\$19,000
Total riparian restoration		\$279,000
• Materials only	\$84,000	
• Labor	\$195,000	
Total upland restoration		\$1,000
• Materials only	\$900	
• Labor	\$100	
Monitoring (*This is an average cost for a 5-year period)		\$30,000*
Total estimated cost		\$415,000

Stream, Riparian and Wetland Restoration

Site 23 Background Information

Project Description:

Restore 3 acres of palustrine forest on hydric soil
Expand 2.3 acres (1,650 feet) of riparian corridor
Enhance 0.45 acre of existing wetlands

Potential Measurable Improvements:

Increase in the QHEI score by 3 to 5 points
Increase flood retention on the site

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
Forested Wetland Restoration and Enhancement
Medium and Large Stream Restoration and Enhancement
Riparian Area Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of benthos
BUI #14: Loss of fish and wildlife habitat

Drainage Area: 72 sq. mi.

County: Ottawa

Location: 83°16' 51.16" W 41°32'14.22" N

Stream: Toussaint Creek (QHEI = 50)

12 Digit Watershed: Upper Toussaint Creek (041000100601)

Wetland: 5 emergent and forested (ORAM = 42, 42, 42, 42, 42)

Stream buffers: Narrow, forested corridor and old field

Surrounding land use: Row crop with little residential

Gradient (% Slope): 3

Ownership: Private



Eastern portion of the field; Toussaint Creek is in the background in a forested corridor



Wetland edge to Toussaint Creek

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$22,000
Total wetland restoration		\$31,000
• Materials only	\$9,000	
• Excavation only	\$10,000	
• Labor	\$12,000	
Total riparian restoration		\$59,000
• Materials only	\$18,000	
• Labor	\$41,000	
Monitoring (*This is an average cost for a 5-year period)		\$30,000*
Total estimated cost		\$142,000

Stream, Riparian and Wetland Restoration

Site 26 Background Information

Project Description:

Enhance 2.13 acres of emergent wetland
 Restore 7.42 acres of emergent wetland
 Enhance 14.13 acres of forested wetland
 Restore 6.45 acres of forested wetland
 Create 11.25 acres of riparian buffer
 Enhance 15.81 acres of upland habitat
 In-stream enhancement of 75 linear feet

Potential Measurable Improvements:

Increase in the QHEI score by 4 to 6 points
 Increase in the ORAM score by 10 to 15 points & FQAI scores
 Increase in quality of fish and macroinvertebrate communities

General Restoration/Enhancement Concept:

Riparian Area Restoration and Enhancement
 Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetlands Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 80.4 sq. mi.



View of a linear wetland in the floodplain area

County: Ottawa

Location: 83°12' 25.70" W 41°33' 2.44" N

Stream: Toussaint Creek (QHEI = 49, 51, 52.5)

12 Digit Watershed: Lower Toussaint Creek
 (041000100603)

Wetland: 6 emergent, forested and scrub/shrub
 (ORAM = 31.5, 27, 28, 44, 47, 20)

Stream buffers: size varies on both banks

Surrounding land use: Row crop, forest, old field

Gradient (% Slope): 1.8

Ownership: Private

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$136,000
Total wetland restoration		\$361,000
• Materials only	\$102,000	
• Excavation only	\$176,000	
• Labor	\$83,000	
Stream restoration		\$9,000
Total riparian restoration		\$276,000
• Materials only	\$83,000	
• Labor	\$193,000	
Total upland restoration		\$13,000
• Materials only	\$8,000	
• Labor	\$5,000	
Monitoring (*This is an average cost for a 5-year period)		\$50,000*
Total estimated cost		\$845,000

Coastal and Forested Wetland Restoration

Site 27 Background Information

Project Description:

Restore 60 acres of coastal wetland
 Restore 1.66 acres of forested wetland
 Enhance 0.87 acre forested wetland
 Create 6.79 acres of upland habitat
 Create 2.15 acres of riparian buffer

Potential Measurable Improvements:

Increase in the QHEI score by 3 to 5 points
 Increase in the ORAM score by 20 to 25 points & FQAI scores
 Increase upland habitat for wildlife

General Restoration/Enhancement Concept:

Forested Wetlands Restoration and Enhancement
 Coastal Emergent Wetland Restoration and Enhancement
 Riparian Area Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.05 sq. mile **County:** Ottawa

Location: 83°09' 35.28" W 41°34' 20.52" N

Stream: Unnamed headwater stream (QHEI = 31)

12 Digit Watershed: Lower Toussaint Creek (041000100603)

Wetland: 1 forested (ORAM = 35)

Stream buffers: None

Surrounding land use: Row crop, small wetland/upland forest

Gradient (% Slope): 0.4

Ownership: Private



View of a narrow buffer along headwater stream

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$444,000
Total wetland restoration		\$2,193,000
• Materials only	\$299,000	
• Excavation only	\$1,700,000	
• Labor	\$194,000	
Total upland restoration		\$7,000
• Materials only	\$4,000	
• Labor	\$3,000	
Monitoring (<i>*This is an average cost for a 5-year period</i>)		\$40,000*
Total estimated cost		\$2,684,000

Site 30

Coastal Wetland Restoration

Toussaint River

Site 30 Background Information

Project Description:

Restore 47 acres of coastal wetlands

Enhance 1.50 acres of emergent wetlands

Potential Measurable Improvements:

Increase in the ORAM score by 20 to 30 points

Increase upland habitat for wildlife

General Restoration/Enhancement Concept:

Coastal Emergent Wetlands Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #14: Loss of fish and wildlife habitat

Drainage Area: 0.81 sq. mile

County: Ottawa

Location: 83°6' 6.21" W 41°34' 44.44"N

Stream: None

12 Digit Watershed: Lower Toussaint Creek (041000100603)

Wetland: 2 emergent (ORAM = 20.5, 20.5)

Stream buffers: None

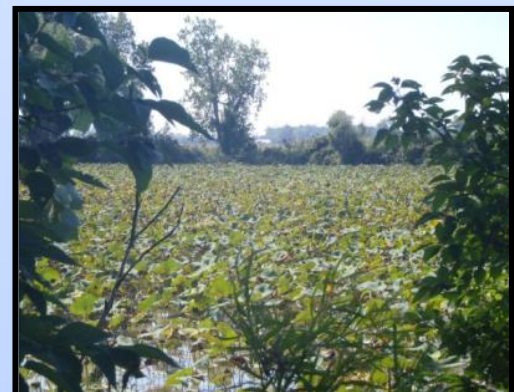
Surrounding land use: Row crop, small scrub/shrub forest fringe

Gradient (% Slope): 0.2

Ownership: Private



View of the wetland fringe and agricultural field at Site 30



View of a large area of Nelumbo lutea in the coastal wetland along Toussaint River adjacent to Site 30

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$267,000
Total wetland restoration		\$1,312,000
• Materials only	\$180,000	
• Excavation only	\$1,005,000	
• Labor	\$127,000	
Monitoring (*This is an average cost for a 5-year period)		\$35,000*
Total estimated cost		\$1,614,000

Stream, Riparian and Wetland Restoration

Site 29 Background Information

Project Description:

Restore 25 acres of emergent wetland on hydric soil
 Restore 10 acres of native uplands
 Preserve 2-3 acres of Category 2 wetland
 Enhance 1,400 feet of headwater stream channel
 Create 3.1 acres of riparian corridor

Potential Measurable Improvements:

Increase in the QHEI score by 5 to 10 points
 Increase flood retention on the site

General Restoration/Enhancement Concept:

Non-Coastal Emergent Wetland Restoration and Enhancement
 Forested Wetland Restoration and Enhancement
 Historically Channelized Waterway Restoration and Enhancement
 Riparian Area Restoration and Enhancement

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
 BUI #6: Degradation of benthos
 BUI #14: Loss of fish and wildlife habitat

Drainage Area: 5.91 sq. mi.

County: Ottawa

Location: 83°8'17.18" W 41°33'19.99" N

Stream: Rusha Creek (QHEI = 30)

12 Digit Watershed: Lower Toussaint Creek (041000100603)

Wetland: 1 forested (ORAM = 41)

Stream buffers: Narrow, agricultural



Vegetated channel of Rusha Creek facing



Idle agricultural field west of the woodlot

Surrounding land use: Row crop

Gradient (% Slope): 0.3

Ownership: Private

Estimated cost summary in 2012		
Project	Itemized cost	Estimated total cost
Design and permitting		\$71,000
Total wetland restoration		\$156,000
• Materials only	\$50,000	
• Excavation only	\$7,000	
• Labor	\$99,000	
Stream restoration		\$167,000
Total upland restoration		\$8,000
• Materials only	\$5,000	
• Labor	\$3,000	
Monitoring (*This is an average cost for a 5-year period)		\$30,000*
Total estimated cost		\$432,000

Potential Restoration Sites on Public and Protected Lands

PUBLIC AND PROTECTED LANDS

This section includes information identified on potential restoration projects by Maumee RAP partners. Most of these project sites/areas were excluded from the studies that developed the *Inventory Reports* (highlighted in previous section) because of the ongoing efforts of other organizations to focus on them. Although these sites were mostly excluded from being selected as a specific site for the inventories, they were considered in the selection of the *Inventory Report* sites. It was important in the development of the *Inventory Reports* to select sites that would make the biggest progress toward delisting. It was recognized that site connectivity, habitat type, flyway corridors, etc. were important factors in consideration of those that were selected. The *Summary Inventory Report* is intended to capture restoration projects that are needed in the Maumee AOC for the removal of population, benthos, and habitat BUIs. It would be remiss if it did not include these critically needed, high priority sites; many of which are on public and/or already protected lands. There are some private lands identified in this section that are proposed for acquisition (and then restoration), so they will/can become public and protected lands.

All sites listed in this section are within the boundaries of the Maumee AOC. Several of them have received letters of recommendation/support from the Maumee RAP, Partners for Clean Streams, and/or the Ohio EPA as projects that will lead toward BUI removal.

Below is a comparative matrix of potential projects on public and protected lands. These projects have been identified by Maumee RAP partners and are recognized as projects that will make progress toward achieving the restoration targets for populations, benthos and habitat BUIs. This *Summary Inventory Report* only includes a brief description of the project, BUIs that will be addressed, location, cost estimates and project leaders. For additional information contact Ohio EPA Maumee RAP Coordinator for project leader contact information.

Site	Land Acquisition (acres)	Wetland Restoration (acres)	Wetland Enhancement (acres)	Native upland Enhancement (acres)	Riparian buffer Enhancement (acres)	Streambank Enhancement (linear feet)	In-stream/Ditch Enhancement (linear feet)	Estimated cost
PL-1	-	-	231	-	-	-	-	\$85,000
PL-2	-	-	135	-	-	-	-	\$450,000
PL-3	88	70	-	-	-	-	-	\$1,100,000
PL-4	-	-	600	-	-	-	-	\$750,000
PL-5	-	830	-	150	-	13,200	-	\$4,250,000
PL-6	50	-	-	-	-	-	-	\$700,000
PL-7	-	-	40	-	-	-	-	\$30,000
PL-8	-	-	350	-	-	-	-	\$1,000,000
PL-9	-	-	-	-	-	-	1500	\$100,000
PL-10	-	-	-	-	-	-	1100	\$100,000
PL-11	-	-	-	100	-	-	-	\$250,000
PL-12	276	276	-	-	-	-	4000	\$2,500,000
PL-13	-	-	-	-	-	-	10,560	\$1,800,000
PL-14	457	273	-	194	-	-	-	\$3,200,000
Totals	871	1449	1356	444	0	13,200	17,160	\$16,315,000

PL-1 Wetland Enhancement

Lower Toussaint Creek



Project Description:

Enhance 231 acres of wetlands by replacing seven small (18"-24") water conveyance structures [Toussaint Wildlife Area]

Potential Measurable Improvements:

Increase in the ORAM

Increase upland habitat for wildlife

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #14: Loss of fish and wildlife habitat

County: Ottawa

Location: 83° 9'25.26"W 41°34'44.47"N

12 Digit Watershed: Lower Toussaint Creek (041000100603)

Ownership: Private club

Estimated Cost: \$85,000

Project Lead(s): Ohio Department of Natural Resources Division of Wildlife

PL-2 Wetland Enhancement

Wolf Creek



Project Description:

Enhance 135 acres of coastal wetlands by repairing failed water conveyance infrastructures [Cedar Point-Pool 2]

Potential Measurable Improvements:

Increase in the ORAM score

Increase upland habitat for wildlife

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: 83°17'46.52"W 41°40'28.54"N

12 Digit Watershed: Wolf Creek-Frontal Lake Erie (041000100704)

Ownership: US F&WS-Ottawa National Wildlife Refuge

Estimated Cost: \$450,000

Project Lead(s): US Fish & Wildlife Service, Ducks Unlimited and The Nature Conservancy

PL-3

Wetland Acquisition & Restoration

Lower Toussaint Creek



Project Description:

Acquire 88 acres on Toussaint River and restore 70 acres of coastal (riparian) wetland [Devgall site]

Potential Measurable Improvements:

Increase in the ORAM score
Increase upland habitat for wildlife
Reduce sediment and nutrient loading to river

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #14: Loss of fish and wildlife habitat

County: Ottawa

Location: 83° 7'16.33"W 41°34'58.52"N

12 Digit Watershed: Lower Toussaint Creek (041000100603)

Ownership: Private

Estimated Cost: \$450,000 (acquisition), \$650,000 (restoration)

Project Lead(s): US Fish & Wildlife Service, Ducks Unlimited and The Nature Conservancy

PL-4

Wetland Enhancement and Reconnection

Lower Toussaint Creek



Project Description:

Restore Lake Erie connection to ~600-acre impounded marsh to re-establish Lake Erie hydrology and fish passage [Navarre Marsh]

Potential Measurable Improvements:

Increase in the ORAM & IBI scores
Increase upland habitat for wildlife
Increase in quality of fish and macroinvertebrate communities

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of Benthos
BUI #14: Loss of fish and wildlife habitat

County: Ottawa

Location: 83° 4'29.89"W 41°35'31.39"N

12 Digit Watershed: Lower Toussaint Creek (041000100603)

Ownership: US F&WS-Ottawa National Wildlife Refuge

Estimated Cost: \$750,000

Project Lead(s): US Fish & Wildlife Service, Ducks Unlimited and The Nature Conservancy

PL-5
Stream and Riparian
Restoration and
Wetland
Reconnection
Cedar Creek



Project Description:

Restore the 987-acres (currently farmed) and reconnect to Lake Erie; restore 2.5 linear miles of natural stream channel, 830 acres of coastal wetland, 150 acres native uplands and install a fish passage structure [Howard Farms]

Potential Measurable Improvements:

Increase in the ORAM, QHEI and IBI scores
Increase upland habitat for wildlife

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of Benthos
BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: 83°15'48.27"W 41°38'53.27"N

12 Digit Watershed: Cedar Creek-Frontal Lake Erie (041000100703)

Ownership: Metroparks of the Toledo Area

Estimated Cost: \$4,250,000 (\$2,000,000 already secured)

Project Lead(s): Metroparks of the Toledo Area and Ducks Unlimited

PL-6
Stream and
Floodplain
Acquisition
Tenmile Creek

Photo not available

Project Description:

50 acre farm in Tenmile Creek floodplain bordered by drainage ditch, in Oak Openings Region, Century Farm with house and barn [Lloyd Homestead]

Potential Measurable Improvements:

Increase flood retention in floodplain
Increase upland habitat for wildlife

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of Benthos
BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: available upon request

12 Digit Watershed: Tenmile Creek (041000010306)

Ownership: Private

Estimated Cost: \$700,000

Project Lead(s): The Olander Parks System

PL-7
Wetland
Enhancement

Turtle Creek

Photo not available

Project Description:

Enhance 40 acres by raising periphery contours and addition of water control structure for more wetland management flexibility [Boss Tract]

Potential Measurable Improvements:

Increase in the ORAM score

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: 83°11'7.03"W 41°35'53.94"N

12 Digit Watershed: Turtle Creek-Frontal Lake Erie (041000100701)

Ownership: US F&WS-Ottawa National Wildlife Refuge

Estimated Cost: \$30,000

Project Lead(s): The Nature Conservancy and Ducks Unlimited

PL-8
Wetland
Enhancement and
Reconnection

Crane Creek



Project Description:

Restoring ~350 acres of coastal marsh for hydrologic connectivity and fish passage [Ottawa NWR-Pool 1]

Potential Measurable Improvements:

Increase in the ORAM and IBI scores

Increase upland habitat for wildlife

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #6: Degradation of Benthos

BUI #14: Loss of fish and wildlife habitat

County: Ottawa

Location: 83°11'47.60"W 41°37'14.76"N

12 Digit Watershed: Crane Creek-Frontal Lake Erie (041000100702)

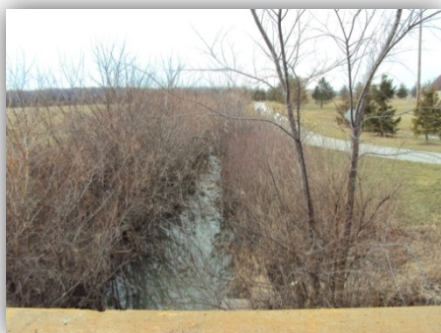
Ownership: US F&WS-Ottawa National Wildlife Refuge

Estimated Cost: \$1,000,000

Project Lead(s): US Fish & Wildlife Service, The Nature Conservancy and Ducks Unlimited

PL-9
Stream
Enhancement

Wolf Creek



Project Description:

Create 1500 feet of streambank stability through the adoption of a two stage channel design. Created floodplain benches will provide improved ecological function. [Wolf Creek Restoration Project (Phase 1)]

Potential Measurable Improvements:

Increase in the QHEI & IBI scores
Reduce sediment and nutrient loading to river
Increase in quality of fish and macroinvertebrate communities

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of Benthos
BUI #14: Loss of fish and wildlife habitat

County: Lucas **Location:** 83.419919W 41.647968N

12 Digit Watershed: Berger Ditch (041000100705)

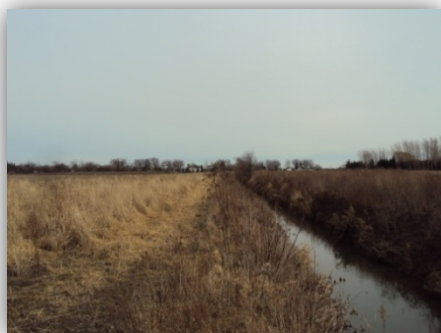
Ownership: City of Oregon

Estimated Cost: \$100,000

Project Lead(s): City of Oregon

PL-10
Stream
Enhancement

Wolf Creek



Project Description:

Create 1100 feet of streambank stability through the adoption of a two stage channel design. Created floodplain benches will provide improved ecological function. [Wolf Creek Restoration Project (Phase2)]

Potential Measurable Improvements:

Increase in the QHEI & IBI scores
Reduce sediment and nutrient loading to river
Increase in quality of fish and macroinvertebrate communities

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations
BUI #6: Degradation of Benthos
BUI #14: Loss of fish and wildlife habitat

County: Lucas **Location:** 83.419919W 41.647968N

12 Digit Watershed: Berger Ditch (041000100705)

Ownership: City of Oregon

Estimated Cost: \$100,000

Project Lead(s): City of Oregon

PL-11 Reforestation

Crane Creek

Photo not available

Project Description:

Approximately 100 acres of reforestation in one contiguous 33-acres block of Farm Unit #9 near Stange Road. The remainder of the 100 acres is scattered between Stange Rd and the Ottawa NWR Visitor's Center.

Potential Measurable Improvements:

Increase upland habitat for wildlife

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: available upon request

12 Digit Watershed: Crane Creek-Frontal Lake Erie (041000100702)

Ownership: US F&WS-Ottawa National Wildlife Refuge

Estimated Cost: \$250,000

Project Lead(s): US Fish & Wildlife Service, The Nature Conservancy and Ducks Unlimited

PL-12 Acquisition and Restoration

Swan Creek



Project Description:

Acquire a 276-acre tract of historic wet prairie (currently farmed) adjacent to TNC's Kitty Todd Preserve and restore it to Oak Openings wet prairie adjacent to 4000 feet of ditch being restored to a natural stream channel

Potential Measurable Improvements:

Increase in the ORAM, QHEI & IBI scores

Reduce sediment and nutrient loading to river

Increase in quality of fish and macroinvertebrate communities

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #6: Degradation of Benthos

BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: available upon request

12 Digit Watershed: Wolf Creek (041000090803)

Ownership: private

Estimated Cost: \$1,800,000 (acquisition) \$700,000 (restoration)

Project Lead(s): Metroparks of the Toledo Area

PL-13 Stream Restoration

Swan Creek

Photo not available

Project Description:

Restore natural stream function and aquatic habitat to 2 linear miles of channelized ditch

Potential Measurable Improvements:

Increase in the QHEI

Increase in the IBI scores

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #6: Degradation of Benthos

BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: 83.79W 41.64N

12 Digit Watershed: Wolf Creek (041000090803)

Ownership: Metroparks of the Toledo Area

Estimated Cost: \$1,800,000

Project Lead(s): Metroparks of the Toledo Area

PL-14 Acquisition and Restoration

Swan Creek



Project Description:

Acquire a 457-acre tract of land (including 273 acres of forested wetlands / uplands) and restore 194 acres of farmland to native Oak Openings habitat adjacent to 3,765-acre Oak Openings Preserve

Potential Measurable Improvements:

Increase in the ORAM score by 5 to 8 points

Increase upland habitat for wildlife

Beneficial Use Impairments (BUI) Addressed:

BUI #3: Degradation of fish and wildlife populations

BUI #14: Loss of fish and wildlife habitat

County: Lucas

Location: available upon request

12 Digit Watershed: Gale Run-Swan Creek (041000090703)

Ownership: private

Estimated Cost: \$2,800,000 (acquisition) \$400,000 (restoration)

Project Lead(s): Metroparks of the Toledo Area

