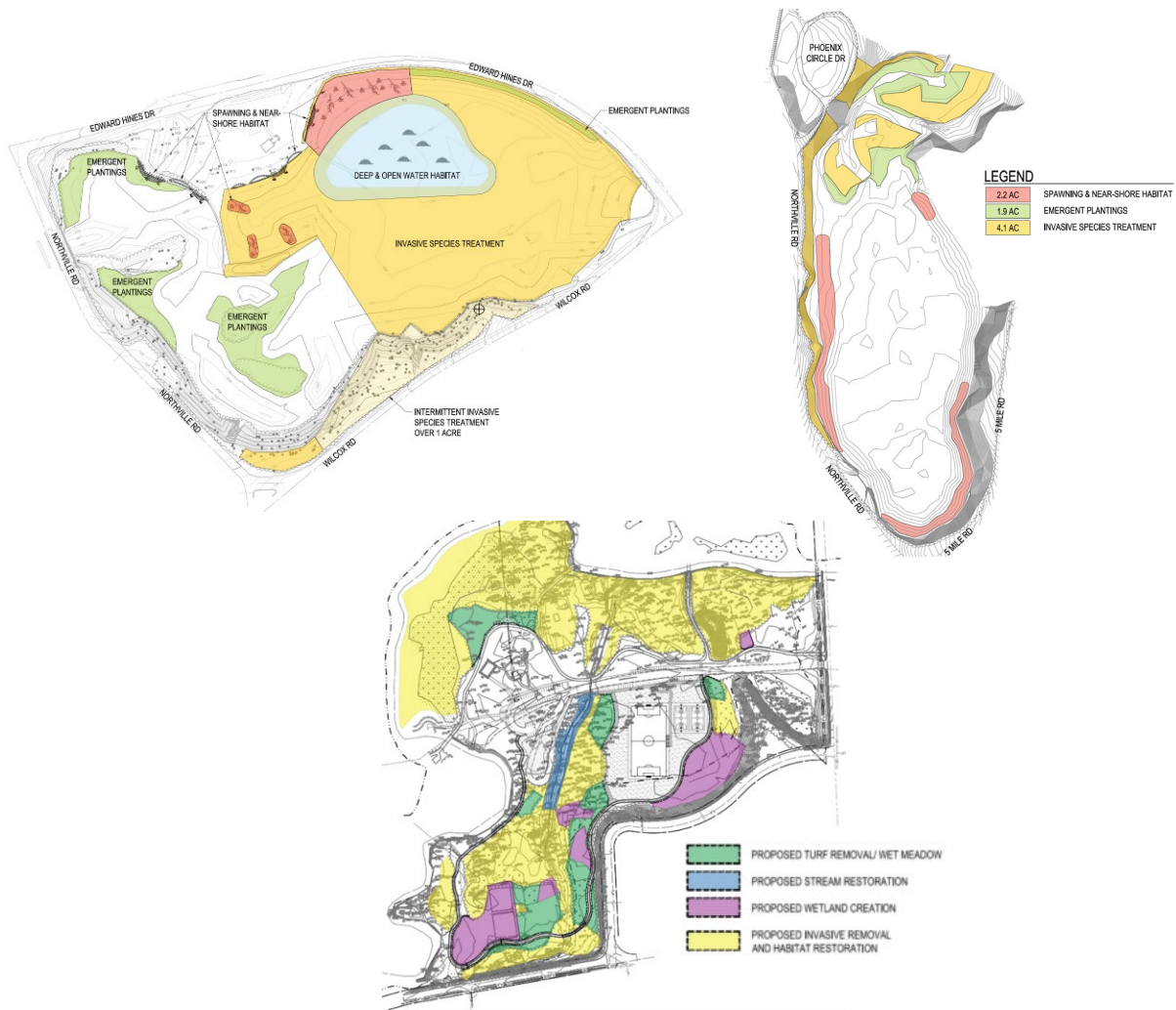


ROUGE RIVER AOC HABITAT DESIGN PROJECTS

US EPA GRANT: GL-00E02997

FINAL DESIGN REPORT

Wilcox Lake, Phoenix Lake, and Inkster Park



February 2024

ROUGE RIVER AOC HABITAT RESTORATION DESIGN PROJECTS

EPA Grant Number: GL-00E02997

Grantee: Alliance of Rouge Communities

Community Partners: Wayne County Parks

Award Amount: \$785,100.00

Project Location: Plymouth, Michigan (48170), Northville, Michigan (48168),
Inkster, Michigan (48141)
Wayne County
Congressional Districts: M6 and M12

Waterbody: Rouge River – Middle Branch, Rouge River – Lower Branch

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SUMMARY

The Alliance of Rouge Communities (ARC), using the \$785,100 Great Lakes Restoration Initiative (GLRI) grant from United States Environmental Protection Agency (USEPA), completed the design of habitat restoration at Wilcox Lake in Plymouth, Michigan; Phoenix Lake in Plymouth and Northville, Michigan; and Inkster Park in Inkster, Michigan. The purpose of these projects is to provide habitat features that will address three of the Beneficial Use Impairments (BUIs) associated with fish and wildlife habitat in the Rouge River, namely Degraded Fish and Wildlife Populations, Degradation of Benthos, and Loss of Fish and Wildlife Habitat. As a result, work towards delisting the Rouge River watershed as an Area of Concern (AOC) as designated by the Great Lakes Water Quality Agreement (GLWQA). The ARC engaged Environmental Consulting & Technology, Inc. (ECT) as the firm that would complete the design, permitting, and construction documents. A general history of the grant issuance and amendments is as follows:

- Grant issued 7/15/21
- Grant time extension – end date 9/30/23, approved 1/31/23

Wilcox Lake Habitat Restoration Summary

The Wilcox Lake project includes removal of sediments within Wilcox Lake to create more open water area, shallow water habitat, and over-wintering deep water habitat. New substrate including sandy gravel, cobbles, and boulders will provide spawning substrate, attachment points, and cover for fish, aquatic insects, and other aquatic fauna. Woody debris will be placed along the shoreline to provide cover for forage fish and spawning fish, basking sites for waterfowl and turtles, and attachment surfaces for aquatic insects. Invasive species will be removed both within the lake and in the riparian corridor. Additionally, construction of bioswales near the existing parking lot will collect and filter surface drainage before discharging to the lake.

Phoenix Lake Habitat Restoration Summary

The Phoenix Lake project will install new substrate including sandy gravel, cobbles, and boulders to provide spawning substrate, attachment points, and cover for fish, aquatic insects, and other aquatic fauna. Woody debris from felled trees will be anchored along the shoreline to provide cover for forage fish and spawning fish, basking sites for waterfowl and turtles, and attachment surfaces for aquatic insects. Invasive species will be removed in the riparian corridor.

Inkster Park Habitat Restoration Summary

The Inkster Park project will create new wetland habitat containing a diversity of water depths and wetland plants to provide habitat for wading birds, waterfowl, amphibians, reptiles, and aquatic insects. The habitat will contain diverse flowering forbs that provide food for pollinators. Small mammals and birds will benefit from the increased habitat diversity and cover. Maintained lawn will be converted to forested habitat by planting native trees, shrubs, and an understory seed mix. Additionally, a section of river bank along the Lower Rouge River that runs through the intended habitat area will be stabilized using bioengineering techniques to provide additional habitat and reduce streambank erosion.

1.0 INTRODUCTION

During the last century, tributaries of the Rouge River have suffered from declining water quality, loss and impairment of aquatic habitat, and increased frequency and magnitude of peak flood flows. The flat river slope and the meandering channel could not pass the large flows associated with major precipitation events. Increasing urbanization within the watershed as well as urbanization upstream exacerbated this problem by increasing impervious surfaces, leading to frequent flooding within downstream local communities.

Fortunately, water quality has improved since 1992 thanks to the federally-funded Rouge Project. For example, 89 of the 127 miles of the larger streams and tributaries in the watershed are now free from public health threats associated with uncontrolled combined sewer overflow discharges. Water quality improvement is exhibited by increased dissolved oxygen levels needed to sustain fish and aquatic life. Increased populations and diversity of benthos, fish, and wildlife have been measured along the river since 1999. The USEPA Office of Inspector General declared the Rouge Project “a blueprint for success” (EPA OIG report number 2002-P-00012).

The ARC is the Rouge River Public Advisory Committee’s (PAC) fiduciary and coordinating organization. Many of the previously completed reports [Ex: Habitat Delisting Targets (2008), Rouge River Delisting Strategy (2012), Upper Rouge Delisting Strategy (2012), and Rouge River BUI Report Card (2013)] listed project types, in addition to specific projects, that needed to be completed in the watershed to remove the Habitat BUIs and delist the AOC have been implemented by the ARC and Wayne County. The USEPA, Michigan Department of Environmental, Great Lakes and Energy (EGLE), Michigan Department of Natural Resources (MDNR), Rouge River Advisory Council (RRAC), ARC and our local members began facilitating the development of the formal list for removal of the Habitat BUIs in 2015. This work resulted in the development of a final Rouge AOC Habitat list that was approved by the PAC/RRAC, submitted to EGLE in March 2016 and approved by EPA in June 2018. On that list were three projects that were considered by EGLE (formerly Michigan Department of Environmental Quality) (MDEQ), MDNR and USEPA to be top priority projects:

- *Wilcox Lake Restoration* – Lake restoration through dredging, in-lake enhancements, and invasive species management in the riparian area.
- *Phoenix Lake Restoration* – Lake restoration through in-lake enhancements and invasive species management in the riparian area.
- *Inkster Park Restoration* – Wetland creation/restoration, invasive species management, streambank stabilization on portions of the Lower Rouge River, and stream restoration on portions of a tributary to the Lower Rouge River.

2.0 PROJECT BACKGROUND

Wilcox Lake Habitat Restoration

Over the years, Wilcox Lake, an impoundment located in Plymouth, MI along the Middle Branch of the Rouge River, has slowly filled in with sediment. Due to this buildup, the lake is shallow in many areas and has visible depositional areas and islands, decreasing the total acreage of water and habitat present. Sedimentation has also degraded shallow water habitat in the littoral zone. Invasive species in shallow water habitat has further degraded the aquatic habitat. Overall, fish productivity and the carrying capacity of the lake have declined dramatically. The proposed project design will restore and enhance ecosystem functions that the lake provides; including valuable fish spawning, nursery, and forage habitat; herpetofauna habitat; and habitat for other wildlife species.

To improve ecosystem functions, the following improvements were proposed:

- Removal of sediments within Wilcox Lake and the re-shaping of the reservoir basin morphology to create more open water area, a diversity of shallow water habitats, and over-wintering deep water habitat. These efforts will improve fish spawning, nursery, and cover habitat; waterfowl habitat; and herpetofauna habitat.
- Restoration of the aquatic benthic substrates, submerged and emergent aquatic vegetation, and riparian habitat. The addition of new substrates will include sandy gravel/cobbles, and boulders in strategic locations to provide spawning substrate, attachment points, and cover for fishes, aquatic insects, crustaceans, and other aquatic fauna. Native submerged, emergent, and floating aquatic vegetation will be planted in shallow water littoral zones around the lake to create lacustrine wetland habitat for waterfowl feeding, fish spawning and nursery habitat, and nutrient sequestration within Wilcox Lake.
- Woody debris in the form of felled trees along the shoreline placed offshore will increase habitat diversity and provide cover for forage fish and spawning fish, basking sites for waterfowl and turtles, and attachment surfaces for aquatic insects. In addition to wood debris, boulder clusters will be added offshore to add cover for spawning fish that spawn in deeper water, cover for small fish, and feeding areas for adult fish.
- Invasive species management will be conducted within the current riparian vegetation corridor and in Wilcox Lake itself. Target riparian invasive species include buckthorn, honeysuckle, autumn and Russian olive, tree of heaven, garlic mustard, and black alder. Target aquatic invasive species include Eurasian milfoil, coontail, curly-leaf pondweed, phragmites, narrow-leaf cattail, purple loosestrife, and yellow flag iris.
- Improvements to pervious and impervious surfaces to reduce direct non-point source pollution to the lake. This includes construction of bioswales near the parking lot to collect and filter surface drainage.

Phoenix Lake Habitat Restoration

Phoenix Lake is an artificial impoundment located along the Middle Branch of the Rouge River. Located in Plymouth Township, Michigan, it serves as a recreational site for fishing and small watercraft use, as well as flood control during large rain events. These types of reservoirs contain beneficial habitats for fish and other aquatic species, for uses such as spawning nursery, forage, and cover from predation. If not maintained, these uses and processes within reservoirs can be reduced or even eliminated through increased sediment loads, shoreline destabilization due to rapidly fluctuating water levels, or destruction of riparian habitat through urbanization. This project is designed to restore and improve the resiliency of the ecosystem functions that Phoenix Lake provides.

To restore and improve ecosystem functions, the following improvements were proposed:

- Restoration of the aquatic benthic substrates, submerged and emergent aquatic vegetation, and riparian habitat. The addition of new substrates will include sandy gravel/cobbles, and boulders in strategic locations to provide spawning substrate, attachment points, and cover for fishes, aquatic insects, crustaceans, and other aquatic fauna. Native submerged, emergent, and floating aquatic vegetation will be planted in shallow water littoral zones around the lake to create lacustrine wetland habitat for waterfowl feeding, fish spawning and nursery habitat, and nutrient sequestration within Phoenix Lake.
- Woody debris in the form of felled trees along the shoreline placed offshore will increase habitat diversity and provide cover for forage fish and spawning fish, basking sites for waterfowl and turtles, and attachment surfaces for aquatic insects. In addition to wood debris, boulder clusters will be added offshore to add cover for spawning fish that spawn in deeper water, cover for small fish, and feeding areas for adult fish.
- Invasive species management will be conducted within the current riparian vegetation corridor. Target riparian invasive species include buckthorn, honeysuckle, autumn and Russian olive, tree of heaven, garlic mustard, and black alder.

Inkster Park Habitat Restoration

Inkster Park is located adjacent to the Lower Rouge River in the City of Inkster. Most of the park area is routinely mowed and used for active recreation. However, the park is low and routinely floods. The project plan proposes to create and restore 14 acres of habitat in the park, including 12 acres wetland/wet meadow. Emergent wetland will be constructed to provide a diversity of water depths and wetland plants to create habitat for wading birds, waterfowl, amphibians, reptiles, and aquatic insects. The wet meadow community will contain diverse flowering forbs that provide food for pollinators. Small mammals and birds will benefit from the increased habitat diversity and cover. 2 acres of maintained lawn will be converted to habitat by planting native trees and shrubs and seeded with an understory seed mix. Plugs will be planted to improve native plant diversity in the herbaceous layer. A 500-foot-long tributary of the Lower Rouge River that runs through the intended habitat area will be stabilized using bioengineering techniques to provide additional habitat and reduce streambank erosion. Lastly, 10.0 acres of riparian invasive species will be treated to encourage native species in the riparian corridor to thrive.

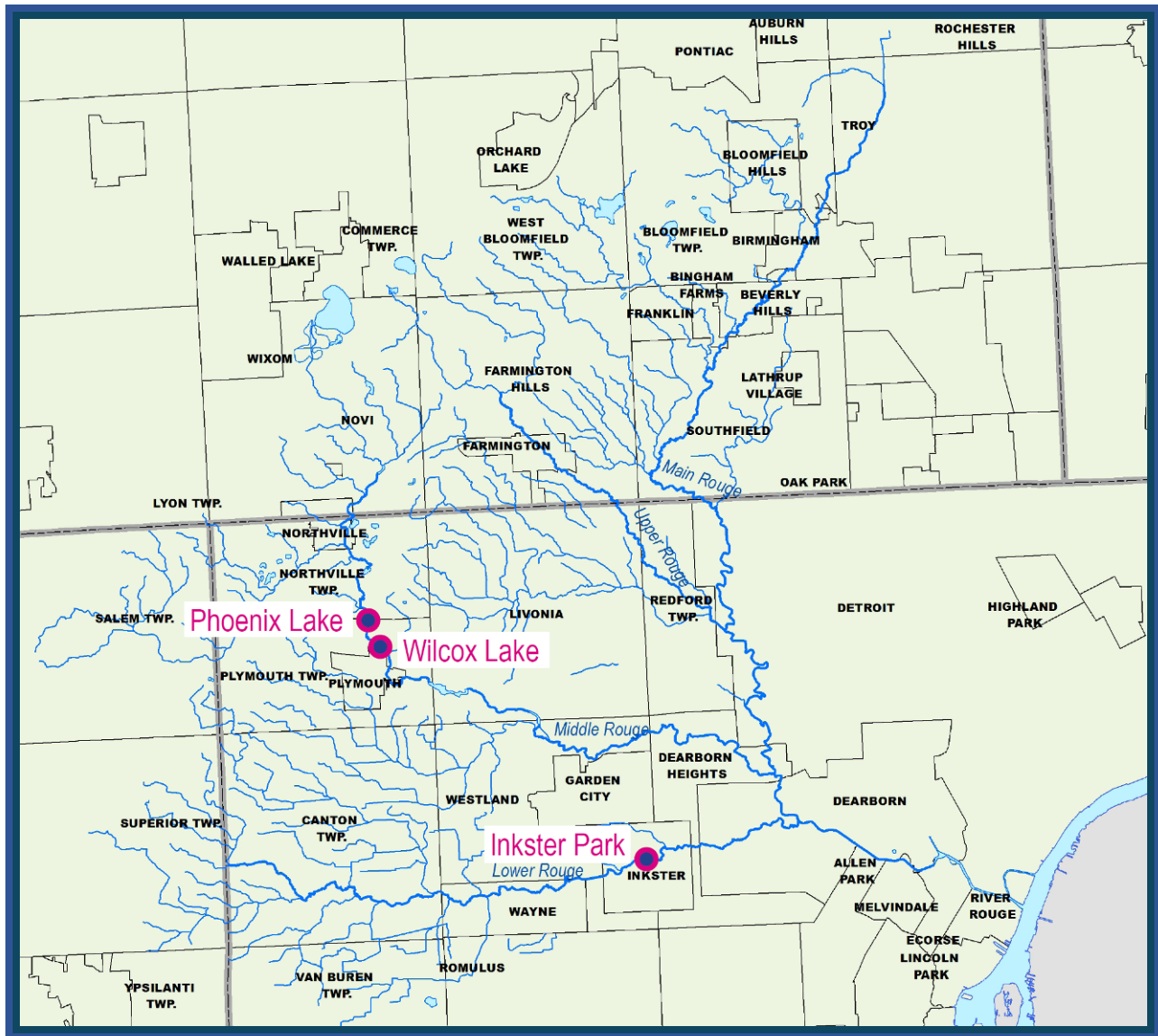


Figure 1. Proposed Project Locations within the Rouge River Watershed

3.0 PROJECT SCOPE

Within the grant, the project was divided into the following tasks:

- Task 1: QAPP/Reporting & Administration/Public Outreach
- Task 2: Preliminary Engineering and Field Investigation
- Task 3: Design/Permitting

3.1 QAPP/Reporting & Administration/Public Outreach

Following the grant award, the project began with the development of a Quality Assurance Project Plan (QAPP) as required by the USEPA to ensure environmental data collection was conducted under a formal management protocol. In February 2023, the final version of the QAPP was approved by the USEPA.

Project partners reached out to the public to inform them of the proposed activities and to obtain input. These efforts included two meetings open to the public to answer questions: one event was on January 11, 2023 and the other was on March 1, 2023. Additionally, social media was heavily utilized to inform the public about activities proposed at the three sites and answer questions. The Alliance of Rouge Communities (ARC) posted information related to each project on the ARC web site and site-specific informational flyers were distributed to interested organizations and the public at large. See Appendix A for the distributed flyers; see Appendix B for social media posts relating to this project.

Throughout the project, the ARC completed semiannual status reports and other documentation required by the USEPA. This document serves as the final project report as required under this task.

3.2 Preliminary Engineering and Field Investigation

From January to November 2022, a series of data collection activities were completed. Table 1 shows when activities were completed at each site.

	Wilcox Lake	Phoenix Lake	Inkster Park
Topography	1/4/22	1/17/22	3/15/22
Bathymetry	1/4/22	1/17/22	N/A
General Site Assessment	3/18/22	3/18/22	3/18/22
Wetland Assessment	5/20/22- 5/23/22	5/20/22- 5/23/22	7/29/22
Soil Sampling	6/22/22- 6/23/22	N/A	N/A
Sediment Sampling	6/22/22- 6/23/22	11/17/22	N/A
Geotechnical	6/22/22- 6/23/22	N/A	N/A
Fish Survey	7/12/22	7/12/22	N/A
Hydrologic Analysis	9/2022	9/2022	N/A
T&E Evaluation	1/10/22	1/10/22	1/10/22

Figure 2. ECT data collection activities

A summary of the critical information obtained from data collections efforts is as follows:

Topography and Bathymetry

Topographic surveys of each property were conducted by a registered land surveyor. For Wilcox and Phoenix Lakes, bathymetric surveys were completed in the same time frame, by separate field crews. The surveyor compiled survey data to help create computer-aided design (CAD) aerial basemaps. An example of the submittal prepared by the surveyor is shown in Figure 3 and the full survey sets are shown in Appendix C. The topographic survey helped set the stage for subsequent design efforts and drawings that were prepared and submitted with permit applications and contract documents.

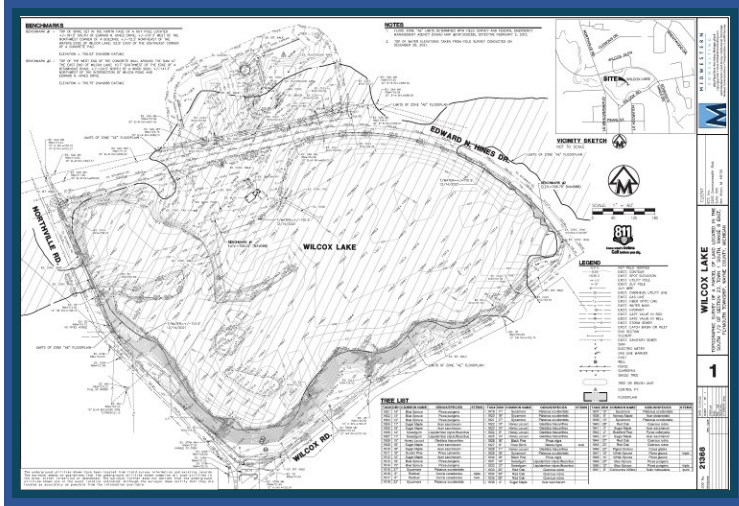


Figure 3. Topographic and bathymetric survey completed at Wilcox Lake

General Site Assessment

ECT visited each site to observe general site conditions including flora and fauna, property users, potential discrepancies with the topographic survey, and any features to be removed or modified.



Figure 4. Sample observation from Inkster general site assessment. At Inkster Park, a bare riverbank with severe erosion was observed.

Wetland Assessment

ECT conducted wetland assessments across each project area to inform habitat restoration design and the permitting process. Wetlands were delineated according to the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual – Technical Report Y-87-1 (January 1987) and the appropriate Regional Supplement to the Corps of Engineers Wetland Delineation Manual. Wetland boundaries were delineated and recorded using a GPS with sub-meter accuracy.

Twelve wetlands were identified at the Wilcox Lake site, including forested wetlands (Wetlands A, C/D, E, F, G, H, I, J, K, L, and M) emergent wetlands (Wetlands B and M).

At the Phoenix Lake site, five wetlands were identified, including forested wetlands (Wetlands A, C, D, and E), emergent wetlands (Wetlands A, B, C, D, and E) and scrub-shrub wetlands (Wetlands C and D).

At Inkster Park, twenty-one wetlands were identified, including forested wetlands (Wetlands A, B, C, E, G, I, J, K, L, M, N, P, Q, and T), emergent wetlands (Wetlands A, B, D, E, F, G, H, O, R, S, and U), and one scrub-shrub wetland (Wetland F).

Summaries containing more detailed results of the wetland characterization efforts are included in Appendix D.

Wetland ID	Lat/Long	Wetland Type ¹	State Regulatory Status ²	Reason for Regulatory Status	Acres
A	42.397850, -83.465650	PFO / PEM	Regulated	Within 500 ft of, and connected to, an inland lake, pond, river, or stream	0.24
B	42.396729, -83.467822	PEM	Regulated	Within 500 ft of, and connected to, an inland lake, pond, river, or stream	0.08
C	42.396499, -83.467327	PFO / PSS / PEM	Regulated	Within 500 ft of, and connected to, an inland lake, pond, river, or stream	0.53
D	42.397005, -83.466581	PFO / PSS / PEM	Regulated	Within 500 ft of, and connected to, an inland lake, pond, river, or stream	0.99
E	42.397436, -83.465303	PFO / PEM	Regulated	Within 500 ft of, and connected to, an inland lake, pond, river, or stream	1.30
TOTAL					3.14

Source: ECT, 2022.

1 Cowardin Classification: PEM = Palustrine Emergent Wetland; PSS = Palustrine Scrub-Shrub Wetland; PFO = Palustrine Forested Wetland

2 Final jurisdictional determination is made by EGLE.

Figure 5. Wetland summary table at Phoenix Lake

Soil/Sediment Sampling and Geotechnical Investigation

At the Wilcox Lake site, 2 soil borings on land and 12 sediment cores within Wilcox Lake were conducted to inform dredging activities and disposal requirements. Samples were composited from each core and were subjected to laboratory tests to determine physical and chemical properties of the existing material. Based on results, optimum locations were selected for proposed habitat features. All dredged or excavated materials were proposed to be disposed of in an upland site.

At Phoenix Lake, 6 ponar grab samples were taken to inform the team of general sediment characteristics. Samples were composited from each core and were subjected to laboratory tests to

determine physical and chemical properties of the existing substrate, including PFAS sampling requested by EGLE during the permitting process. No PFAS was detected during sediment testing. Based on the results from the lab for the Phoenix Lake sediment it was determined placement of habitat substrate or structures would not create an “attractive nuisance” for aquatic communities in the lake. All dredged or excavated materials were proposed to be disposed of in an upland site.

The geotechnical report has been included in Appendix E and the sediment summaries are included in Appendix F.



Figure 6. Soil and sediment sample locations at Wilcox Lake

Fish Survey

To accurately characterize the fish community to inform project design and establish baseline conditions, sampling of the fish community was conducted at Wilcox Lake and Phoenix Lake. At Wilcox Lake, the field crew utilized electrofishing equipment; at Phoenix Lake electrofishing was not feasible, therefore conventional fishing methods were used. 50 individuals were collected at Wilcox Lake, with Largemouth bass, White Sucker, and Pumpkinseed being the most abundant species. Ultimately, both lakes were observed to have similar fish communities, with moderately diverse assemblages. Summaries of fish sampling efforts at both sites are available in Appendix G.



Figure 7. Fish caught during Phoenix Lake fish survey

Hydrologic Analysis

Hydrologic variance, or the fluctuation of the water surface, with the Middle Rouge River was an important factor in the design of the restoration improvements in the Wilcox Lake and Phoenix Lake impoundments. Long-term discharge records measured at the nearest USGS gaging station on the Middle Branch of the Rouge River were analyzed: USGS 04167000 Middle River Rouge near Garden City, Michigan. Discharge data were scaled to the project site based on watershed area and land type to more accurately represent inflow and outflow of the lakes.

Appendix H contains an in-depth explanation of the hydrologic analysis.

Threatened & Endangered Species (T&E) Evaluation

ECT utilized the Michigan Natural Features Inventory natural heritage database as well as the Information, Planning, and Consultation tool from the United States Fish and Wildlife Service (USFWS) to complete a desktop review and determine possible T&E species in the project area based on habitat suitability. Based on the desktop evaluation, ECT then performed a field review of the trees proposed for removal to identify which would be suitable habitat for roosting Indiana or northern long-eared bats. ECT recommends that removal of potential bat trees occur October 1 through April 14 when bats are not present. Additionally, although suitable habitat was not found on the sites for the Eastern Massasauga Rattlesnake, it is recommended that projects within EMR's known range implement general BMPs including wildlife-safe material and to require contractors to be educated on EMR and report observations to the USFWS within 24 hours. These notes were added to the project specifications. Summaries of the T&E evaluation at each site are included in Appendix I.



Figure 8. Potential bat roost tree identified at Wilcox Lake

Note exfoliating bark. Tree shall be protected during construction or felled outside bat roosting season.

3.3 Design/Permitting

Wilcox Lake

After examining site assessment data, habitat restoration design was completed. A summary of project design and alternatives considered follows.

No Action

If the proposed project were not implemented, the opportunity to improve fish and wildlife habitat and populations in the Rouge River Area of Concern (AOC) to address Beneficial Use Impairments (BUIs) would be lost. Loss of fish and wildlife habitat in the Rouge River AOC is partly due to development. Habitat cannot be recovered in large parts of the watershed. Furthermore, restoration opportunities are largely limited to public land. Restoring and improving habitat in the Wilcox Lake impoundment would contribute toward addressing the BUIs. That opportunity will be lost if the project is not executed.

Dam Removal

Removing the dam and restoring the Rouge River channel through the former impoundment would also improve fish and wildlife habitat in the AOC. However, the dam owner and the greater Wayne County community desire to maintain the impoundment as a recreational amenity in an otherwise urbanized region with very few inland lakes. Keeping the dam and restoring aquatic habitat in it not only improves fish and wildlife habitat in the AOC but also provides the public with a resource in short supply and access to an urban fishery. Removing the dam increases habitat but has a substantial negative social impact. In contrast, the proposed project increases fish and wildlife habitat *and* increases the substantial positive social impact.

Complete Sediment Removal

Removing all accumulated sediment in the former impoundment would create more habitat but is cost prohibitive.

Partial Sediment Removal

The proposed project involves partial removal of accumulated sediment in an intentional manner to increase spawning, nursery, and over-wintering habitat for fish and habitat for amphibians and reptiles. There are countless potential alternatives for where and how deep sediment can be removed but they all have similar potential temporary impacts to the Rouge River. Wetlands and littoral habitat are not present in the areas proposed to be dredged. Therefore, exploring other alternatives for where dredging could occur would not result in less environmental impact. The proposed project was designed to maximize the amount of habitat created with the grant funds available while avoiding and minimizing impacts to existing wetlands and littoral habitat to the extent possible.

Most of the work for the Wilcox Lake project is located within the 100-year floodplain. This required the issuance of a joint permit from EGLE and United States Army Corps of Engineers (USACE). A joint permit application was completed, including all necessary attachments. Quantities of cut and fill below the ordinary high water mark (OHWM) and below the 100-year floodplain were calculated from the design drawings and tabulated. The application was submitted on October 14, 2022 and the permit was issued on May 2, 2023. The EGLE permit application package for the Wilcox Lake project is attached as Appendix J.

Phoenix Lake

After examining site assessment data, habitat restoration design was completed. A summary of project design as well as alternatives considered follows.

No Action

If the proposed project was not implemented, the opportunity to improve fish and wildlife habitat and populations in the Rouge River Area of Concern (AOC) to address Beneficial Use Impairments (BUIs) would be lost. Loss of fish and wildlife habitat in the Rouge River AOC is partly due to development. Habitat cannot be recovered in large parts of the watershed. Furthermore, restoration opportunities are largely limited to public land. Restoring and improving habitat in the Phoenix Lake impoundment would contribute toward addressing the BUIs. That opportunity will be lost if the project is not executed.

Equipment Access

Construction of a temporary access route down to Phoenix Lake will involve tree removals and regrading a steep slope. It was considered to only do work which involved access by foot, such as emergent plantings or invasive species control in order to avoid the costs associated with temporary access. Realistically, this would preclude installation of habitat structures and substrate restoration, increase costs of plantings and invasive species control, and perpetuate the issue of lack of access for future habitat work or maintenance.

Dam Removal

Removing the dam and restoring the Rouge River channel through the former impoundment would also improve fish and wildlife habitat in the AOC. However, the dam owner and the greater Wayne County community desire to maintain the impoundment as a recreational amenity in an otherwise urbanized region with very few inland lakes. Keeping the dam and restoring aquatic habitat in it not only improves fish and wildlife habitat in the AOC but also provides the public with a resource in short supply and access to an urban fishery. Removing the dam increases habitat but has a substantial negative social impact. In contrast, the proposed project increases fish and wildlife habitat *and* increases the substantial positive social impact.

Sediment Removal

Removing accumulated sediment in the former impoundment would create more/varied habitat but is cost prohibitive.

Substrate restoration

The proposed project involves partial restoration of lake bottom substrates to increase spawning and nursery habitat for fish and habitat for amphibians and reptiles. There are countless potential alternatives for where and how deep substrate can be placed but they all have similar potential temporary impacts to the Rouge River since establishment of lake access is required. Sandy substrate is proposed in shallow areas; a depth of 4" substrate will be placed where existing sediment is firm and a depth of 12" will be placed where existing sediment is soft. The proposed project was designed to maximize the amount of habitat created with the grant funds available while avoiding and minimizing impacts to the extent possible.

Most of the work for the Phoenix Lake project is located within the 100-year floodplain. This required the issuance of a joint permit from EGLE and USACE. A joint permit application was then completed, including all necessary attachments. Quantities of cut and fill below the OHWM and below the 100-year floodplain were calculated from the design drawings and tabulated. The application was submitted on October 11, 2022 and the permit was issued on May 2, 2023. The EGLE permit application package for the Phoenix Lake project is attached as Appendix J.

Inkster Park

After examining site assessment data, habitat restoration design was completed. A summary of project design as well as alternatives considered follows.

The project plan proposes to create and expand wetland/wet meadow areas. The emergent wetland will contain a diversity of water depths and wetland plants, providing habitat for wading birds, waterfowl, amphibians, reptiles, and aquatic insects. The wet meadow community will contain diverse flowering forbs that provide food for pollinators. Small mammals and birds will benefit by the increased habitat diversity and cover. In addition, maintained lawn will be converted to habitat by planting native trees and shrubs and seeding with a understory seed mix. Plugs will be planted to create plant diversity in the herbaceous layer. A small tributary will also be reshaped to facilitate a two-stage channel with floodplain access to prevent erosion and improve the quality of water entering the Rouge.

In summary, the following elements are proposed:

1. Restoration of tributary to Lower Rouge River
2. Excavation to facilitate wetland creation
3. Invasive species removal in wetland and riparian zones
4. Native planting and seeding
5. Habitat structure installation

Wetlands could be created almost anywhere on site, but wetland creation was prioritized in areas adjacent to existing wetlands to accommodate existing drainage patterns, minimize impact, and hydrologically connect pocket wetlands where feasible.

If budget allowed, large swaths of the site would benefit from invasive species treatment, however, invasive species treatment along riverbanks would result in destabilization of riverbanks and increase susceptibility to erosion, so these areas were excluded from consideration. Because of budget constraints, the remaining areas identified as having the highest quantities of invasive species were

chosen for treatment. The areas identified for invasive species treatment contain some or all of the following species: phragmites, invasive honeysuckle, and buckthorn.

The "do nothing" approach was ruled out as it does not accomplish the project goal of creating/restoring wetland and riparian habitat.

Most of the work for the Inkster Park project is located within the 100-year floodplain. This required the issuance of a joint permit from EGLE and USACE. A joint permit application was then completed, including all necessary attachments. Quantities of cut and fill below the OHWM and below the 100-year floodplain were calculated from the design drawings and tabulated. The application was submitted on December 11, 2023 and the permit is anticipated to be received in April 2024. The EGLE permit application package for the Inkster Park project is attached as Appendix J.

4.0 PROJECT OUTCOMES

The primary goal of this project was to improve the water quality in the Rouge River and support the removal of three BUIs associated with fish and wildlife habitat: Degraded Fish and Wildlife Populations, Degradation of Benthos, Loss of Fish and Wildlife Habitat.

As a result of this Rouge River AOC Habitat Restoration Design Grant, the achieved outputs were:

- EGLE Permit Application Packages (Appendix J)
- Design Plans (Appendix K)
- Technical Specifications (Appendix L)
- Cost Estimates (Appendix M)

The outputs, outcomes, and measures to be expected after implementation of the project are as follows:

Measures:

Great Lakes Restoration Initiative Action Plan III, Measures of Progress (MoPs) for the overall project when the Implementation Grant (GL-00E02997) is completed are:

- 2.2.1 - Aquatic/terrestrial acreage controlled: 21.0 acres invasive species management
- 4.1.1 - Acres of coastal wetland, nearshore, and other habitats restored, protected, or enhanced: 21.9 acres of habitats

Outputs:

- 7.9 acres of restoration/enhanced in-lake habitat
 - Wilcox: 3.8 ac
 - Phoenix: 4.1 ac
- 11.0 acres of invasive species control
 - Wilcox: 7.0 ac
 - 6.7 ac in-lake
 - 0.3 ac riparian
 - Phoenix: 4.0 ac riparian
 - Inkster: 10.0 ac riparian
- 11,563 cy yards of sediment removed (*under the implementation grant this was changed to 6,052 due to cost considerations*)
- 14.0 acres of habitat created/enhanced including:
 - 12.0 acres of habitat creation/enhancement
 - 2.0 acres of habitat created from maintain lawn
- Approximately 970 feet of streambank stabilization
 - Wilcox: 470 ft shoreline/riverbank stabilized
 - Inkster: 500 ft streambank stabilized
- Aid in the removal of three of the Rouge River AOC BUIs: Loss of Fish and Wildlife Habitat, Degradation of Fish and Wildlife Populations, and Degradation of Benthos.

4.1 Project Highlights

The commitment and involvement of various partners on the project including USEPA, ARC, Wayne County Parks, and local municipalities was a major highlight of the project and facilitated site-specific designs that are impactful, practical, and cost effective. In particular, regular coordination with Wayne

County Parks factored in public use of each site, proposed park amenities at the Wilcox and Inkster sites, and future work being considered at each location. Additionally, at the Wilcox Lake site, ECT coordinated with a local community group to build on riparian invasive vegetation species removal efforts, which had already occurred on a portion of the site in 2022.

4.2 Obstacles Encountered

The Wilcox Lake site has a gravel parking lot, approximately 0.3 acres in size, adjacent to the area where in-lake restoration is proposed. It was originally thought that this parking lot would encompass both staging and dewatering efforts during construction; however, based on ECT's experience from a recent dredge project at a nearby lake, it was concluded that the dewatering would likely require a larger footprint or phasing, likely spanning two or more years to dewater and remove all dredge material. To avoid this, ECT and Wayne County Parks coordinated to expand the staging footprint and allow dewatering activities to expand across the street to another area of the park.

Phoenix Lake is bordered by roads to the east, west, and south and surrounded by steep slopes on all sides. This made access difficult during data collection efforts and limits possible routes for equipment access during construction. This issue was addressed by proposing tree removal and grading down the north slope. This approach minimizes safety concerns from adjacent roads during construction and will facilitate future access for maintenance in and around Phoenix Lake.

4.3 Next Steps

The designs will be implemented under two future GLRI grants: one for the Wilcox Lake and Phoenix Lake sites, and the other for the Inkster Park site. These grants are titled "Rouge River AOC Habitat Restoration - Wilcox/Phoenix Implementation" (Grant No. GL-00E03267) and "Rouge River AOC Habitat Restoration - Inkster Implementation" (Grant No. TBD). The scope of each grant includes development of final contract bidding documents, public bidding, contractor selection, project construction and oversight.

APPENDIX A
Public Education Project Flyers

APPENDIX B
ARC Social Media Posts

APPENDIX C

Topographic and Bathymetric Surveys

Appendix C1 – Wilcox Lake Topographic and Bathymetric Survey
Appendix C2 – Phoenix Lake Topographic and Bathymetric Survey
Appendix C3 – Inkster Park Topographic Survey

APPENDIX D

Wetland Characterization Summaries

Appendix D1 – Wilcox Lake Wetland Characterization Summary
Appendix D2 – Phoenix Lake Wetland Characterization Summary
Appendix D3 – Inkster Park Wetland Characterization Summary

APPENDIX E
Geotechnical Investigation Report

Wilcox Lake

APPENDIX F

Sediment Summaries

Appendix F1 – Wilcox Sediment Summary
Appendix F2 – Phoenix Sediment Summary

APPENDIX G
Fish Survey Summary

Wilcox Lake and Phoenix Lake

APPENDIX H
Hydrologic Analysis Memorandum

Wilcox and Phoenix Lake

APPENDIX I

Threatened & Endangered Species Summaries

Appendix I1 – Wilcox Lake T&E Summary
Appendix I2 – Phoenix Lake T&E Summary
Appendix I3 – Inkster Park T&E Summary

APPENDIX J

EGLE Permit Application Packages

- Appendix J1 – Wilcox Lake EGLE Permit Application Package**
- Appendix J2 – Phoenix Lake EGLE Permit Application Package**
- Appendix J3 – Inkster Park EGLE Permit Application Package**

APPENDIX K

Design Plans

Appendix K1 – Wilcox Lake 100% Design Plan Set
Appendix K2 – Phoenix Lake 100% Design Plan Set
Appendix K3 – Inkster Park 100% Design Plan Set

APPENDIX L

Technical Specifications

Appendix L1 – Wilcox Lake & Phoenix Lake Technical Specifications
Appendix L2 – Inkster Park Technical Specifications

APPENDIX M

Cost Estimates

Appendix M1 – Wilcox Lake Cost Estimate
Appendix M2 –Phoenix Lake Cost Estimate
Appendix M3 – Inkster Park Cost Estimate

