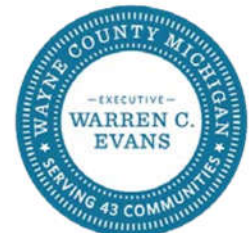
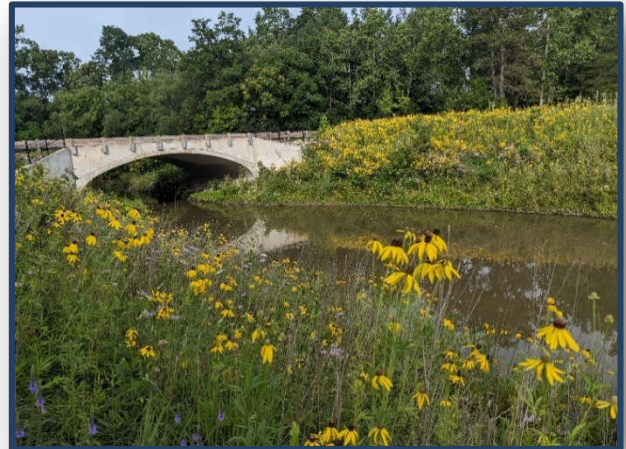


**ROUGE RIVER AOC WAYNE COUNTY HABITAT  
RESTORATION PROJECT  
U.S. EPA GRANT: GL-00E02040  
FINAL REPORT**



**September 2023**

# ROUGE RIVER AOC WAYNE COUNTY HABITAT RESTORATION

**EPA Grant Number:** GL-00E02040

**Grantee:** Charter County of Wayne, Michigan

**Partners:** Alliance of Rouge Communities

**Award Amount:** \$9,045,963.00

**Project Location:** Dearborn/Westland/Livonia, Michigan  
Wayne County Park Areas  
Congressional District: M12  
Zip Codes: 48124, 48150, 48185

**Waterbody:** Rouge River – Main Branch and Middle Branch

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- Appendix C: Construction Contracts & Amendments
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- Appendix F: Nankin Lake Restoration Construction Summary & As Built Drawings

## **SUMMARY**

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The Wayne County Department of Public Services, in partnership with the Alliance of Rouge Communities (ARC), was awarded \$9,045,963 in Great Lakes Restoration Initiative (GLRI) grant funds (#GL-00E02040) from United States Environmental Protection Agency (USEPA), to implement three priority habitat restoration projects in the Rouge River Area of Concern (AOC). These projects include the Henry Ford Estate (HFE) Dam Fishway (fish passage) project, the Rouge Oxbow Restoration project, and the Nankin Lake Restoration project. The Rouge Oxbow and the HFE Fishway are on the Main Branch of the Rouge River and the Nankin Lake Restoration is on the Middle Branch of the Rouge River. The purpose of these projects is to restore connectivity to the Great Lakes system as well as provide habitat features that will facilitate the removal of three of the Beneficial Use Impairments (BUIs) impacting the Rouge River Area of Concern, namely Degraded Fish and Wildlife Populations, Degradation of Benthos, and Loss of Fish and Wildlife Habitat.

### **Henry Ford Estate Dam Fishway**

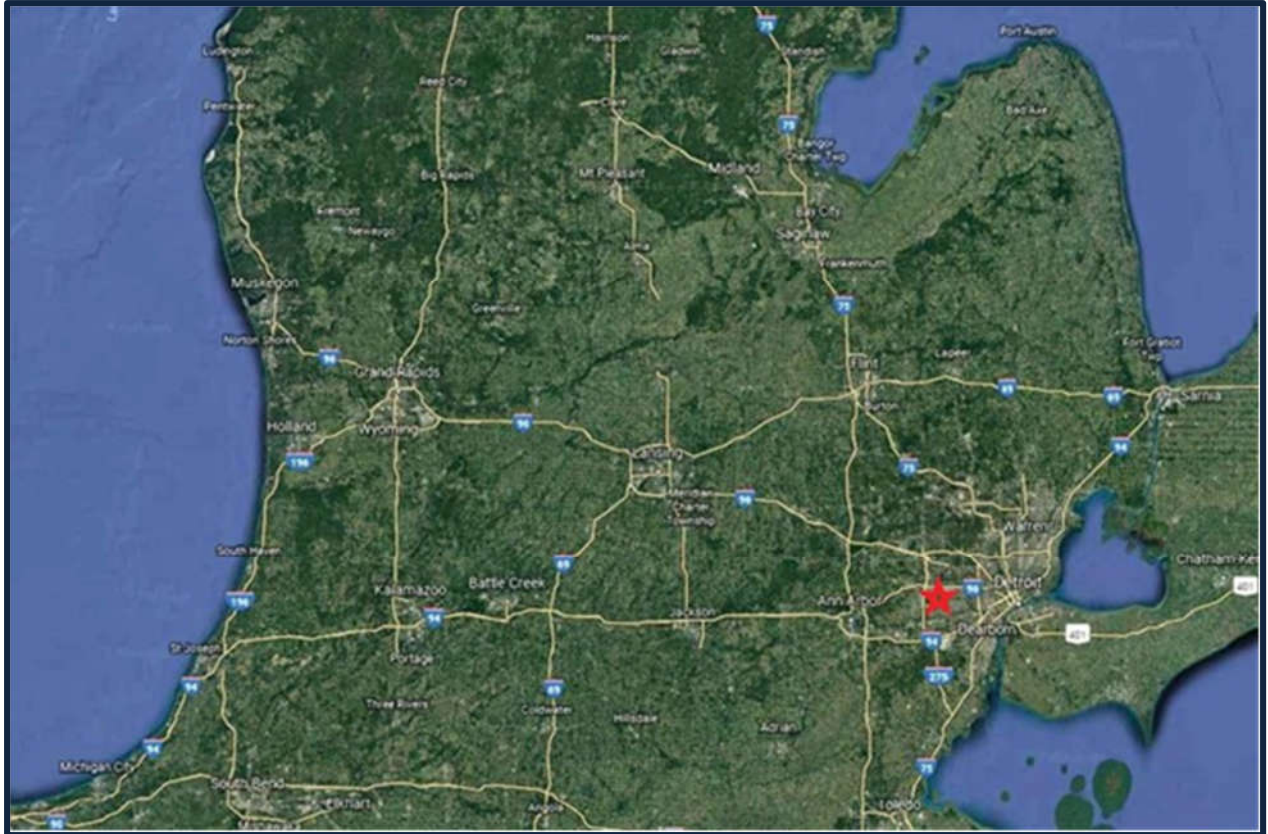
The HFE Dam is located 8 miles upstream of the Rouge River's confluence with the Detroit River. It is the first dam on the Rouge River upstream of the Detroit River and the Great Lakes system. The HFE Fishway project creates a fish passage around the dam to reconnect approximately 43.8 river miles and 123.3 miles of tributary stream to the Great Lakes system for the first time in over 100 years. Establishment of the HFE Fishway in the form of a natural channel not only provides fish passage but also provides improved diversity within the river corridor for fish species, macroinvertebrates, mussels, and other aquatic life.

### **Rouge Oxbow Restoration**

Wayne County and The Henry Ford began to restore the Rouge Oxbow in 2002. Completion of this project (Phase 3), in partnership with the ARC, caps off over 16 years of effort to restore the habitat functions of an old oxbow meander on the Rouge River. This oxbow meander had been disconnected hydraulically when this section of river was channelized with concrete in the early 1970's. The Rouge Oxbow Restoration establishes the upstream connection of the oxbow to the Rouge River. This provides many benefits including a restored connection for benthic macro-invertebrates, amphibians, birds, fish, and small mammals. Benefits to bass, channel catfish, and bowfin through the development of the created lacustrine habitat. Reconnects the Oxbow to 20 Rouge River miles, 100 tributary miles as well as to the Detroit River and the Great Lakes system. Removal of 7,000 yards of debris and fill and establishes 280 linear feet of new channel making it available to local and Great Lakes migratory fish.

### **Nankin Lake Restoration**

Over the years, Nankin Lake had filled with sediment. Due to this buildup, the lake was shallow in many areas, decreasing the total acreage of surface water and habitat present by approximately 1.5 acres. Sedimentation had also degraded shallow water habitat in the littoral zone. Invasion of phragmites and narrow-leaf cattails in shallow water habitat further degraded the aquatic habitat. Overall, fish productivity and the carrying capacity of the lake had been impaired. Flow during storm events would also negatively impact the impoundment and downstream habitats significantly. The project restores the ecosystem services the lake provides including valuable spawning, nursery, and forage habitat for fishes and other aquatic species of all life stages.



***Rouge River Watershed***

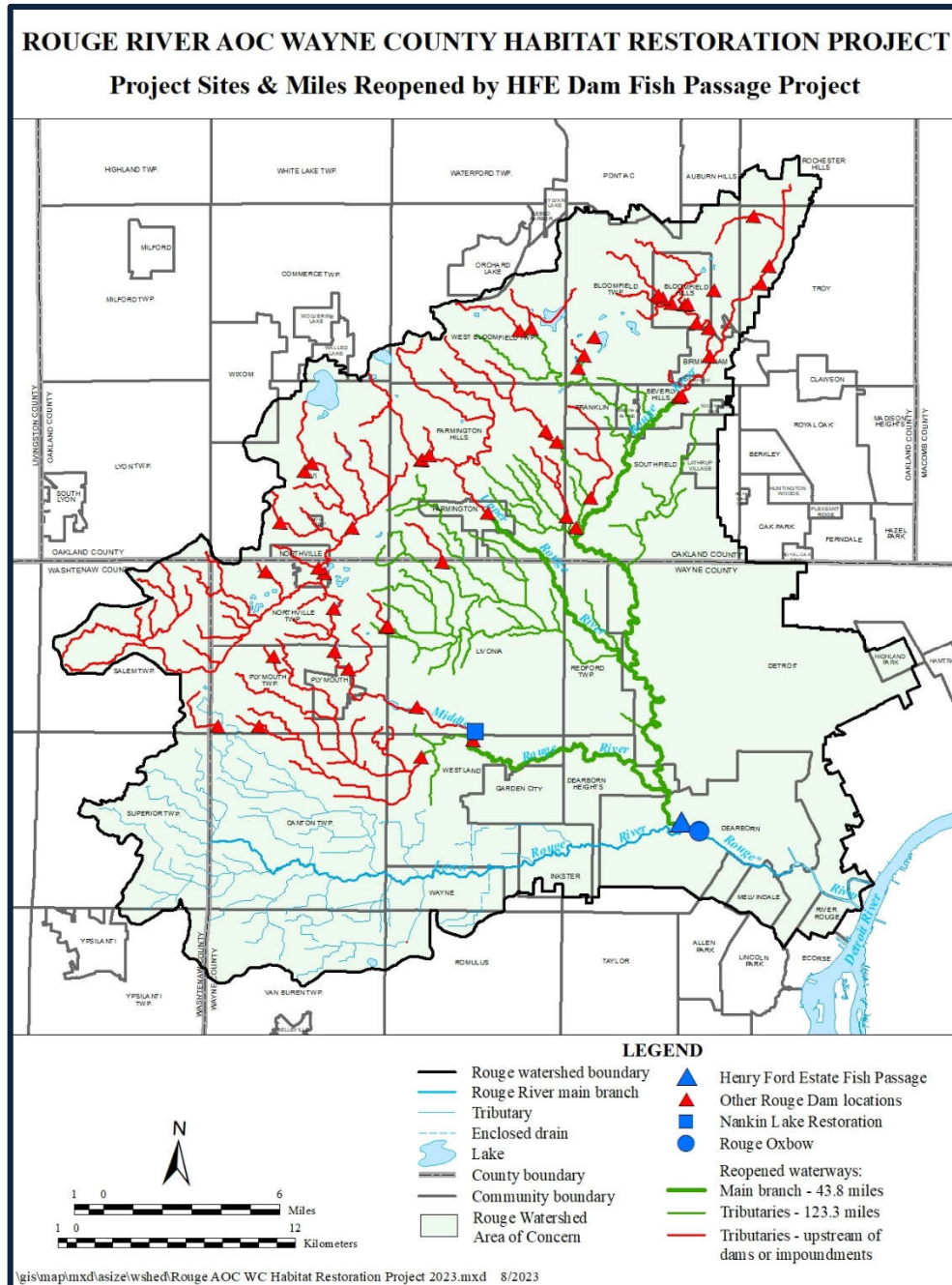
## **1.0 INTRODUCTION**

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Wayne County received this grant funding for Rouge River Area of Concern (AOC) Wayne County Habitat Restoration Project as part of its effort to delist the AOC. The Rouge River watershed is a designated AOC under the Great Lakes Water Quality Agreement (GLWQA), and, has three Beneficial Use Impairments (BUIs) associated with fish and wildlife habitat: Degraded Fish and Wildlife Populations, Degradation of Benthos, Loss of Fish and Wildlife Habitat.

During the last century, the Rouge River has suffered from declining water quality and increased flood conditions, primarily due to increasing urbanization within the watershed. The flat river slope and the meandering channel could not pass the large flows associated with major precipitation events. Upstream urbanization continued to exacerbate this problem due to increased amounts of impervious surfaces culminating in floods within downstream local communities. Water quality in recent years, though, has improved since 1992 thanks to the federally funded Rouge River National Wet Weather Demonstration Project and post construction stormwater control. 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. Also, the U.S. EPA Office of Inspector General declared the Rouge Project “a blueprint for success” (EPA OIG report number 2002-P-00012). Wayne County helped organize the Alliance of Rouge Communities (ARC) to continue and sustain the Rouge AOC efforts.

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. The EPA, MDEQ, MDNR, RRAC, ARC and Wayne County staff 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 EPA in June 2018. On that list were the Henry Ford Estate Dam Fishway, the Rouge Oxbow Phase 3, and Nankin Lake Restoration projects.



**Project Sites & Miles Reopened by HFE Dam Fish Passage Project**

## 2.0 PROJECT BACKGROUND

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The Rouge River watershed is a designated AOC under the Great Lakes Water Quality Agreement (GLWQA) and has three Beneficial Use Impairments (BUIs) associated with fish and wildlife habitat: Degraded Fish and Wildlife Populations, Degradation of Benthos, Loss of Fish and Wildlife Habitat. The Rouge River Advisory Council (RRAC), the Public Advisory Council (PAC) for the Rouge AOC, recommended, in March 2016, a list of projects that need to be completed to remove the Rouge AOC habitat BUIs. As part of that list the Henry Ford Estate Dam Fishway, Rouge Oxbow Phase 3, and Nankin Lake Restoration projects were considered to have a significant impact on the removal of the BUIs. Rationale for each project being on the habitat priority list is provided below.

### **Henry Ford Estate Dam Fishway**

Providing fish passage at the HFE Dam had been identified by the Rouge River Advisory Council (RRAC) as one of the highest priority projects within the watershed to address the habitat and population BUIs within the AOC as detailed in the *Delisting Targets for Fish & Wildlife Habitat & Population Beneficial Use Impairments for the Rouge River Area of Concern* (RRAC, 2008) (AOC document). Providing fish passage at the Henry Ford Estate Dam had also been identified, since 1998, by the Michigan Department of Natural Resources (MDNR) – Fisheries Division as one of the priority projects within the system for recovering of the fishery (DNR Fisheries Special Report Number 22 titled “Rouge River Assessment” (by Beam and Braunscheidel) prepared by the Michigan Department of Natural Resources- Fisheries Division in 1998). Completion of the HFE Fishway reconnects 43.8 miles of the Rouge River and 123.3 additional miles of its tributaries the Detroit River and to the Great Lakes system.

### **Rouge Oxbow Restoration Phase 3**

Floods within downstream local communities created tremendous financial impact and caused the communities to seek help from the federal government. A resulting flood control project was authorized by the Flood Control Act of 1962 to prevent flooding of the Dearborn/Melvindale area of the Rouge River. The project was completed in the mid-1970s. The resulting United State Army Corps of Engineers (USACE) concrete channel was hydraulically efficient and cost effective. Unfortunately, it destroyed much of the aquatic habitat (i.e., elimination of shoreline wetlands, submerged protective areas, shaded shoreline areas, etc.) and all but precluded the passage of most fish from the abundant Detroit River to the upper reaches of the Rouge River. To provide habitat, resting locations for migratory fish, recreational opportunities and restored wetland areas, Wayne County (MI) and The Henry Ford began to restore the Oxbow in 2002. Completion of Phase 3 establishes the upstream hydraulic connection and provides additional habitat improvements needed to complete the Oxbow Restoration project.

### **Nankin Lake Restoration Project**

Over the years, Nankin Lake, an impoundment located in Livonia, MI along the Middle Branch of the Rouge River, had slowly filled in with sediment. Due to this buildup, the lake was shallow in many areas and has visible depositional areas and islands as a result, decreasing the total acreage of surface water and habitat present by approximately 1.5 acres. Sedimentation had also degraded shallow water habitat in the littoral zone. Invasion of phragmites and narrow-leaf cattails in shallow water habitat further degraded the aquatic habitat. Overall, fish productivity and the carrying capacity of the lake had declined dramatically. Flow during storm events affected the impoundment and downstream habitats significantly. Completion of the Nankin Lake Restoration should reduce damaging storm flows which should significantly aid in creation and natural maintenance of instream

habitat in the Middle Rouge River as well as restore the ecosystem functions that the lake provides including valuable spawning, nursery, and forage habitat for fishes and other aquatic species at all life stages.

Each of these projects involved Wayne County as the major landowner/partner and are anticipated to provide long-term benefit to many or all the ARC members. The implementation of the projects will address the following Great Lakes Restoration Initiative Action Plan III, Measures of Progress (MoPs) with the cumulative metric targets listed below. The quantitative metrics provided in this background section are consistent with the final version of the grant funding contract. Section 4.0 Outcomes provides the actual quantitative metrics achieved.

### **Measures**

- **Focus Area 2: Invasive Species - Objective 2.2 Control established invasive species.**
  - 2.2.1 - Number of aquatic/terrestrial acres controlled by GLRI-funded projects. Target:
    - 3 acres of invasive species control.
  
- **Focus Area 4: Habitats and Species - Objective 4.1. Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes**
  - 4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI-funded projects. Target:
    - 6 acres of habitat restoration.
  - 4.1.2 - Number of miles of Great Lakes tributaries reopened by GLRI-funded projects. Target:
    - 167 miles of Rouge River and tributaries reconnected to the Great Lakes.

Additional background information and project specific measures of progress and outputs from each of the three Rouge River AOC Wayne County Habitat Restoration Project activities is provided below.

### **HENRY FORD ESTATE DAM FISHWAY**

This project was the implementation of the Henry Ford Estate Fishway project designed under a National Oceanic and Atmospheric Administration (NOAA) grant to the ARC with Wayne County as a sub-grant partner. This EPA grant allowed Wayne County to continue the partnership with the ARC and to realize implementation of the Henry Ford Estate Fishway including development of construction contract bid documents, obtaining Wayne County Permit Office construction and City of Dearborn SESC permits, provide for construction oversight services with Engineer of Record (ECT, Inc.) and complete fishway construction. Wayne County, an ARC member, partnered with



**HFE Estate Dam Fishway Project Sign**

the ARC, through a sub-grant Interagency Agreement (IAA), for ARC staff to support construction contract bid document preparation, contractor selection and to provide construction oversight assistance. Through a competitive bid process, with ARC support, Wayne County hired Z Contractors, Inc., to construct the HFE Dam Fishway consistent with the NOAA grant design and according to the contract documents.

The HFE Dam is located 8 miles upstream of the Rouge River's confluence with the Detroit River (Figure 1.1). It is the first dam on the 127-long Rouge River upstream of the Detroit River and the Great Lakes system. The Fishway project will have a positive impact on 43.8 miles of the Rouge River and 123.3 miles of its tributaries for fish migration and reconnection to the Great Lakes. Fish passage at the HFE Dam will address three of the Rouge River AOC BUIs: Loss of Fish and Wildlife Habitat, Degradation of Fish and Wildlife Populations, and Degradation of Benthos. The fish passage project will also contribute to the GLRI Action Plan, Focus 4: Habitat and Wildlife Protection and Restoration. Specifically, the project will contribute to the following interim objective: *"By 2014, 3,000 miles of Great Lakes Rivers and tributaries will be reopened and the 500 barriers to fish passage will be removed or bypassed.* Establishment of the fish passage in the form of a natural by-pass channel not only provides fish passage but also provides improved substrate diversity within the river corridor.

The primary project goal is to restore and improve fish and wildlife habitat to promote healthy populations of desirable native fish, wildlife, and benthos populations within the Rouge River Watershed. We believe the goals will be achieved by meeting the project objectives:

- Construct passage around the HFE Dam and hydrologically reconnect approximately 43.8 miles of the Rouge River and 123.3 additional miles of its tributaries to the Great Lakes system, through a natural channel fishway.
- Provide ancillary benefits at the project site (e.g., bank stabilization / erosion control, enhanced fish, and wildlife habitat).
- Restore riparian corridor along both sides of the channel and along the west bank of the Rouge River.
- Control invasive species through implementation of integrated pest management strategies and best management practices.

To achieve these objectives a natural channel fishway was constructed to pass a diversity of fish species in the most efficient manner possible over the widest range of flow conditions possible and provide suitable aquatic habitat for many of the organisms that live in the river. The construction of this fish passage was based on natural channel design concepts that effectively minimized environmental disturbance and future maintenance. It also protected the historical structures associated with the Henry Ford Estate while blending in with the natural riverine floodplain. Additionally, for the fishway's long-term sustainability, maintenance access was constructed. Design of the fishway is documented in the attached Basis of Design and Construction Drawings (Appendix D). Construction/design elements included:

- Riffle-to-riffle mean channel slope of approximately 0.8%.
- Channel length of 850 feet.
- 20-foot wide, 1.7-foot deep fishway channel with a 90 cfs flow capacity and second-stage floodway channel with a total width of 60 feet.
- Optimized passage characteristics (depth, velocity, discharge) for the spring migration season (March through May).
- A fixed metal sheet-pile weir sized to passively control flow through the fishway over the full

range of flows below bankfull discharge of the Rouge River.

- Aquatic habitat for wildlife, aquatic insects, crayfish, and fish.
- The fishway channel was constructed of native stone, boulders, and logs to roughen the channel, reduce flow velocities, provide fish refugia, and naturalize appearance and function.
- A series of riffles and pools were constructed to create deep water habitat, shorten high velocity flow fields, dissipate energy, and increase habitat diversity.
- Channel banks and floodway over-bank areas and slopes planted with a variety of grasses, forbs, shrubs, and trees to establish native vegetation that provides wildlife habitat, shades the fishway, stabilizes the banks, and reduces flow velocity.

### **Measures**

**Great Lakes Restoration Initiative Action Plan III**, Measures of Progress (MoPs) for the Fishway project are:

- **Focus Area 4: Habitats and Species - Objective 4.1. Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes**
  - 4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI-funded projects: 2 acres of habitat restoration.
  - 4.1.2- Number of miles of Great Lakes tributaries reopened by GLRI-funded projects: 167 miles of Rouge River and tributaries reconnected to Great Lakes

### **Outputs**

- 43.8 Rouge River miles and 123.3 miles of Rouge tributary reconnected to Great Lakes
- 2 acres of riparian/creek habitat created by 850 linear feet of natural channel fishway construction.

### **ROUGE OXBOW RESTORATION PHASE 3**

This project was the implementation of the Oxbow Restoration Phase 3 design that had been awarded by NOAA to the ARC with Wayne County as a sub-grant partner. This EPA GLRI grant allowed Wayne County to continue to partner with the ARC to implement the Oxbow Restoration Phase 3 Project including development of the construction contract bid documents, obtain Wayne County construction permit and City of Dearborn SESC permits, provide for construction oversight services from the Engineer of Record and complete Oxbow Phase 3 construction. Under the NOAA grant, the design and MDEQ (now EGLE) permitting was completed for this project activity. Wayne County, an ARC member, partnered with the ARC through a sub-grant Interagency



**Rouge Oxbow Restoration Project Sign**

Agreement (IAA) for ARC staff to support construction contract bid document preparation and to provide construction oversight assistance. Through a competitive bid process, Wayne County hired a contractor (E.C. Korneffel Company, Inc.) to construct the Oxbow Restoration Phase 3 Project consistent with the NOAA grant design and according to the contract documents.

The Oxbow Restoration Phase 3 project had been identified as a priority project within the Rouge River Area of Concern (AOC) to address the habitat and population-related beneficial use impairments (BUIs) by the Rouge River Advisory Council (RRAC). BUIs within the AOC are detailed in the *Rouge River Area of Concern Beneficial Use Impairments Delisting Strategy* (RRAC and ARC, 2011, revised, 2012). According to this report, numerous fish will benefit from the hydraulic reconnection of the Oxbow at The Henry Ford, including largemouth bass, bowfin and numerous sunfishes.

The *Delisting Targets for Fish & Wildlife Habitat & Population Beneficial Use Impairments for the Rouge River Area of Concern* (RRAC, 2008) described this portion of the Rouge River as heavily developed though it still retains a moderately intact riparian corridor in the reaches adjacent to The Henry Ford and Henry Ford Estate. This is due to the connection of the floodplain riparian corridor with the river. This floodplain function also provides opportunities for habitat enhancements.

The primary goal of the Rouge Oxbow Restoration project was to restore valuable fish habitat in a critical area within the Rouge River and to restore functioning riverine wetlands that had been lost due to the channelization of the river. To achieve this goal the Rouge Oxbow Restoration Phase 3 was designed to maximize improvements to fish and wildlife habitats and provide a natural system both in appearance and ecological function. This primary goal was achieved by:

- Removal and replacement of the existing enclosed storm sewer pipe with a much larger, more natural open channel connection.
- Native vegetation (e.g., trees, grasses, and forbs) and habitat (e.g., bolder stones, cobble, and gravel) were installed along and within the restored open channel.
- A portion of Rouge River concrete channel was removed to establish the open channel and a new concrete apron was installed at the oxbow channel opening to tie into the existing concrete channel at the Rouge River.
- A bridge, meeting Michigan Department of Transportation (MDOT) standards, was constructed over the newly restored open channel connection to re-establish Eagle Lane, a vehicular road that serves the southwest portion of The Henry Ford.

The results of the Rouge Oxbow Restoration Phase 3 project are:

- 7,000 yards of debris and fill removed.
- 280 linear feet of additional naturalized oxbow channel reconnecting the oxbow to the Rouge River.
- A restored connection and access to lacustrine oxbow habitat benefiting benthic macro-invertebrates, amphibians, birds, small mammals, and fish, including but not limited to bass, channel catfish, and bowfin.
- Completion of the reconnection of the Rouge Oxbow provides resting and breeding habitat at a critical location in the watershed providing fish and wildlife benefits impacting approximately 20 miles of Rouge River and 100 miles of tributaries, the Detroit River, and the Great Lakes.

## Measures

**Great Lakes Restoration Initiative Action Plan III**, Measures of Progress (MoPs) for the Oxbow project completed are:

- **Focus Area 4: Habitats and Species - Objective 4.1. Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes**
  - 4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI-funded projects: 0.4 acres of habitat restoration.
  - 4.1.2- Number of miles of Great Lakes tributaries reopened by GLRI-funded projects: 0.5 miles of Oxbow channel reconnected.

## Outputs

- ~ 7,000 yards of debris and fill removed.
- 0.5 miles (2,700 liner feet) of naturalized oxbow reconnected to Rouge River and therefore the Great Lakes
- 0.4 acres of new native riparian habitat created by 280 liner feet of new channel.

## NANKIN LAKE RESTORATION PROJECT

This project included the design, permitting and implementing the Rouge River AOC's Nankin Lake Restoration priority project. Activities included development of the request for proposals for design & construction engineering (Engineer of Record) services, obtaining permits from EGLE (formerly MDEQ), Wayne County construction permit office and City of Livonia and City of Westland SESC permits, develop invitation to bid documents for construction services and implement construction of the Nankin Lake



**Nankin Lake Restoration Project Sign**

Restoration. Wayne County hired, through a competitive bid process, an engineering firm to provide design, permitting, contract documents, and construction oversight services. Wayne County also hired, through a competitive bid process, a construction contractor to construct the Nankin Lake Restoration according to approved design, permit conditions and construction contract documents.

The Nankin Lake Restoration project had been identified as a priority project within the Rouge River AOC to address the habitat and population-related, and eutrophication and undesirable Algae beneficial use impairments (BUIs) as approved by the Rouge River Advisory Council (RRAC). This project consisted of the following restoration elements:

- Removal of sediments within Nankin Lake and the re-shaping of the reservoir basin morphology to create more open water area, shallow water habitats, littoral zone aquatic bed wetlands, and over-wintering deep water habitat. This aquatic restoration project will improve fish spawning, nursery, and cover habitat; waterfowl habitat; and aquatic turtle habitat.
- Restoration of the aquatic benthic substrates submerged and emergent aquatic vegetation,

and riparian habitat. The addition of new substrates includes sandy gravels in strategic locations that would 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 areas around the lake to create habitat for waterfowl feeding, fish spawning and nursery habitat, and nutrient sequestration within Nankin Lake.

- Woody debris in the form of felled trees along the shoreline 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 were 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 was conducted within the current vegetative corridor (approximately 50-foot on the north and south shorelines). Native shrubs and trees were planted in the riparian corridor along the north and south sides of the lake to provide near shore habitat. Target invasive species include buckthorn, honeysuckle, autumn and Russian olive, privet, Siberian elm, tree of heaven, and garlic mustard. Some dead trees were kept providing snag habitat for birds, mammals, bats, and other animals that use them.
- Improvements to pervious and impervious surfaces to reduce direct non-point source pollution to the lake. This included vegetative upland buffers (no-mow zones) and bioswales near the parking lots to collect and filter surface drainage.

### **Measures**

***Great Lakes Restoration Initiative Action Plan III***, Measures of Progress (MoPs) for the Nankin Lake Restoration project are:

- **Focus Area 2: Invasive Species - Objective 2.2. Control established invasive species.**
  - 2.2.1. Aquatic/terrestrial acreage controlled: 3 acres of invasive species management.
- **Focus Area 4: Habitats and Species - Objective 4.1. Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes**
  - 4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored, and enhanced by GLRI-funded projects: 4 acres of habitat restoration.

### **Outputs (Concept targets)**

- 4.0 acres of habitat restored/created.
  - ~35,000 cu. yds. of sediment removal
  - 3.0 in lake habitat created/restored.
    - 0.5 acres of open water habitat
    - 0.5 acre of deep-water habitat (12-15 feet of water depth)
    - 0.5 acre of sand/gravel/cobble spawning habitat
    - 1.5 acre of emergent/submergent habitat (is this pike spawning/amphibian marsh?)
  - 1.0 acre of riparian habitat restoration
  - 20 fish habitat structures (felled trees, boulder clusters, and wood cribs)
- 3 Acres of invasive species (phragmites) control

***Note to reader:*** The quantitative metrics provided above are consistent with the metric numbers listed within the final EPA GLRI grant funding contract (GL-00E02040-7). Section 4.0 Project Outcomes presented below identifies the actual quantitative metrics achieved by project implementation.

### 3.0 PROJECT SCOPE

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

- Task 1: Grant Reporting/Administration/Public Outreach
- Task 2: Preliminary Engineering and Field Investigation – Nankin Lake Restoration
- Task 3: Design/Permitting – Nankin Lake Restoration,
- Task 4: Contract Documents and Contractor Selection (HFE Dam Fishway, Oxbow Restoration Phase 3 and Nankin Lake Restoration), and
- Task 5: Construction/Construction Oversight (HFE Dam Fishway, Oxbow Restoration Phase 3 and Nankin Lake Restoration)

#### 3.1 Grant Reporting/Administration/Public Outreach

Following the grant award, the project began with the development of an Interagency Agency Agreement (IAA) between Wayne County and the Alliance of Rouge Communities (ARC) as the Engineer of Record and NOAA design grant recipient to provide construction invitation to bid contract documents, contractor selection support and construction oversight for the implementation of the HFE Fishway project and the Oxbow Restoration Phase 3 project. The IAA was amended three times in response to setbacks encountered on the HFE Fishway project caused by major flooding events that occurred at inopportune times during the project construction. Grant reporting requirements were also added to the agreement to provide support to Wayne County for the final report as well as for the final and annual financial and disadvantaged business enterprise reporting.

A Quality Assurance Project Plans (QAPPs) for the HFE Fishway and Oxbow Restoration were developed through the IAA with the ARC, submitted and approved by the USEPA to ensure project quality controls were established and that environmental data collection was conducted under a formal management protocol.

Wayne County prepared, advertised and administered the competitive procurement process for the design and engineering (field/design/construction oversight) services for the Nankin Lake Restoration design, construction procurement support and project implementation. Environmental Consulting & Technology, Inc., (ECT) was selected and contracted to provide the Design and Construction Engineering Services for the Nankin Lake Restoration Project.

Throughout the grant Wayne County and the ARC reached out to the public and key stakeholders to inform them of the proposed activities and to obtain input. The Alliance of Rouge Communities posted information related to each project on the ARC web site and social media. Informational flyers were distributed to interested organizations and the public at large. Reports were made at each of the Rouge River Advisory Council (RRAC) and Alliance of Rouge Community (ARC) meetings regarding project activities. See Appendix A for public outreach materials including project flyers and



Example Information Flyer

ARC Facebook posts. See also the RRAC/ARC website for past meeting information [Rouge River Advisory Council \(RRAC\) \(allianceofrougecommunities.com\)](http://allianceofrougecommunities.com).

Throughout the project, semiannual status reports and other documentation required by the USEPA were prepared and submitted. This document serves as the final project report as required by the grant.

### 3.2 Preliminary Engineering and Field Investigation – Nankin Lake Restoration

After the Design and Construction Engineering Services for the Nankin Lake Restoration Project contract was executed a project specific QAPP was prepared and approved prior to beginning any data collection activities.

**Table 1. ECT Data Collection Activities**

	<b>Date/Date Range</b>
<b>Topography &amp; Bathymetry</b>	October 2018/ April 2019
<b>Hydrologic Analysis</b>	July-August 2019
<b>Wetland Delineation/Vegetative Mapping</b>	October – December 2018
<b>Geotechnical Investigation</b>	October 2018/ March 2019
<b>Sediment Analysis</b>	November 2018/July 2019/ August 2019
<b>Threatened &amp;Endangered Species Evaluation</b>	September – November 2018
<b>Fish Survey</b>	June - July 2019

#### Topographic and Bathymetric Survey

Elevation survey and bathymetry (water depth and sediment thickness) survey was conducted with transects across the lake and the adjacent upland area. Surveys were also used to determine the location of existing or abandoned structures or where any utilities exist in or adjacent to work areas. The survey results were used to prepare the restoration plan design and to estimate sediment removal requirements and cost estimates.

#### 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 Nankin Lake restoration project. To analyze the hydrology of Nankin Lake, evaluation of the magnitude and frequency of discharges that have occurred through Nankin Lake was made. Long-term discharge records measured at the nearest USGS gaging station on the Middle Branch of the Rouge River were utilized. Those discharges were scaled to the project site based on watershed area and land type to accurately represent inflow and outflow at Nankin Lake. To determine water surface elevations, field surveys of the water surface of Nankin Lake were performed. The surveyed water surface elevations, as well as the scaled discharges at the time of the surveys, were utilized to estimate a relationship between discharge and water surface elevation. With that relationship, and the long-term discharge records from the USGS gaging station, the frequency of a range of water surface elevations in Nankin Lake were estimated to support the project design.



Figure 3. Transect locations at Nankin Lake

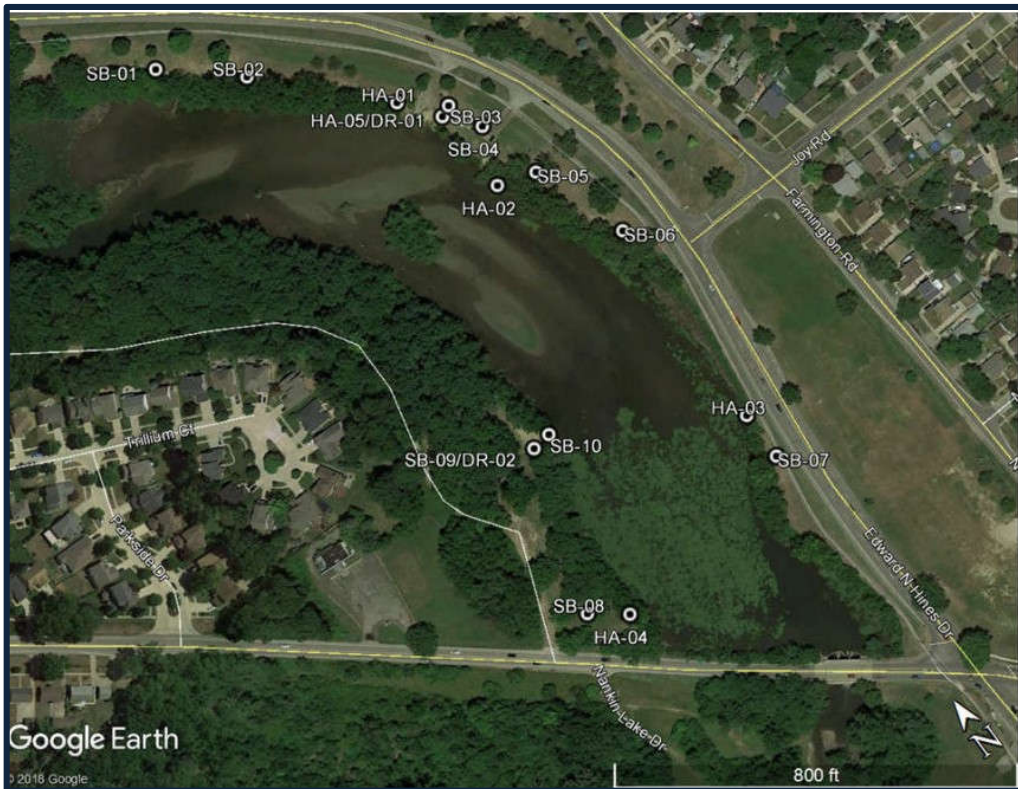


Figure 4. Soil and sediment sample locations at Nankin Lake

Wetland Delineation/Vegetative Mapping

Professional wetland scientists and ecologists conducted surveys of the project site to determine wetland community types and quality. Site hydrology and soil characteristics were also evaluated to determine if positive indicators exist for wetland conditions as well as the overall quality of the wetlands. Habitat assessment was performed to identify invasive species, the habitat value for the anticipated wildlife species that may use the wetlands and the overall health of the wetlands. The jurisdictional limits of existing wetlands were established using accepted methodologies by both state and federal regulatory agencies. As part of the wetland evaluation process, the lake conditions were reviewed to identify potential wetland enhancement and restoration opportunities.

Geotechnical Investigation

Ten soil borings were performed along the shoreline with each extending to a depth of 5-10 feet below grade. This information was used in the design of the near-shore and shoreline habitats. Soil samples were visually classified. Moisture content tests, unit weight determinations and unconfined compressive strength tests were performed on representative cohesive soil samples. Loss on Ignition Tests (LOI) were performed on samples suspected to contain organic content. Sieve analysis was performed on representative samples of existing granular material.

Sediment Analysis

Surficial sediment samples within the water body were collected. Sediment samples were collected in sediment deposition zones based on selected outfall locations, inlet/outlet locations and accessibility. Field observation of the sediment characteristics was noted and the location GPS'ed for mapping purposes. The samples were processed and analyzed for chemical oxygen demand (COD), total organic carbon (TOC), nutrients, grain size, water content and contaminants (if required). The purpose of the sediment evaluation was to characterize the sediment to determine potential disposal alternatives for the soils (in-lake, upland, fill or at a Class II sanitary landfill). The samples were analyzed based on the State of Michigan protocol for dredge characterization which includes metals, volatile and semi-volatile compounds, and PCB scans. The toxicity characteristic leaching procedure (TCLP) was used on samples that initial analysis results indicate that TCLP is required under the State of Michigan dredging protocol. Additionally, the sediment evaluation provided data to determine design elements or plans needed to prevent the intrusion of existing sediments in excavation areas or into the lake post construction.

Threatened & Endangered Species (T&E)

Since all federal agency grant programs require at least a programmatic environmental assessment that must consider potential impacts to federally and state-listed T&E plant and animal species, T&E information was collected. Sources for this information included the Michigan Natural Features Inventory (MNFI) database and the U.S. Fish and



**Potential Bat Roost Tree**

Wildlife Service (USFWS) species listing for Wayne County, MI. With this T&E species information, the project area was surveyed by qualified ecologists to evaluate suitable T&E species habitat and for the potential presence of listed species that occur within a 1.5-mile radius of the project site.

### Fish



Biological monitoring for fish assemblages in the study area was conducted to aid in establishing the design criteria for the fish habitats. Fish were collected using pulsed DC electroshocking (60 Hz) using a GPP5.0 (Smith-Root, Inc., Vancouver, WA). Appropriate GPP settings were determined in the field based on ambient water conductivity. Each area of the lake was sampled in 15-minute electroshocking units. During each sampling unit, stunned fish were netted from the water and placed in holding tanks supplied with fresh water from the Rouge River. Following each sampling unit (i.e., 15-minute interval), collected fish were identified to the species level, measured to the nearest mm (total length TL), and subsequently live-released back into the Rouge River. The total time from capture to release was not allowed to exceed 30 minutes to reduce handling stress. To provide for a representative assemblage structure, a minimum of 30 fish per primary species was the target to be collected within each reach. The baseline fish reporting metrics include species richness and abundance; catch per unit effort; and size-frequency distributions.

### ***Northern Pike Nankin Lake Fish Survey***

The Nankin Restoration field investigation/preliminary engineering reports including the Wetland Summary, Geotechnical Memorandum, Soil Characterization Summary, Fish Monitoring Summary, Herpetofauna Assessment Summary, and the T&E Summary are included in Appendix B.1

### **3.3 Design/Permitting – Nankin Lake Restoration**

This task included development of construction design plans, technical specifications, and construction cost estimating. During the design phase of the project, plans were advanced to 30% design drawings, with additional engineering, planning, design refinement/modifications, stakeholder collaboration, and technical team review and feedback. Following this review, the design drawings produced were advanced to 50% design for review and then to 95%. Final plans and specifications were developed following the last review including EGLE and Wayne County Construction Permit Office reviews. EGLE Joint Permit Application package was submitted, and the permit was obtained. The Wayne County Permit Office construction application package was prepared and the authorization letter for the permit issuance was obtained. Appendix B.2 includes the Habitat Concept Design Metric Plan, 95% Plans and Technical Specifications, EGLE Permit, and the Wayne County Construction Permit authorization.

### **3.4 Contract Documents and Contractor Selection (Henry Ford Estate Dam Fishway, Oxbow Restoration Phase 3 and Nankin Lake Restoration)**

The design plans and technical specifications developed for the Nankin Lake Restoration and previously under the NOAA GLRI grants for the HFE Fishway and Oxbow Restoration Phase 3 were finalized into the contract bid documents for each project. Wayne County Permit Office application packages were submitted, and authorizations received for the successful contractors to obtain. All Wayne County contractual front-end specifications were prepared, and all EPA grant requirements were incorporated into the contract agreement templates included in each invitation for bid (IFB) packages.

Wayne County administered each of the contractor bidding processes, including issuing the IFB packages, selection of the construction contractors, and contract execution with the chosen contractors. The ARC staff, as Engineer of Record, for the implementation of the HFE Fishway Project and Oxbow Restoration Phase 3 Project assisted in the bidding process. ECT, Inc., as the competitively procured Nankin Lake Restoration Design and Engineering Services consultant, assisted in the bidding processes.

The bidding processes consisted of pre-bid meetings, answering questions/providing clarifications to bidders, developing, and issuing bid addendum as needed. The lowest responsive and qualified bidders were selected for each project as follows:

- **Henry Ford Estate Dam Fishway:** Z Contractors, Inc.; contract execution June 2018; contract amount \$2,214,000.
- **Rouge Oxbow Restoration Phase 3:** E.C.Korneffel Company, Inc.; contract execution June 2018; contract amount \$1,049,007.65.
- **Nankin Lake Restoration:** E.C.Korneffel Company, Inc.; contract execution August 2020; contract amount \$2,932,042.

The Construction Contract bid tabulations are included in Appendix C.

### **3.5 Construction/Construction Oversight (HFE Dam Fishway, Oxbow Restoration Phase 3 and Nankin Lake Restoration)**

The contractors selected completed project construction in accordance with the construction documents with requisite adjustments for unforeseen issues for each project as follows:

- **Henry Ford Estate Dam Fishway:** Z Contractors, Inc.; construction oversight by ARC staff (ECT, Inc.). Construction initiated June 2018; Construction completed August 2023. Required contract modifications included:
  - Modification #1: project cost increase of \$125,000 to restore and prevent further erosion adjacent to Henry Ford Estate Dam that was discovered following project start up.
  - Modification #2: February 2020 project cost increase of \$734,214.37. Settlement amendment to repair damage caused by flooding and soil erosion that occurred prior to project completion.
  - Modification #3: October 2021 time extension to August 2023 to provide time for Wayne County to obtain supplemental grant funding to make repairs to the project caused by historic flooding that occurred in June and July 2021 prior to project

completion.

- Modification #4: June 2022 project cost increase of \$350,863.32 to make repairs to the project site caused by the June/July 2021 historic flooding.
- **Rouge Oxbow Restoration Phase 3:** E.C.Korneffel Company, Inc.; construction oversight by ARC staff (ECT, Inc.). Construction initiated June 2018; Construction completed August 2020. Required contract modifications included:
  - Modification #1: time and project cost increase to \$140,000 to address unforeseen issues including a concrete trough structure and grade beam that was hidden underneath the section of Rouge concrete channel being removed to establish the Oxbow re-connection channel to the Rouge River. This required additional demolition, excavation, backfill and additional dewatering to successfully complete the project.
- **Nankin Lake Restoration:** E.C. Korneffel Company, Inc.; construction oversight by ECT, Inc. Construction initiated June 2021; Construction completed July 2023.

#### Field Engineering/Construction Oversight Services

This work included all functions and activities necessary to provide the oversight required to ensure that all materials and work performed was in conformance with the project plans and specifications. The functions and activities of this task included those typically associated with projects of this nature, including:

- Prepare for and conduct a Pre-Construction site inspection and meeting.
- Respond to inquiries and /or requests for information.
- Attend bi-weekly construction site meetings.
- Review and approve shop drawings and submittals.
- Assist in resolution of issues that arise during construction of the project.
- Provide daily on-site oversight at intervals appropriate to the various stages of construction to observe the contractor's activities to verify that the progress and quality of the project is being constructed in conformance with the project plans and specifications.
- Verify that the contractor uses equipment and methods approved in or specified by the contract.
- Inspect materials to be used in the work, verifying they meet the project specifications.
- Verify that the contractor complies with all permit requirements as they pertain.
- Provide design engineering, specifications, and design drawing development when changes or modifications to the project plans are necessary.
- Conduct site walks with the Contractor to develop the project "punch list" and for updating of those items.
- Conduct an inspection to determine if the work is substantially complete for acceptance as it relates to the contract documents and time; and

#### Construction Administration

Contract administration tasks associated with these projects included:

- Review proposals/claims and make recommendations related to contract modifications, extra work, extra compensation, and/or extensions of contract time.
- Process and maintain records for contract modifications and/or field changes.
- Review and approve or make recommendations on Contractor construction pay applications.

- Tracked and maintained status of miscellaneous submittals and requests for information.
- Review and balance all pay item quantities.
- Provide complete project documentation and files, specifically as they relate to correspondence, meeting minutes, submittals, contract modifications, work orders, material certifications, test reports, and interim progress estimates; and
- Review Contractor's final submission of "as-builts" plans for compliance with the specifications and the work complete.

Construction summaries and As-built drawings for each project are provided in Appendices D, E, F.

## 4.0 PROJECT OUTCOMES

The goals of this project were to implement the Henry Ford Estate Dam (HFE) Fishway, complete implementation of the Rouge Oxbow Restoration by implementing Phase 3 and design and implement the Nankin Lake Restoration project. Now that these projects have been completed, they will help 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.

The Great Lakes Restoration Initiative Action Plan III, Measures of Progress (MoPs) associates with this grant award and the quantitative goals/metrics to be achieved by the grant project were:

- **2.2.1 - Number of aquatic/terrestrial acres controlled by GLRI-funded projects:**
  - 3 acres of invasive species controls
- **4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored, and enhanced by GLRI-funded projects:**
  - 6 acres of habitat restoration.
- **4.1.2 - Number of miles of Great Lakes tributaries reopened by GLRI-funded projects:**
  - 167 miles of Rouge River and tributaries reconnected to the Great Lakes.

### **Overall Grant Award/Project - Measures of Progress Accomplished:**

Measures of Progress (MoPs)		Overall Target	Individual Sites			Accomplished	% Accomplished
Number	Description		Fishway	Oxbow	Nankin		
2.2.1	Acres of invasives controlled	3			7	7	233%
4.1.1	Acres of other habitats created/restored/protected	6	2.3	0.4	6.3	9	150%
4.1.2	Miles of Great Lakes tributaries reopened	167	167.1	0.5		167.6	100%

### 4.1 Project Highlights

The success of these projects, and a notable highlight, was the commitment and involvement of the various partners to get the projects complete and above project targets during the COVID 19 pandemic. In addition, the Rouge Oxbow Restoration Phase 3 project was awarded the Michigan American Public Works Association (APWA) Environmental Project. The Fishway, Oxbow and Nankin Restoration projects also received Keep Michigan Beautiful awards.

**HENRY FORD ESTATE DAM FISHWAY:** Great Lakes Restoration Initiative Action Plan III, Measures of Progress (MoPs) for the Fishway project are Focus Area 4: Habitats and Species - Objective 4.1. Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes.

- 4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI-funded projects:
  - **2.3 acres of habitat restoration.**
- 4.1.2- Number of miles of Great Lakes tributaries reopened by GLRI-funded projects:
  - **167.1 miles of Rouge River and tributaries reconnected to Great Lakes.**

### **HFE Fishway Outputs Achieved**

- 43.8 Rouge River miles and 123.3 miles of Rouge tributary (167.1 miles) reconnected to Great Lakes.
- 2.3 acres of riparian/creek habitat created by 850 linear feet of natural channel fish passage.

### **HFE Fishway Project Awards:**

- 2023 Keep Michigan Beautiful Award.
- 2023 Michigan Chapter American Public Works Association (APWA) – award pending.

**ROUGE OXBOW RESTORATION PHASE 3:** Great Lakes Restoration Initiative Action Plan III, Measures of Progress (MoPs) for the Oxbow project are Focus Area 4: Habitats and Species - Objective 4.1. Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes.

- 4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI-funded projects:
  - **0.4 acres of habitat restoration achieved.**
- 4.1.2- Number of miles of Great Lakes tributaries reopened by GLRI-funded projects:
  - **0.5 miles of Oxbow channel reconnected.**

### **Rouge Oxbow Restoration Phase 3 Outputs Achieved**

- ~ 7,000 yards of debris and fill removed.
- 0.5 miles (2,700 liner feet) of naturalized oxbow reconnected to Rouge River and therefore the Great Lakes
- 0.4 acres of new native riparian habitat created by 280 liner feet of new channel.

### **Rouge Oxbow Project Awards:**

- 2019 Keep Michigan Beautiful Michigan Award in the category of Environmental Enhancement
- 2020 Project of the Year in the category of Environment \$1 million to \$5 million by the Michigan Chapter of the American Public Works Association.

**NANKIN LAKE RESTORATION:** Great Lakes Restoration Initiative Action Plan III, Measures of Progress (MoPs) for the Nankin Lake Restoration project are:

- Focus Area 2: Invasive Species\_- Objective 2.2. Control established invasive species.
  - 2.2.1. Aquatic/terrestrial acreage controlled:
    - **7 acres of invasive species management.**
- Focus Area 4: Habitats and Species - Objective 4.1. Protect and restore communities of native aquatic and terrestrial species important to the Great Lakes
  - 4.1.1 - Number of acres of other habitats in the Great Lakes basin protected, restored and enhanced by GLRI-funded projects:
    - **6.3 acres of habitat restoration.**

### **Nankin Lake Restoration Outputs Achieved**

- ~35,000 cu. yds. of sediment removal
- 6.3 acres in lake habitat created/restored.
  - 3.9 acres of open water habitat
  - 0.1 acre of deep-water habitat (>8 feet)
  - 0.6 acre of sand/gravel/cobble spawning habitat
  - 1.7 acre of emergent/submergent nursery habitat

- 1.0 acre of riparian habitat restoration
- 20 fish habitat structures (felled trees, boulder clusters, and wood cribs)
- 7 Acres of Invasive Species Control
  - 4.0 acres of riparian invasive species control
  - 3.0 acres of wetland invasive species control (phragmites)

**Nankin Lake Project Awards:**

- 2023 Keep Michigan Beautiful Award.

**4.2 Obstacles Encountered**

Several historic wet weather events caused damage to the HFE Fishway at very inopportune times in the project completion (vegetation establishment stages) of the project. This also resulted in the need for project budget increases, time delays and supplemental grant funding amendments and construction contract amendments. To restore the site restoration plans were prepared and executed. These efforts included installing a new row of steel sheet-piling to stop flow in the Rouge River from entering the fishway channel while repairs were made. Repair efforts involved restoring the rock-lined fishway channel, the fishway bench and slopes, and the upstream end to the fishway to the appropriate grades and form. New erosion control blanket and vegetation was installed to specifications and the sheet-piling was left in place to allow adequate time for vegetation establishment to protect the site from future wet weather events (see Appendix D for Fishway Construction Summary).

As mentioned above, the COVID 19 pandemic disrupted and slowed some of the project activities, in particular the design, permitting, construction document development and construction contracting for the Nankin Lake Restoration. COVID 19 stay at home orders and requisite work adjustments slowed the EGLE permitting process, the construction contract procurement document development and advertising process as well as the contractor selection process. These delays, coupled with supply chain issues resulted in the construction bids coming in over grant budget cost estimate. This resulted in the need for a project budget increase and supplemental grant funding award to proceed with the project implementation (see Appendix F for Nankin Lake Restoration Construction Summary).

## **APPENDIX A**

### **Public Outreach Materials**

- Project Information Flyers
- GLRI Celebration Book & Coffee Hour Slides
  - HFE Facebook posts
  - Rouge Oxbow Facebook posts
- Nankin Lake Restoration Facebook posts

# **APPENDIX B.1**

## **Nankin Lake Restoration Field Investigation Information**

- HASP
  - Nankin Base Map
  - Wetlands Summary
- Geotechnical Memorandum
  - Sediment Summary
    - T&E Summary
  - Fish Monitoring Summary
- Herpetofauna Assessment Summary

## **APPENDIX B.2**

### **Nankin Lake Restoration Design/Permitting**

- Habitat Concept Design Metric Plan
- 95% Plans and Technical Specifications
  - EGLE Permit
- Wayne County Construction Permit Approval

## **APPENDIX C**

### **Construction Bid Tabulations**

- HFE Fishway – Z Contractors, Inc.
- Rouge Oxbow Restoration – E.C. Korneffel Company, Inc.
- Nankin Lake Restoration – E.C. Korneffel Company, Inc.

**APPENDIX D**  
**HFE Fishway Construction Summary**  
**&**  
**As Built Drawings**

**APPENDIX E**  
**Rouge Oxbow Restoration Phase 3**  
**Construction Summary**  
**&**  
**As Built Drawings**

**APPENDIX F**  
**Nankin Lake Restoration**  
**Construction Summary**  
**&**  
**As Built Drawings**