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January 16, 2018

Marc Tuchman
US Environmental Protection Agency
Great Lakes National Program Office
77 West Jackson Boulevard
Chicago IL 60604-3590

Subject: Milwaukee Estuary AOC Loss of Fish and Wildlife Habitat BUI Management Actions

Dear Mr. Tuchman:

The Loss of Fish and Wildlife Habitat beneficial use impairment has two types of management actions necessary for delisting per the delisting target. The types of actions required include both sediment remediation and habitat projects. As you know, the list of sediment management actions cannot be completed until sediment characterization is complete and any necessary projects are identified. The list of habitat management actions associated with the Loss of Fish and Wildlife Beneficial Use Impairments was finalized in 2015, and is as follows:

a. Little Menomonee Grassland Restoration (**complete**)
b. Milwaukee River Fish Habitat Enhancement and Expansion (**complete**)
c. Wheelhouse Gateway Riparian Restoration (**complete**)
d. Menomonee River Concrete Removal (**complete**)
e. Five Low Flow Barriers Removal (**complete**)

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f. Kinnickinnic River Habitat Rehabilitation (part of project in design & implementation phases)
g. Burnham Canal Wetland Restoration (in design and bidding phase)
h. Little Menomonee Corridor Restoration (in planning phase)
i. Bay View Wetland Restoration (in design phase)
j. Estabrook Park Dam Fish Passage (in implementation phase)
k. Kletzsch Park Dam Fish Passage (in design & implementation phase)

This information can also be found in all of our Remedial Action Plan Updates since 2015. The RAP Updates can be found on our website, under the "Plans" tab: http://dnr.wi.gov/topic/greatlakes/milwaukee.html. As you can see great progress has been made in recent years in implementing these management actions. We appreciate EPA-GLNPO's support of many of these projects and look forward to your future support, which is vital to success in removing this BUI.

Thank you,

Stephen Galarneau
Director
Office of Great Waters – *Great Lakes & Mississippi River*

CC: Kendra Axness, LAMP and AOC Coordinator
Vic Pappas, Lake Michigan Field Supervisor
Stacy Hron, Milwaukee Estuary AOC Coordinator

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: The Little Menomonee Parkway Grassland Restoration Project

Project Location: Little Menomonee River Parkway, Milwaukee County, Wisconsin (map attached). The project area is a 32-acre site within the Little Menomonee Parkway, bounded by Appleton Avenue to the South, Little Menomonee River Parkway to the east, 107th Street to the west and Lynx Avenue to the north.

Project Sponsor: Milwaukee County Department of Parks, Recreation & Culture

Project Landowner: Milwaukee County Department of Parks, Recreation & Culture

Proposed Work:
This project enhances/expands the grassland habitat in the AOC, and will improve breeding opportunities for grassland species that are designated as state and/or local species of concern. Currently, there is a lack of upland grassland habitat areas of any significant size elsewhere within the AOC.

The objectives of this project are to:

- Restore native grassland habitat on the site,
- Improve breeding and migratory habitat for bird, invertebrate, and herptile grassland species of local concern,
- Reduce erosion from the site to the Little Menomonee River.

Restoration activities include using a forestry mower and chainsaws to remove the stands of non-native invasive woody species, treating stumps and regenerative growth with herbicide, control of other invasive plants and re-vegetation to native prairie. In total, 22.3 acres of invasive shrubs will be restored to grassland and invasive plant management will occur over several growing seasons on the entire 32.5 acres.

This restoration project is a component of a larger 169-acre Milwaukee County Parks restoration and management (R&M) plan for this section of the Little Menomonee River. The R&M plan is a ten-year project that encompasses all short and long term goals/activities such as invasive species control, wildlife habitat management, hiking trail maintenance, and public use. All R&M plans are developed by DPRC Natural Areas staff, reviewed and approved by the DPRC Chiefs of Operations and Planning.

Collaboration with Partners
The project is being implemented by Milwaukee County Department of Parks staff as well as hired contractors. Funding was received through the Wisconsin DNR/Great Lakes Restoration Initiative.

Loss of Fish and Wildlife Habitat
Project Summary

Timetable and Duration

Woody vegetation removal	March 2013 through May 2014, Spring 2015
Invasive species control & native prairie planting	Summer & Fall 2014, Summer & Fall 2015

This project is a component of a larger Restoration and Management Plan along this section of the Little Menomonee River Parkway. As part of that plan, invasive species will be monitored and controlled by Milwaukee County Parks staff to prevent recolonization of the grassland restoration site.

Project Budget & Funding

The total estimated cost for project implementation is $37,000 for materials, equipment rental, and labor costs.

	Quantifiables	Cost
Grassland Restoration	32.5 Acres	
Forestry Mowing-woody invasives	**20 Acres**	
1) Equipment rental, labor (DPRC staff or contractor)	$500/acre	$ 10,000.00
2) Herbicide Treatment (DPRC staff or contractor)	$300/acre	$ 6,000.00
Prairie Planting Contractor - (Seed, Site Prep, Planting)	**20 Acres**	
1) Seed	$300/acre	$ 6,000.00
2) Site prep (options: controlled burn, cut woody veg removal,	$400/acre	$ 8,000.00
3) Planting	$80/acre	$ 1,600.00
Herbaceous Invasives Removal	**12.5 Acres**	
1) DPRC staff time and fringe	$300/acre	$ 3,750.00
2) Herbicide (materials)		$ 1,650.00
		$ 37,000.00

Fish and Wildlife Plan Goals Addressed by Project

4. Improve terrestrial riparian habitat connectivity by expanding riparian buffer habitat quality and continuity.
5. Protecting high-quality areas or environmentally sensitive lands, especially those supporting rare and protected species.

Project Rationale/Why Critical for BUI Removal

Large stands of common buckthorn (non-native invasive species) are encroaching on the existing grassland and provide little to no groundcover due to the dense shade they generate. These buckthorn populations are degrading habitat through the reduction of native species

diversity and the creation of edge habitat which leads to increased predation and parasitism. In addition, the lack of groundcover under the buckthorn makes these areas susceptible to continuous soil erosion during rainfall events. These eroded sediments, along with run off from nearby subdivisions, flow into culverts that drain directly into the Little Menomonee River. By converting the degraded areas (32.5 acres) into grassland through the first phase of this restoration project, erosion issues would be dramatically reduced and absorption of run-off would increase, thereby decreasing the amount of potentially harmful pollutants entering the Little Menomonee River. The removal of the invasive species will also provide critical, improved habitat conditions for breeding and migratory wildlife within a regionally designated environmental corridor (SE WI Regional Planning Commission).

Necessary Project Elements

- Ongoing native plant establishment and invasive plant control will be accomplished by Park Department staff as part of their long-term maintenance for the Little Menomonee River Parkway Natural Areas Plan.
- The project is permanently protected as part of the Milwaukee County Park System.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

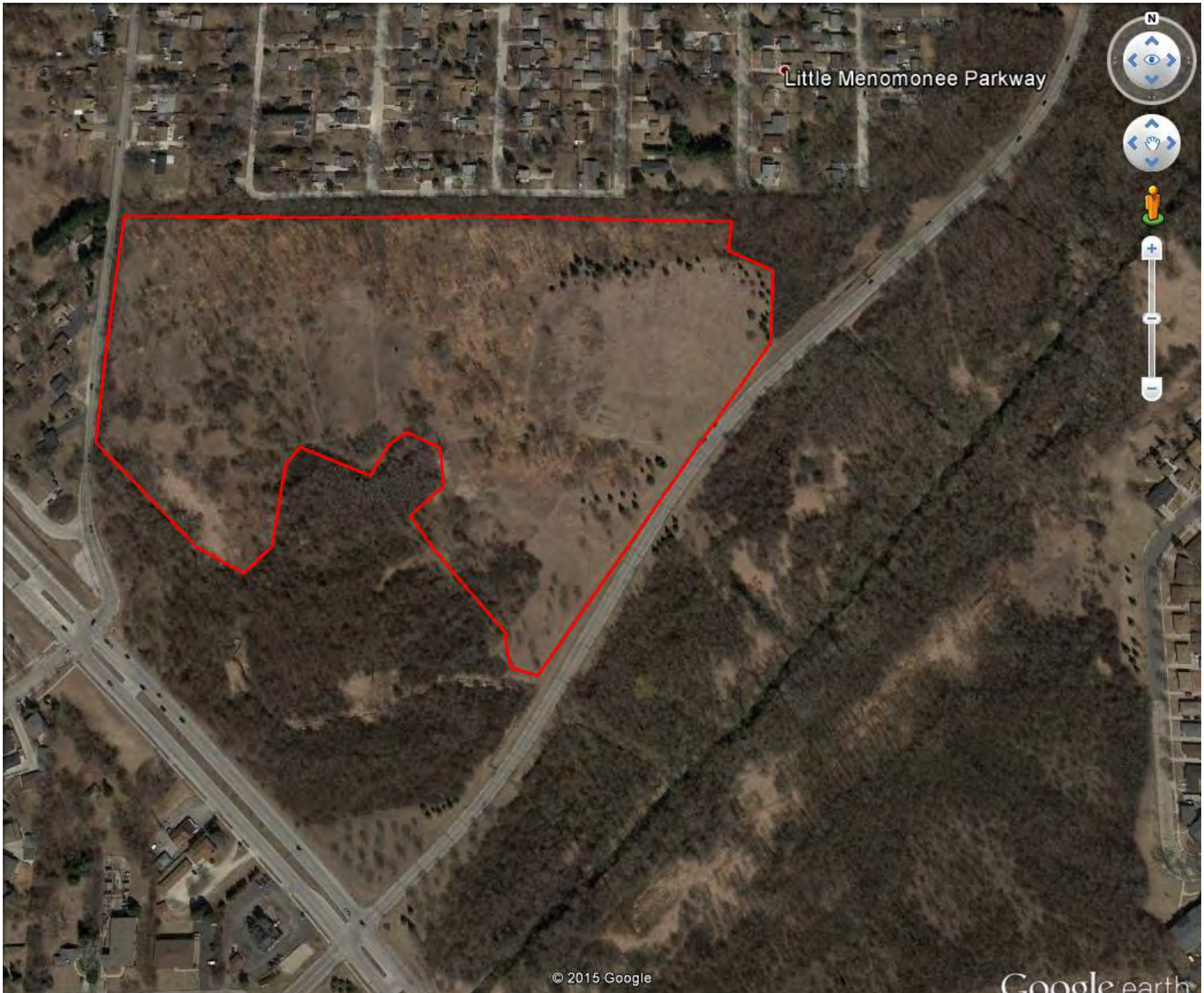
Goals and Metrics Used

Wildlife Habitat Goal	Metric Used to Evaluate Environmental Outcomes
Enhance/improve terrestrial habitat by expanding buffer width to a minimum of 75 feet, or expanding the buffer width to 400' to 1,000' to meet core or habitat area needs	• Area of native upland suitable habitat reconstructed • Area of native species restored • Area of exotic invasive species removed
Enhance/improve terrestrial habitat by identifying and enhancing existing potentially restorable habitat areas through fish and wildlife assessments (for portions of the LMR, this process is already underway from a 2011 wildlife assessment)	• Area of native upland suitable habitat reconstructed • Number of native species restored • Area of exotic invasive species removed • Area of native species restored

Loss of Fish and Wildlife Habitat
Project Summary

February 2015

Loss of Fish and Wildlife Habitat
Project Summary



Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Bay View Wetland/Grand Trunk Wetland Restoration

Project Location: SE Bank of Kinnickinnic River, Adjacent to Estuary

Project Sponsor: City of Milwaukee

Project Landowner: City of Milwaukee Port Authority

Proposed Work
The City has proposed restoring this wetland, which is hydrologically connected to the KK River and Estuary. The wetland site is adjacent to redevelopment property and has a history of filling and other disturbance. Their goal is to restore the wetland to be a benefit for fish and wildlife as well as an amenity for the area.

Collaboration with Partners
The City worked with a stakeholder committee, including WDNR and a few Tech Team members, during the master planning process. The Tech Team and WDNR would like to continue to be involved as Stakeholders in the project going forward.

Timetable and Duration
Master Planning 2013-2014
The timetable and duration of design and implementation phases are unknown and dependent on funding. Design and implementation would be feasible in a two year timeframe.

Project Budget & Funding
Master planning for the site was paid for by a $148,400 grant from Fund for Lake Michigan. Estimates range from $2 Million -$6 Million for total site development, including items beyond wetland restoration.

Fish and Wildlife Plan Goals Addressed by Project

1. Enhance/improve aquatic habitat by…
    A. Identifying and enhancing fish spawning sites from Lake Michigan to the tributaries and headwaters where opportunities exist (e.g., inner and outer harbors, Milwaukee River downstream of the North Ave. Dam pedestrian bridge), and/or
    B. Improving lateral connectivity by connecting aquatic habitat to floodplain wetland with suitable hydroperiod from Lake Michigan to the tributaries and headwaters where opportunities exist.
2. Improve aquatic habitat connectivity by…
    A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or
3. Enhance/improve terrestrial, semi-aquatic, and/or riparian habitat by…
    A. Expanding habitat buffer width to a minimum of 75 feet, and/or
    B. Where possible, expanding shoreline buffers up to 1,000 feet to meet core habitat area needs for semi-aquatic species, and/or
4. Improve terrestrial riparian habitat connectivity by expanding riparian buffer habitat quality and continuity.

5. Protecting high-quality areas or environmentally sensitive lands, especially those supporting rare and protected species.

Project Rationale/Why Critical for BUI Removal

This site contains one of the only remaining wetlands in the estuary/harbor area, thereby providing an important opportunity for restoration of fish spawning and other wetland and riparian habitat in the estuary. It is the only wetland left in the Kinnickinnic watershed with natural hydrology necessary to restore a functional seiche wetland, which is a critical habitat important for northern pike spawning. The site also contains an isolated population of Butler's Gartersnake, a Species of Local Conservation Interest (SLCI) now mostly absent from the estuary and opportunity for restoring populations of several other SLCI which have significantly declined. These include organisms that are dependent upon an ephemeral pond as a critical habitat feature (e.g., primary burrowing crayfish and amphibians) and riparian shoreline habitat (e.g., several breeding and migratory birds and bats). The site could therefore contribute to enhancing habitat and populations of several SCLI.

Necessary Project Elements

- A seiche wetland with a passively controlled hydrologic connection to the river and in turn estuary. The connection should be passable by aquatic organisms, with northern pike the target species to use for design purposes.
- An adequate buffer between aquatic habitats and development (as defined above in goal 3).
- Any passive recreational activities on site should not interfere or be in conflict with the habitat or wildlife value of the site.
- Incorporate ephemeral wetlands on the site that remain fish-free and preserve, enhance and/or creating snake denning sites. These are critical habitats for semi-aquatic SLCI are already present on site.
- Preserve and restore upland habitat on site that support sustainable SLCIs (i.e. first do no harm to existing species inhabiting the site).
- An invasive species and vegetation management plan (aquatic and terrestrial) with provisions made for long-term implementation.
- A stormwater management plan for the entire site is recommended.
- Some type of permanent conservation protection for the site (conservation easement or equivalent).
- Maximize benefits for multiple species (fish, waterfowl, invertebrates, etc.) with a focus on SLCI (see Species Checklists and match SLCI to proposed habitat goals).
- If possible, provide access to the wetland for canoes or kayaks, but limiting access to only non-motorized vessels is recommended.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Create and protect wetland habitat through the establishment of a functional seiche wetland with suitable Northern Pike spawning habitat on site.
- Spawning of Northern Pike demonstrated.
- Physical establishment of a functional, fish-free, ephemeral wetland habitat on site, occupied by ephemeral wetland dependent SLCI (e.g., amphibians, fairy shrimp).
- A goal of 6.5 acres of wetland and habitat present on site.
- Removing impediments to establish functional aquatic organism passage.
- Removing historic fill.
- Creation or enhancement of upland buffer habitat surrounding wetland habitats.

- An increase in the number of SLCI utilizing the site, as measured by appropriate occupancy documentation.

Loss of Fish and Wildlife Habitat
Project Summary

February 2015

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Burnham Canal Wetland Restoration Project

Project Location: Burnham Canal in the vicinity of S. 11th Street and W. Bruce Street

Project Sponsors: Milwaukee Metropolitan Sewerage District (MMSD)

Project Landowner: City of Milwaukee, Miller Compressing, and other private owners

Proposed Work
MMSD proposes to fill in the Burnham Canal to create wetland habitat, restoring habitat in an area that historically had abundant wetlands but is now nearly entirely devoid. The Burnham Canal is a 3,000 foot long unused shipping canal in the Menomonee River Valley, just south of downtown Milwaukee, Wisconsin. The restoration would create 7.5 acres of wetland habitats along an over half mile corridor in the heart of urban Milwaukee. The project would create an oasis for fish and wildlife of the Menomonee River Valley.

Some work has already been completed that would allow the project to proceed. The Burnham Canal is part of a working industrial harbor and contains contaminated sediments. Both the contamination and navigation issues are being addressed by MMSD. Congress has removed the previous navigable waterway designation as the canal currently serves no use to the local industry. This removes a regulatory barrier for permits to be granted for a fill project. The project area west of the 11th Street Bridge was declared a Superfund Alternative site due to the contamination of metals and polycyclic aromatic hydrocarbons (PAHs) within the sediment. Miller Compressing Company is the cooperating responsible party required to implement the EPA's Record of Decision (ROD), which includes a 12-inch sand cover over the bed of the canal. MMSD proposed a betterment to the ROD by replacing the 12-inch sand cover with 15-20 feet of granular fill and extending this work west to the Canadian Pacific Railroad (CP RR) Bridge near the mouth of the canal. This alternative cover would allow wetland habitat to be created on top of the cover material.

A combination of shallow marsh and seasonally flooded wetlands would be created within the filled canal. Vegetation and other features would be designed to improve the Canal's water quality and fish and wildlife habitat. The design will focus on the creation of spawning and nursery habitat for Northern Pike that will be adaptive to climate change and also enhance habitat for other Species of Local Conservation Interest (SLCI). The project will be constructed in two phases divided by the 11th Street Bridge. Phase 1 consists of the area west of the 11th Street Bridge and Phase 2 consists of the area east of the bridge to the CP RR Bridge. When completed, Phase 1 will restore 4.5 acres of wetland and Phase 2 will add an additional 3 acres of wetland habitat.

Collaboration with Partners
MMSD has an agreement with Miller Compressing, the responsible party for the Superfund ROD. Under the terms of the agreement, Miller Compressing will pay MMSD $2.2 million to construct the wetland which will satisfy the terms of the ROD. This funding is contingent upon MMSD obtaining additional funding necessary to construct the Phase 1 section by June 30, 2015. If MMSD does not obtain the additional funding then Miller Compressing will not pay MMSD $2.2 million and will construct an

aggregate sediment cap. The aggregate cap will meet the requirements of the ROD and allow for the future construction of a wetland, if funding becomes available.

The US Army Corps of Engineers (USACE) is designing the Burnham Canal wetland project under their Remedial Action Plan (RAP) program. MMSD has received grant funding from Fund for Lake Michigan to fund the local share of these design costs. Several members of the Tech Team are working with MMSD and the USACE to provide feedback on the wetland design. This includes the City of Milwaukee, WDNR, and SEWRPC. MMSD will utilize multiple public and private partnerships to perform post construction monitoring and future educational outreach.

Timetable and Duration

Design: Ongoing – September, 2015
Permitting and Real Estate: June 2015 – December 2015

Phase 1 Implementation Schedule:
Construction: Spring 2016 – Fall 2019
Post Construction Monitoring: 2020 - 2025

Phase 2 Implementation Schedule: TBD

Project Budget & Funding

	Pre-Design	Design	Construction	Post-Construction
Phase 1	$130,000	$300,000	$3,500,000	$115,000
Phase 2			$3,000,000	$115,000
Total	$130,000	$300,000	$6,500,000	$230,000
Currently Funded	$130,000	$300,000	$2,200,000	$0
Still Needed	$0	$0	$4,300,000	$230,000

Remaining funding needed:

	Construction	Post-Construction	Total
Phase 1	$1,300,000	$115,000	$1,415,000
Phase 2	$3,000,000	$115,000	$3,115,000
Total funding still needed	$4,300,000	$230,000	$4,530,000

Miller Compressing will provide $2.2 million towards the Phase 1 work if MMSD obtains the remaining $1.415 million by June 30, 2015. MMSD is seeking grant funding for the $1.4 million through the NOAA Habitat Restoration Grant in 2015. MMSD also has a grant award for $27,500 from the Wisconsin Coastal Management Grant. MMSD will seek additional funds for the Phase 2 work as soon as funding is secured for Phase 1. The design cost for both phases of the project is $300,000. The USACE is funding $195,000 and MMSD received a grant from Fund for Lake Michigan for this remaining $105,000.

Loss of Fish and Wildlife Habitat
Project Summary

Fish and Wildlife Plan Goals Addressed by Project

1. Enhance/improve aquatic habitat by…
    A. Identifying and enhancing fish spawning sites from Lake Michigan to the tributaries and headwaters where opportunities exist (e.g., inner and outer harbors, Milwaukee River downstream of the North Ave. Dam pedestrian bridge), and/or
    B. Improving lateral connectivity by connecting aquatic habitat to floodplain wetland with suitable hydroperiod from Lake Michigan to the tributaries and headwaters where opportunities exist.
2. Improve aquatic habitat connectivity by…
    A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or
3. Enhance/improve terrestrial, semi-aquatic, and/or riparian habitat by…
4. Expanding habitat buffer width to a minimum of 75 feet, and/or Improve terrestrial riparian habitat connectivity by expanding riparian buffer habitat quality and continuity.

Project Rationale/Why Critical for BUI Removal

This project provides one of the only opportunities to restore a seiche wetland to the Menomonee Valley and estuary, where thousands of acres of such wetlands existed prior to 1900. The seiche wetland is a critical habitat important for successful spawning of Northern Pike and other fish species. The project will also provide habitat for numerous bird, mammal, herptile and fish species in an area otherwise lacking appropriate habitat. It will more than double the wetland habitat in this urban area by creating 7.5 acres of shallow marsh and seasonally flooded wetlands.

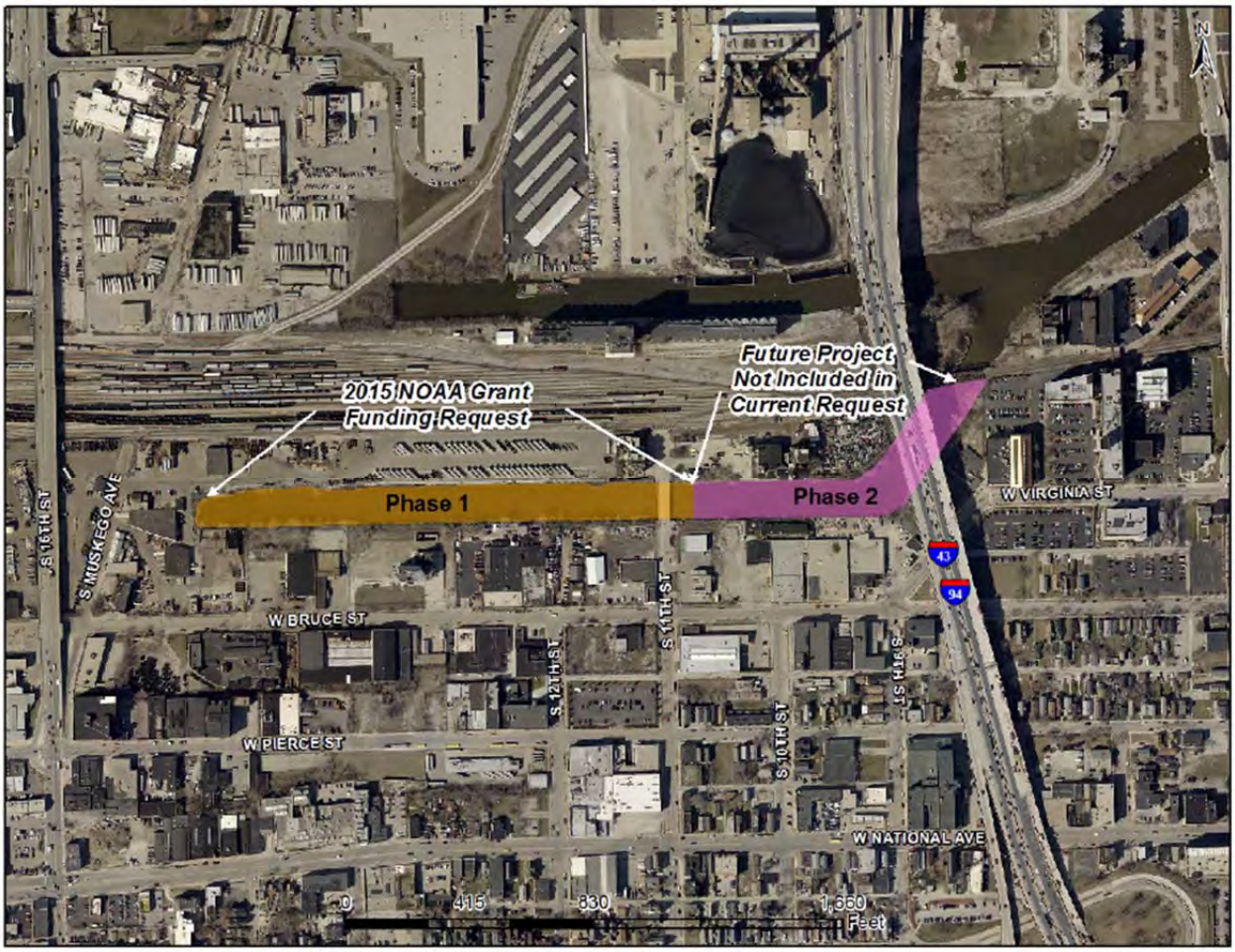
Necessary Project Elements

- A seiche wetland with a passively controlled hydrologic connection to the estuary. The connection should be passable by aquatic organisms, with northern pike the target species to use for design purposes.
- A design that incorporates a variety of wetland types and includes improvements for other wetland dependent SLCI is recommended (e.g., birds, herptiles) in addition to fish.
- The vegetation plans should be designed to be as resistant to invasive species as possible.
- An invasive species and vegetation management plan (aquatic and terrestrial) that will be implemented in both a short and long term basis.
- Include submergent and emergent vegetation cover types. Shoreline and wetland vegetation should be selected to maximize food resources for breeding and migratory birds.
- Some type of permanent conservation protection for the site (conservation easement, deed restriction or equivalent).

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Establishment of a functional seiche wetland with suitable Northern Pike spawning habitat on site.
- Spawning of Northern Pike demonstrated.
- An increase of acres of wetland and other wildlife habitat present on site.
- An increase in the number of SLCI utilizing the site, as measured by appropriate occupancy documentation.
- Creation of 7.5 acres of wetland habitat.

Loss of Fish and Wildlife Habitat
Project Summary



Burnham Canal Project Site (phases 1 & 2)

June 2015

Loss of Fish and Wildlife Habitat
Project Summary

Photo of Burnham Canal looking east

June 2015

Loss of Fish and Wildlife Habitat
Project Summary

Burnham Canal Artistic Rendering

June 2015

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Milwaukee River Fish Habitat Enhancement and Expansion

Project Location: Milwaukee River, downstream of former North Avenue Dam

Project Sponsor: WDNR

Project Landowner: River Revitalization Foundation/on riverbed

Proposed Work

The Wisconsin Department of Natural Resources (WDNR) constructed Phase 2 of the Milwaukee Estuary Area of Concern (AOC) fish spawning habitat project during October 2014. The project involved the modification and expansion of the existing Phase 1, 0.45-acre rock reef constructed in 2006 (Wawrzyn, 2007). Both phases of the reef project were planned to meet over lapping spawning life-requisites of walleye, lake sturgeon and other game and non-game simple lithophilic spawning fishes. Modifications to the existing reef involved lowering a portion of the existing rock reef to reduce the frequency that areas of the reef are desiccated by long-term (monthly-annual) decreasing Lake Michigan water levels, and more frequent short-term (hourly) fluctuations in water levels caused by lake seiche amplified through the Milwaukee River's long and confined connecting channel. The existing reef elevations ranged from 576.0-ft to 577.4-ft. Based on Lake Michigan's 95-year record low elevation of 576.02-ft and seiche of +0.8-ft observed during construction of the Phase 1 reef, the planned maximum elevation for modifying or expanding the reef was proposed to be 575.0-ft. The plan to expand the existing reef by 0.4-acres and 200-linear feet was not feasible. Lake levels increased by 1.7-ft between the planning and construction phase of the project. Higher lake levels required a reduction in the reef length as greater volumes of rock were needed to construct a wider and higher causeway to provide a visible, stable and safe foundation for the contractor equipment and operator.

Collaboration with Partners

Timetable and Duration
Construction completed in October 2014

Project Budget & Funding
$63,331 FFLM &

Fish and Wildlife Plan Goals Addressed by Project

1. Enhance/improve aquatic habitat by…
A. Identifying and enhancing fish spawning sites from Lake Michigan to the tributaries and headwaters where opportunities exist (e.g., inner and outer harbors, Milwaukee River downstream of the North Ave. Dam pedestrian bridge), and/or

Loss of Fish and Wildlife Habitat
Project Summary

Project Rationale/Why Critical for BUI Removal

Extensive areas of the Milwaukee River Estuary Inner Harbor and the open water Outer Harbor areas south of the Milwaukee River may not be conducive to rock spawning reef or shoal construction, or use of coarse woody debris and other structures for cover. These features could be subject to burial by sediment transported by the three rivers. Existing sediments are thick and may not bear the weight of rock without specially engineered base caps. Large tracts will continue to be dredged to maintain commercial navigation depths including the Harbor's Kinnickinnic River channel, the Menomonee River to 25th St., the Milwaukee R. to Buffalo St. extended and Outer Harbor south of its confluence with the Milwaukee R. Placement of physical structures could conflict with navigational uses. Within the Inner Harbor, the Milwaukee R. between the former North Avenue Dam and Humboldt Avenue Bridge and constructed rock spawning reef provide the best opportunities.

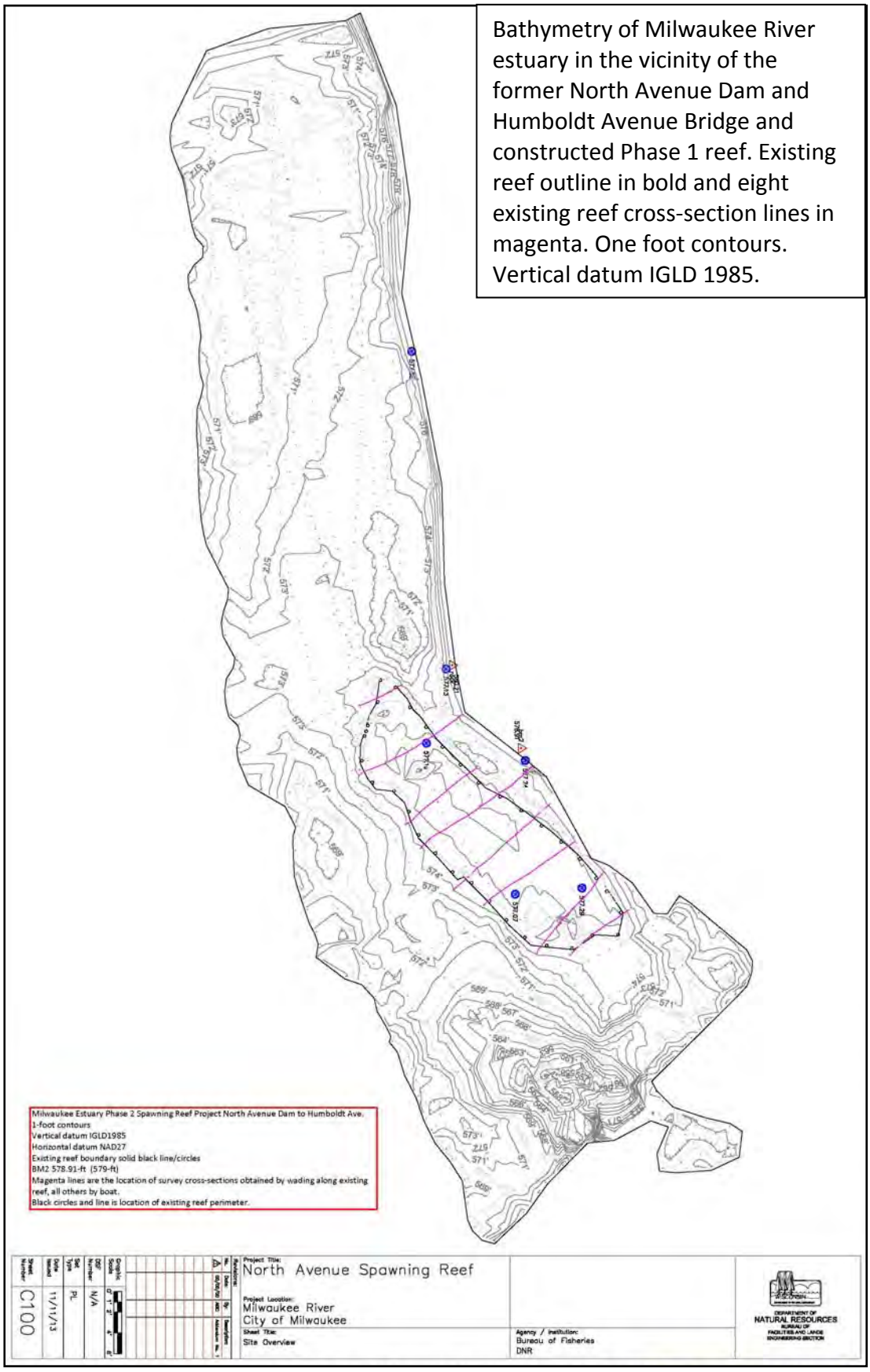
Necessary Project Elements

- Enlarged spawning reef located in the area of the former North Avenue Dam. Re-grade the existing reef to the lowest practicable elevation (575.0-ft) without disturbing the original sandy shoal.
- Enhance and expand the existing reef's function and value for lithophilic spawning fishes.
- Abate the potential impacts caused by low lake levels and seiche oscillations.
- The lateral extent of the reef should be located on riverbed extending from land and river bed titled to the River Revitalization Foundation to the channel centerline.
- Consistent with the spawning life-requisites for walleye and Lake sturgeon (McMahon et al., 1984; Aadland and Kuitunen, 2006).
- Design must be buildable, acceptable to landowners, and permitable by regulatory agencies.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Completions of spawning reef (size)
- Evidence of native fish spawning.

Loss of Fish and Wildlife Habitat
Project Summary



Bathymetry of Milwaukee River estuary in the vicinity of the former North Avenue Dam and Humboldt Avenue Bridge and constructed Phase 1 reef. Existing reef outline in bold and eight existing reef cross-section lines in magenta. One foot contours. Vertical datum IGLD 1985.

May 2015

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Wheelhouse Gateway Riparian Restoration

Project Location: North Riverboat Road, Milwaukee (west/north bank of the Milwaukee River)

Project Sponsor: River Revitalization Foundation

Project Landowner: River Revitalization Foundation

Proposed Work

The Wheelhouse site is a 2.8 acre parcel along 650 feet of Milwaukee River shoreline in the AOC, about 1 mile upstream from downtown and Lake Michigan and adjacent to 800 acres of primary environmental corridor contained within Milwaukee, Shorewood, and Glendale. The proposed work addresses shoreline stabilization, erosion control, invasive species removal and the addition and enhancement of native species, canoe launch improvements, rain garden installation, and trail connections. The approach on this project is to use proven bioengineering techniques for bank and slope stabilization and to replace invasive and non-native plants with diverse native vegetation through an all biological engineered solution. This will start at the river bank and continue to the top of the river bluff along most of the site. The project overall will serve as an example of the best combination of fisheries biology, bank stabilization, native vegetation establishment and pollutant reduction in a developed urban area. The proposed construction work will consist of several phases that will take place over three months and be followed by ongoing management, starting with initial site stabilization and sediment control, tree clearing, grading, river bank stabilization, soil placement, compost blanketing, reseeding, slope interrupter placement, biodegradable turf reinforcement mat placement, hydro mulching (2:1 slopes and steeper), and tree and shrub planting. Maintenance and care work will follow immediately and continue for three years (the construction season plus two years). This will include watering, weed control, small erosion repair, and reporting.

Collaboration with Partners

RRF is a partner in the Southeastern Wisconsin Watersheds Trust (SWWT) funded by the Joyce Foundation, working to improve water quality through a watershed approach. Our role as land trust is to identify, prioritize and implement projects in our Land Protection Plans for the Milwaukee and Menomonee Rivers that are also aligned with the Watershed Restoration Plans for these and the Kinnickinnic River. We are a founding organization of the Milwaukee River Greenway Coalition which is implementing a Greenway Master Plan for the 800 acre river valley protected through City ordinance; this being one of the priority projects within the greenway. Because of our location, we also belong to the Lake Michigan Shorelands Alliance facilitated by Gathering Waters Conservancy working to protect and enhance the lands within the Lake Michigan basin.

Timetable and Duration

Start Date June 15, 2013 End Date: December 31, 2013 and ongoing maintenance. Maintenance follows in perpetuity.

Project Budget & Funding

$700,000 – DNR Knowles-Nelson Stewardship Fund – Acquisition
$40,000 – River Revitalization Foundation (small local funding sources – Building demolition
$248,000 – Fund for Lake Michigan – Shoreline restoration

Loss of Fish and Wildlife Habitat
Project Summary

Fish and Wildlife Plan Goals Addressed by Project

3. Enhance/improve terrestrial, semi-aquatic, and/or riparian habitat by…
    A. Expanding habitat buffer width to a minimum of 75 feet, and/or
    B. Where possible, expanding shoreline buffers up to 1,000 feet to meet core habitat area needs for semi-aquatic species
4. Improve terrestrial riparian habitat connectivity by expanding riparian buffer habitat quality and continuity.

Project Rationale/Why Critical for BUI Removal

At the time of acquisition, in 2009, the Wheelhouse site represented one of the only opportunities for habitat restoration within the AOC. The dearth of suitable habitat restoration sites is largely due to the channelized character of most of the rivers within downtown. Habitat restoration efforts would further be challenged by the fragmentation of any terrestrial habitat that was created. The Wheelhouse is located at the southern end of the Milwaukee River Greenway. It is thus connected to over 800 acres of riparian habitat. The site is one of the last parcels on the river that does not have an armored shoreline, making it one of very few candidates for this type of shoreline restoration.

Necessary Project Elements

- **Site Preparation** work will begin with the installation of biodegradable compost filled socks to the site. We will progress through the site from downstream to upstream. This critical first step prevents further sediment laden runoff from entering the river. Filtrexx is preferable to silt fence because there is no trenching necessary for installation. This trenching causes damage to trees and further destabilizes soil.
- **Selective tree and shrub removals** will begin the construction phase. Non-native trees, hazardous trees and invasive trees and shrubs will be cut and treated with herbicide. All woody debris will be chipped and/or used on site for plant protection and habitat. We anticipate removing approximately one third of the current tree cover with future removal taking place over a longer period with native forest dynamics being the goal. Trees that are preserved will be treated with great care during all construction phases.
- **Bank stabilization** will be performed with a system of fabric encapsulated soil lifts that include all biodegradable materials, native plant plugs, native seed, and compost based engineered soils. Areas below the two year flood line are relatively stable and will be undisturbed with the exception of planting an area of emergent aquatic plugs near and below the ordinary high water mark.
- **Fishing access** will be constructed with and wholly integrated into the bank stabilization efforts. They will consist of limestone slabs laid onto the existing FES sections so as to create steps down to the water's edge, just above the 2 year flood line.
- **Slope stabilization** will take place with a similar pallet of materials as the FES lifts and a common approach; Use all biodegradable materials, low impact construction methods, and the best compost, and aggregate materials available to ensure a weed free, quickly established native plant cover that will offer exceptional resistance to erosion and the best ecosystem support available.
- Plant species will be prescribed for each site with consideration given to slope aspect, anticipated weed competition, existing adjacent vegetation, along with consideration of anticipated species dynamics of the site. 4-5 Native emergent aquatic species, 24-30 herbaceous species (grasses,

sedges, and forbs), 8-12 shrub species, and 3-5 tree species will be utilized. All species will be native to Milwaukee County and sourced from the closest genotypic source available. Construction work will take an estimated three months until completion.

- **Ongoing Vegetation management** will take place for 3 years following construction. The main species of concern on this parcel are Crown Vetch, Garlic Mustard, Reed Canary Grass, Thistle, and Burdock. Each species has very different management methodology, all of which will be implemented according to the appropriate ecological timeline (based on weather). The invasive species control will be a continued effort for at least 4 years. During that time, species diversity and invasive eradication will be monitored and management may be adapted to achieve maximum success rates.
- Permanent conservation of the site is ensured by RRF ownership of the property. RRF is committed to continued management.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Approximately 650 feet of shoreline restored.
- 2.8 acres of restored habitat connected to over 800 acres of Greenway habitat.
- Expand riparian buffer of at least 100 feet between hardscape and river and enhance the quality of the buffer by replacing with native vegetation and habitat features.
- Extend the continuity of natural shoreline by approximately 650 feet, connected to existing natural shoreline.

Loss of Fish and Wildlife Habitat
Project Summary

May 2015

Loss of Fish and Wildlife Habitat
Project Summary

May 2015

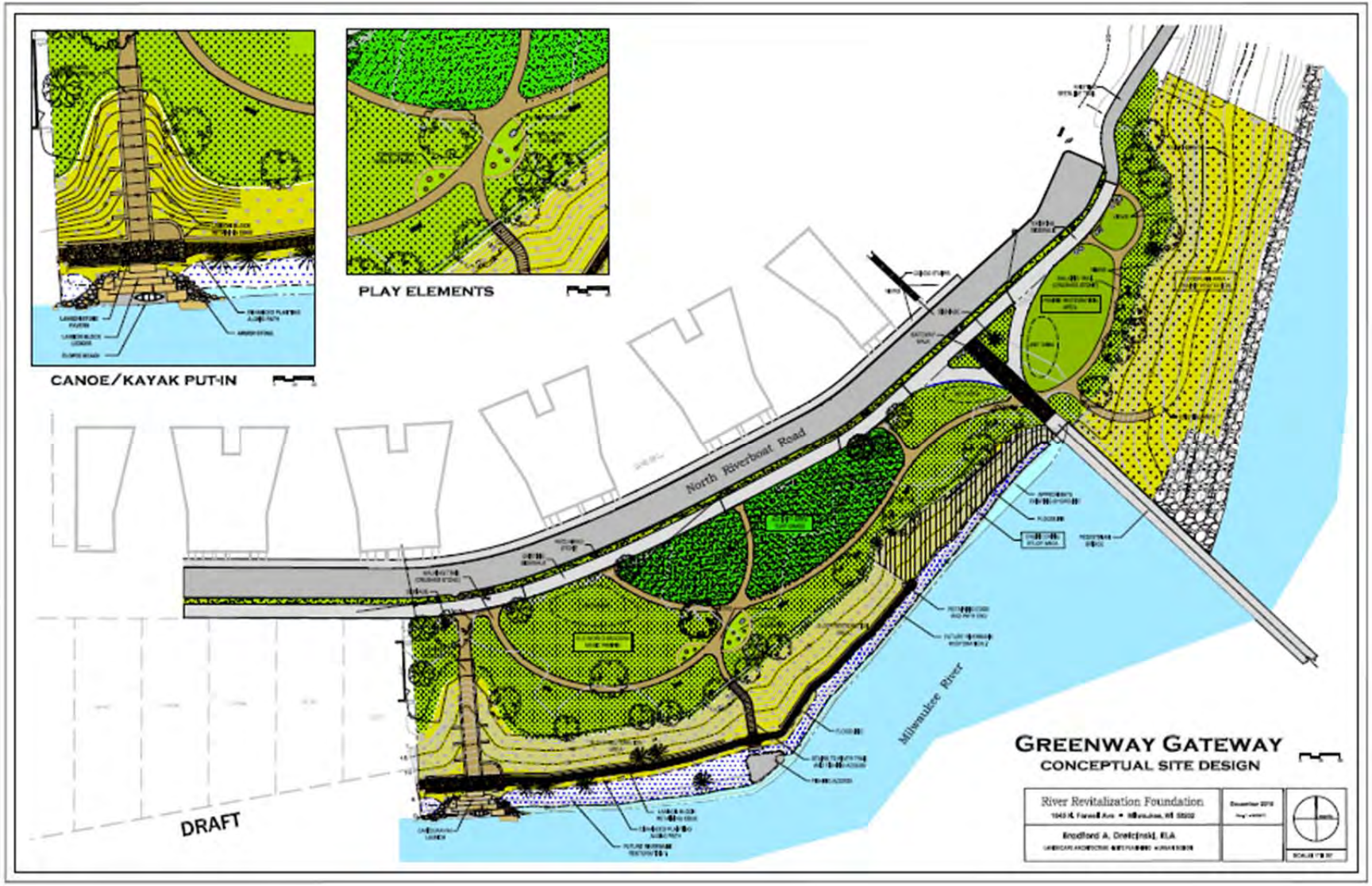
Loss of Fish and Wildlife Habitat
Project Summary

May 2015

Loss of Fish and Wildlife Habitat
Project Summary

May 2015

Loss of Fish and Wildlife Habitat
Project Summary



May 2015

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Menomonee River Stream Management (Concrete Removal) Phases 1 & 2

Project Location: Menomonee River Soo Line Railroad Bridge to Wisconsin Ave (Phase 1) and Wisconsin Avenue to 500 feet south of Interstate 94 (Phase 2)

Project Sponsors: Milwaukee Metropolitan Sewerage District (MMSD) (Phases 1 & 2) and US Army Corps of Engineers (USACE) (Phase 2)

Project Landowner: MMSD

Proposed Work
MMSD, in partnership with USACE, is completing the removal of 3,700 linear feet of concrete channel lining on the downstream reach of the Menomonee River to remove passage barriers to aquatic organisms and improve habitat conditions within this specific channel reach. This work is being completed in two phases (figure 1). Phase 1 consisted of the 1,100 feet of channel at the upstream portion of this section and was completed by MMSD in 2014. Phase 2 is the downstream 2,600 feet of this section. This phase is currently under construction and is being undertaken by the USACE with MMSD as the local partner. It is scheduled for completion in early 2016.

Concrete channel lining was installed in this section of the Menomonee River in the 1960's to improve the river's flood carrying capacity; however, it created a significant barrier to aquatic organisms between Lake Michigan and the upstream Menomonee River watershed. MMSD started the removal of these barriers in 2000 with the removal of 1,100 feet of concrete channel lining and the upstream drop structure. Following the completion of Phases 1 & 2, as well as MMSD's Low Barrier Removal Project (completion 2015) located upstream of Hart Park, the barriers will be removed opening fish passage from Lake Michigan to the Lepper Dam at Menomonee Falls at Menomonee River mile 17. This will enable fish to access 37 miles of fluvial and 1,000 acres of wetland spawning and nursery habitat and expand recreational fishing opportunities for trout and salmon, and other native game fishes not previously available.

Removal of the concrete invert and replacement with graded stone substrate will also improve conditions by:

- increasing groundwater discharges to the stream
- creating interstitial spaces and flow (hyporheic flow) for macroinvertebrates,
- providing substrate for lithophilic spawning fishes to deposit and protect eggs,
- summer cooling,
- providing cover for juvenile fish, and microbes and biofilms capable of converting inorganic forms of nutrients (e.g., denitrification) thereby improving water quality.

WDNR Fisheries Management has an approved project to evaluate the effectiveness of Phase 1 and 2 projects for enabling fish passage.

Collaboration with Partners
MMSD has worked with several members of the Tech Team including the WDNR, SEWRPC, Milwaukee Riverkeeper, and Trout Unlimited on the Menomonee River concrete removal projects. These agencies have provided funding or in-kind contributions for professional services for the project design, pre- and

post-construction monitoring, and education outreach. MMSD also received grant funding from the US Environmental Protection Agency and the National Fish and Wildlife Foundation.

Timetable and Duration

Phase 1
Design: 2010 – 2013
Construction: May 2013 – Dec 2014

Phase 2
Design: 2013 - 2014
Construction: Ongoing – Spring 2016

Post Construction Monitoring (Both Phases): Spring 2016 - 2017

Project Budget & Funding

	Design	Construction	Post-Construction
Phase 1	$750,000	$4,600,000	$50,000
Phase 2	$750,000	$6,000,000*	$50,000
Total	$1,500,000	$10,600,000	$100,000
Currently Funded	$1,500,000	$10,600,000	$100,000
Funding Needed	$0	$0	$0

*For the Phase 2 project construction costs, the USACE is funding approximately $4 million (65%) and MMSD is funding the remaining $2 million (35%).

Fish and Wildlife Plan Goals Addressed by Project

1. Improve aquatic habitat connectivity by…
    A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or
    B. Improving lateral connectivity by connecting aquatic habitat to floodplain wetland with suitable hydroperiod from Lake Michigan to the tributaries and headwaters where opportunities exist.
2. Improve aquatic habitat connectivity by…
    A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or
    B. Reconnecting high quality habitat downstream of the Bridge Street Dam and Lepper Dam to the main stem rivers of the AOC in cases where that habitat is directly connected to the estuary (i.e., there are no downstream barriers from the proposed project site).

Physical/biological habitat secondary goals:
1. Moderate flow regimes to decrease flashiness.
2. Provide and preserve sufficient baseflow.

Project Rationale/Why Critical for BUI Removal

Prior to European settlement, the Milwaukee Estuary provided extensive fluvial and wetland habitats for a diverse fish assemblage as well as access to hundreds of miles of upstream riverine and floodplain

habitats for spawning and development. All of the wetlands, conservatively estimated at 6,000 acres, have been filled and all of the estuaries fluvial habitats were dredged and bulkheaded, and access to upstream habitats were obstructed by dams or concrete channel inverts. Existing land and water-based uses in the estuary prevent these historic habitat functions and values from being restored, and as a result, with few exceptions self-sustaining populations of many ecologically and economically important fish stocks are not possible. To mitigate these estuary habitat losses federal, state and local management groups have contributed to the removal of barriers (dams, culverts, concrete inverts) to enable lake and estuary fish to access remaining spawning and nursery habitats upstream of the estuary, and provide a source of return recruitments to the estuary and lake. The removal of this final section of concrete will open up 37 miles of fish passage to historical spawning and rearing habitat including over 1,000 acres of riparian wetlands. It will provide benefits to multiple aquatic and semi-aquatic species including fish and benthos. Game fish species expected to benefit include Lake Sturgeon, Redhorse Sucker species, Walleye, Lake Run Trout, Salmon, Northern Pike and Smallmouth Bass.

Necessary Project Elements

- Replace the concrete channel lining with a stone lined channel throughout the project reach.
- Install pool/ riffle systems that allow native fish (e.g. Northern pike) to pass through the steep section of the river.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Providing fish passage through this section of the river to allow access to upstream spawning and rearing habitat.

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Kletzsch Park Dam Fish Passage

Project Location: Milwaukee River at river mile 10 (10-miles upstream of confluence with Lake Michigan). Between Green Tree Rd. and Bender Rd., City of Glendale, Milwaukee County.

Project Sponsor: Milwaukee County

Project Landowner: Milwaukee County

Proposed Work
The goal of this project is to provide aquatic organism passage at the Kletzsch Park Dam. The dam is a barrier to native fish and other aquatic life passage except during infrequent and extended duration flood events. The structure would be passive by design, require minimal to no operation and maintenance cost, and would permanently allow passage upstream in the Milwaukee River (Aadland, 2010).

Collaboration with Partners
The Tech Team and WDNR would like to be involved as Stakeholders in the project.

Timetable and Duration
The timetable and duration of design and implementation phases are unknown and dependent on funding. Planning and design through implementation would be feasible in a two year timeframe.

Project Budget & Funding
There is currently no funding to plan or construct fish passage at this dam. The County is pursuing funding for that aspect of the project. A rough estimate for planning, design, construction and ancillary tasks is $650,000.

Fish and Wildlife Plan Goals Addressed by Project
The proposed project is consistent with the goals set forth in the Milwaukee Estuary AOC Remedial Action Plan 2013 Update, Fish and Wildlife Plan, including;

1. Enhance/improve aquatic habitat by…
    B. Improving lateral connectivity by connecting aquatic habitat to floodplain wetland with suitable hydroperiod from Lake Michigan to the tributaries and headwaters where opportunities exist.
2. Improve aquatic habitat connectivity by…
    A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or
    B. Reconnecting high quality habitat downstream of the Bridge Street Dam and Lepper Dam to the main stem rivers of the AOC in cases where that habitat is directly connected to the estuary (i.e., there are no downstream barriers from the proposed project site).

Project Rationale/Why Critical for BUI Removal
This dam, located at river mile 10 and the Estabrook Dam at river mile 7 are the furthest downstream and last remaining fish and aquatic life passage barriers on the Milwaukee River. A similar fish and

aquatic life passage facility is proposed for the Estabrook Dam (see Estabrook Dam Loss of Fish and Wildlife Habitat Project Summary). Since 1997, former dams as barriers to fish and aquatic life passage were removed at river mile 3 (North Avenue Dam at Milwaukee), river mile 30 (Lime Kiln Dam at Grafton), and river mile 31 (Chair Factory Dam at Grafton). A fishway was completed in 2010 at the Mequon-Thiensville Dam. It is a critical component for providing access to reproductive and nursery habitats in the upstream portions of the Milwaukee River.

Necessary Project Elements

- The Kletzsch Park Dam is not a complete barrier to aquatic invasive species (AIS). The USFWS and WDNR have determined that the first complete barrier to potential AIS from Lake Michigan is the Village of Grafton Bridge Street Dam at river mile 32. In-water and land-based construction activities will follow WDNR practices and permit requirements for preventing the spread of AIS.
- Milwaukee County owns the Kletzsch Park Dam and either owns or has access easements for lands abutting the dam, and will maintain the fish passage facility.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Enable fish and aquatic life access to an additional 22-mile of barrier free riverine habitat and 2,400-acres of wetland habitat.
- 22 miles of tributary connected to the mainstem of the Milwaukee River, Milwaukee Estuary and Lake Michigan.
- One critical impediment retrofitted for fish and aquatic life passage.
- One riparian area impediment retrofitted to improve continuity of riparian buffers, including improvements to decrease resistance to animal movements.
- Increase in suitable habitat patch size resulting from new connectivity.

References

Aadland, Luther, P. 2010. Reconnecting Rivers: Natural Channel Design in Dam Removals and Fish Passage. Minnesota Department of Natural Resources Ecological Resources Division.
http://www.dnr.state.mn.us/eco/streamhab/reconnecting_rivers.html

Loss of Fish and Wildlife Habitat
Project Summary

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Estabrook Dam Fish Passage

Project Location: Milwaukee River, downstream of Port Washington Road

Project Sponsor: Milwaukee County

Project Landowner: Milwaukee County

Proposed Work
The goal of this project is to provide aquatic organism passage at Estabrook Dam. The passage would be provided by a structure if the dam is to remain in place or by removing the dam entirely. It would be passive in nature and would permanently allow passage upstream in the Milwaukee River. The County must repair or remove the dam, and this work would likely be coordinated with that effort.

Collaboration with Partners
The County has collaborated with the community and stakeholders in preparing an environmental impact statement for this project. The Tech Team and WDNR would like to continue to be involved as Stakeholders in the project going forward.

Timetable and Duration
Environmental Impact Statement 2015
The timetable and duration of design and implementation phases are unknown and dependent on funding. Design and implementation would be feasible in a two year timeframe. The County must repair or remove the dam by December 31, 2016.

Project Budget & Funding
The Milwaukee County 2016 Budget approves borrowing $750,000 to assist with construction of a fish passage at Estabrook Dam. According to the Draft Environmental Impact Statement prepared by AECOM on behalf of Milwaukee County, a rough estimate for dam removal is $ 2.4 million and a rough estimate for fish passage with dam repair is $ 3.4 million.

Fish and Wildlife Plan Goals Addressed by Project

1. Enhance/improve aquatic habitat by…
    B. Improving lateral connectivity by connecting aquatic habitat to floodplain wetland with suitable hydroperiod from Lake Michigan to the tributaries and headwaters where opportunities exist.
2. Improve aquatic habitat connectivity by…
    A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or
    B. Reconnecting high quality habitat downstream of the Bridge Street Dam and Lepper Dam to the main stem rivers of the AOC in cases where that habitat is directly connected to the estuary (i.e., there are no downstream barriers from the proposed project site).

Project Rationale/Why Critical for BUI Removal

Loss of Fish and Wildlife Habitat
Project Summary

This dam is the furthest downstream aquatic organism passage barrier on the Milwaukee River. It is a critical link to providing access to habitat in the upstream portions of the Milwaukee River.

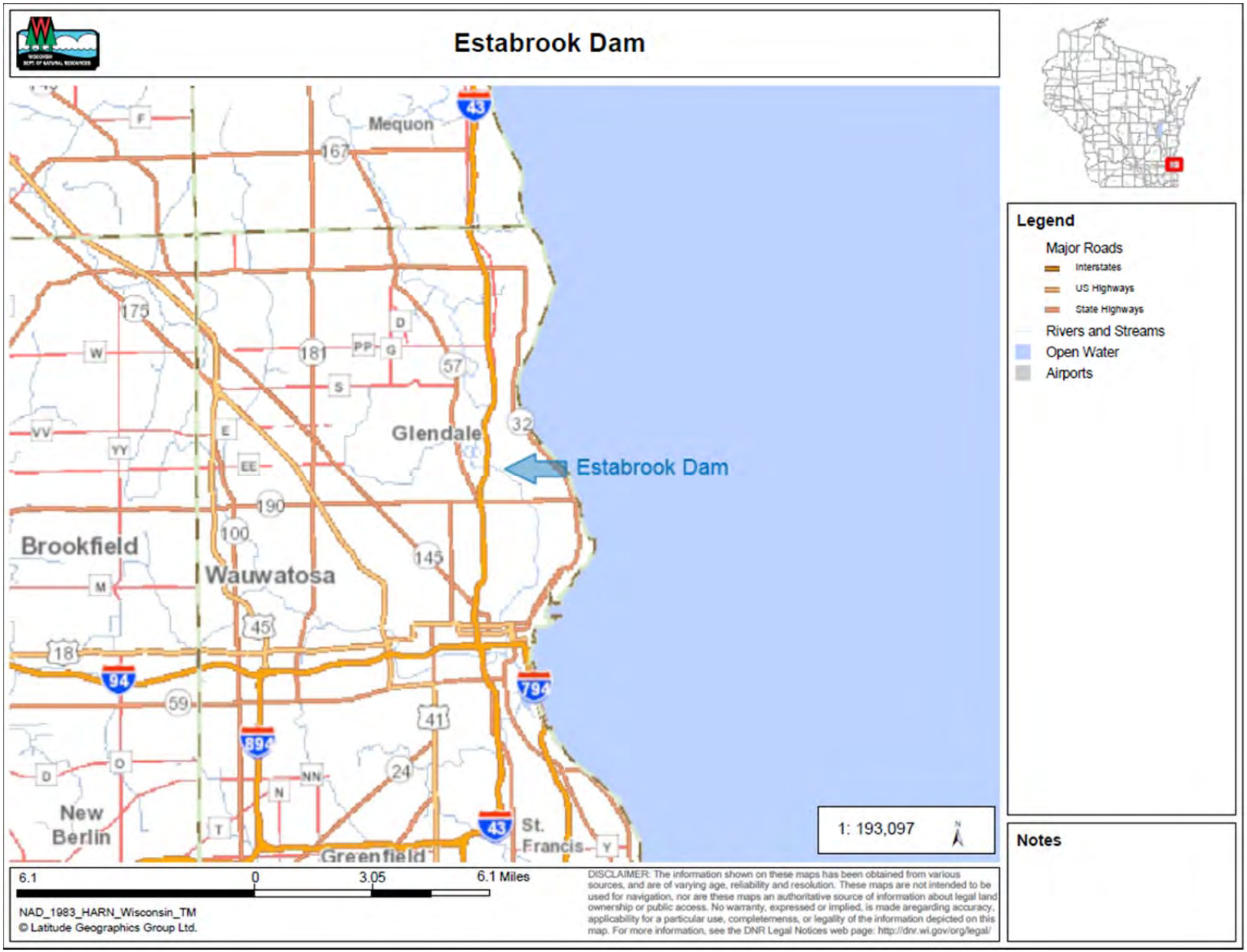
Necessary Project Elements

- Aquatic organism passage to upstream of the dam site. The connection should be passive (i.e. not active, such as a fish lift) and passable by aquatic organisms, with northern pike the target species to use for design purposes.
- The passage may be accomplished by dam removal or through a passive fish passage structure.
- Adequate buffer between aquatic habitats and development (as defined above in goal 3).
- An invasive species and vegetation management plan (aquatic and terrestrial) that is implemented at the site.
- Maintenance plan with provisions for implementation for any constructed passageway.
- Some type of permanent conservation protection for any riparian portions of the site (conservation easement or equivalent).
- If the dam remains in place, an operating order must be developed for the dam. The operating order will clarify and establish water levels and specify operational standards for the dam.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Amount (length) connected as fish and aquatic organism habitat.
- One impediment removed and/or retrofitted.
- Number of tributary miles connected to mainstem.
- One riparian area impediments removed and/or retrofitted to improve continuity of riparian buffers, including improvements to decrease resistance to animal movements.
- Increase in suitable habitat patch size resulting from new connectivity

Loss of Fish and Wildlife Habitat
Project Summary



June 2015

Loss of Fish and Wildlife Habitat
Project Summary

Estabrook Dam

Legend

2010 Air Photos (WROC)

Notes

0.1 0 0.05 0.1 Miles

NAD_1983_HARN_Wisconsin_TM

June 2015

Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Five Low Flow Barriers on the Menomonee River

Project Location: Menomonee River between N 90th Street (extd) and N 84th Street (extd)

Project Sponsor: Milwaukee Metropolitan Sewerage District (MMSD)

Project Landowner: Milwaukee County

Proposed Work

MMSD will remove five manmade barriers to fish passage in the Menomonee River channel in order to improve fish passage from the Milwaukee Estuary to the upper reaches of the Menomonee River and its tributaries for over 39 species of fish. Three of the barriers are from a single 24-inch MMSD Metropolitan Intercepting Sewer that crosses the river at three locations. At each of these locations, the sewer creates a 1-1.5 foot drop that impairs fish passage. The fourth location is an old low dam/grade control structure with a 2-3 foot drop constructed in the 1930s. The last barrier is an old concrete road crossing that creates an one foot drop and then a shallow area 10 feet in width behind the drop this is impassable under base flow conditions.

The project consists of abandoning underutilized portions of the MMSD sewer and modifying the remaining active portions in order to allow for the removal of the barriers at the three crossings. The remaining two barriers will also be removed.

Collaboration with Partners

MMSD has worked with several members of the Tech Team including the WDNR, SEWRPC, USGS, Milwaukee Riverkeeper, Trout Unlimited, Friends of Hoyt Park, and Milwaukee County Parks Dept on this project. These agencies have provided funding or in-kind contributions for professional services for the project design, pre- and post-construction monitoring, and education outreach. MMSD also received over $765,000 of grant funding from the Fund for Lake Michigan, National Oceanic and Atmospheric Administration, Sustain Our Great Lakes, and Great Lakes Fisheries Trust.

Timetable and Duration
Design = Ongoing – Summer 2015
Construction = Fall 2015 – Spring 2016

Project Budget & Funding

The total project costs for this project is approximately $2M.
Project grant funding:

- Fund For Lake Michigan - $200,000
- National Oceanographic and Atmospheric Administration - $142,100
- Sustain Our Great Lakes - $400,000

Loss of Fish and Wildlife Habitat
Project Summary

Great Lakes Fisheries Trust - $25,000
MMSD will fund the remaining $1.2 M in project costs.

Fish and Wildlife Plan Goals Addressed by Project

1. Enhance/improve aquatic habitat by…
    B. Improving lateral connectivity by connecting aquatic habitat to floodplain wetland with suitable hydroperiod from Lake Michigan to the tributaries and headwaters where opportunities exist.
2. Improve aquatic habitat connectivity by…
    A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or
    B. Reconnecting high quality habitat downstream of the Bridge Street Dam and Lepper Dam to the main stem rivers of the AOC in cases where that habitat is directly connected to the estuary (i.e., there are no downstream barriers from the proposed project site).

Project Rationale/Why Critical for BUI Removal

The removal of these barriers will improve fish passage from the estuary to 34 miles upstream to historical spawning and rearing habitat including over 1,000 acres of riparian wetlands.

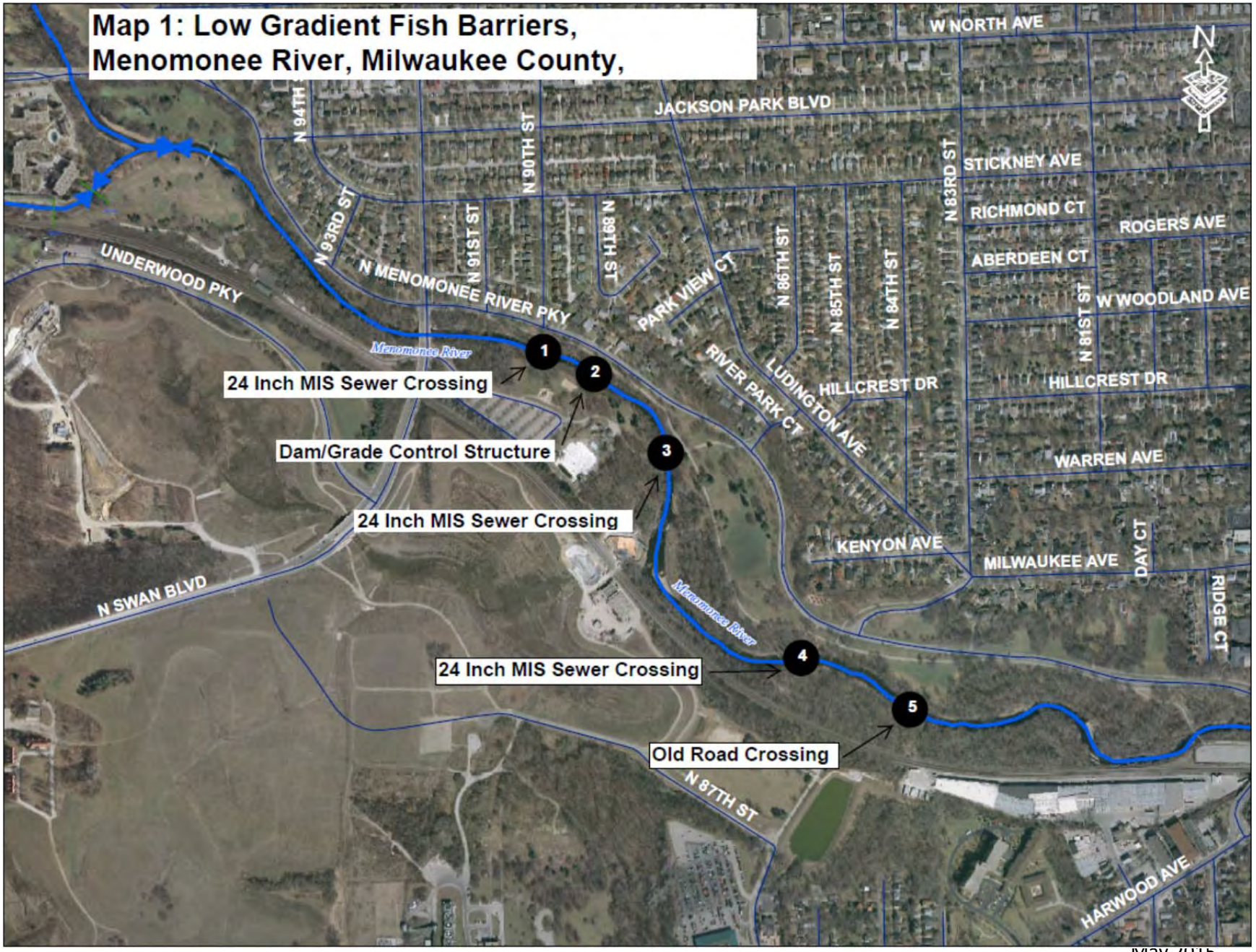
Necessary Project Elements

- Aquatic organism passage to upstream of the dam site by removing five concrete barriers that prevent fish passage during low flow periods.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Amount (length) connected as fish and aquatic organism habitat.
- Five impediments removed and/or retrofitted.
- Number of tributary miles connected to mainstem.
- Increase in suitable habitat patch size resulting from new connectivity

Loss of Fish and Wildlife Habitat
Project Summary



Loss of Fish and Wildlife Habitat
Project Summary

Project Title: Kinnickinnic (KK) River Habitat Rehabilitation

Project Location: KK River between I-94 and Becher St.

Project Sponsor: Milwaukee Metropolitan Sewerage District (MMSD)

Project Landowner: MMSD, Milwaukee County, City of Milwaukee and other private riparian landowners

Proposed Work
Previous studies have shown this section of the KK River does not sustain a viable aquatic habitat due to low dissolved oxygen levels, lack of flow and limited diversity of channel morphology. In addition, there are contaminated sediments within this stream reach. Improvements to the channel morphology could partially address the habitat issues. The first step in the process is a feasibility study, followed by design and implementation of selected remedy that meets AOC habitat goals. The proposed feasibility study will develop alternatives and select a preferred alternative that meets the following objectives:

- A reduction of the contaminated sediments getting transported to the Milwaukee Estuary through removal or sequestration of contaminated river sediments in the study area.
- Improvement of fish and wildlife habitat through diversifying river channel and stream bank morphology and channel substrate diversity.
- Improve water quality in the study reach of the KK River (dissolved oxygen goal of 5 mg/L).
- No increase in the 1% probability flood elevation.

Collaboration with Partners
MMSD has worked with the WDNR and other members of the Tech Team to secure a NOAA grant in the amount of $200,000 to perform a feasibility study. WDNR and Tech Team would continue to be involved in the feasibility and design of the habitat improvements.

Timetable and Duration
Feasibility Study: June 2015 – June 2016
Design and Implementation: contingent on funding

Project Budget & Funding
The total project costs for the feasibility study is approximately $325,000. MMSD has received a NOAA grant in the amount of $200,000. Estimates on design and construction cost will be determined at the end of the feasibility study.

Fish and Wildlife Plan Goals Addressed by Project
Physical/biological habitat primary goals:
1. Enhance/improve aquatic habitat by…
A. Identifying and enhancing fish spawning sites from Lake Michigan to the tributaries and headwaters where opportunities exist (e.g., inner and outer harbors, Milwaukee River downstream of the North Ave. Dam pedestrian bridge), and/or
B. Improving lateral connectivity by connecting aquatic habitat to floodplain wetland with suitable hydroperiod from Lake Michigan to the tributaries and headwaters where opportunities exist.
2. Improve aquatic habitat connectivity by…

Loss of Fish and Wildlife Habitat
Project Summary

A. Improving linear connectivity by restoring or enhancing fish and aquatic organism passage from Lake Michigan to the tributaries and headwaters, and/or

Project Rationale/Why Critical for BUI Removal

This project will address degraded aquatic habitat conditions in the upper limits of the Milwaukee Estuary AOC on the KK River. This is the one of the only stretches of the KK River that has natural bed and banks remaining.

Necessary Project Elements

- Identify feasible alternatives that will meet the project objectives defined above.
- Identify guidelines for an invasive species and vegetation management plan (aquatic and terrestrial) that will be developed in a future design phase.
- Permanent protections will be secured for any areas where habitat improvements are planned.

Criteria for Measuring Project Goals are Met (Qualitative and/or Quantitative)

- Improving linear connectivity of the Kinnickinnic River within the AOC and to the estuary.
- Increase in suitable habitat patch size resulting from new connectivity
- Creation or enhancement of upland buffer habitat surrounding along the riparian corridor to improve connectivity.

Loss of Fish and Wildlife Habitat
Project Summary

February 2015