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**LOWER EAST RIVER
RESTORATION PLAN**

DECEMBER 2020

Lower East River Restoration Plan

A planning document for the enhancement of the East River.

December 31, 2020

Prepared by:
Bay-Lake Regional Planning Commission
1861 Nimitz Drive
De Pere, WI 54115
(920) 448-2820
www.baylakerpc.org



The Nature Conservancy
342 Louisiana Street
Sturgeon Bay, WI 54235
(920) 743-8695
<https://www.nature.org/en-us/>



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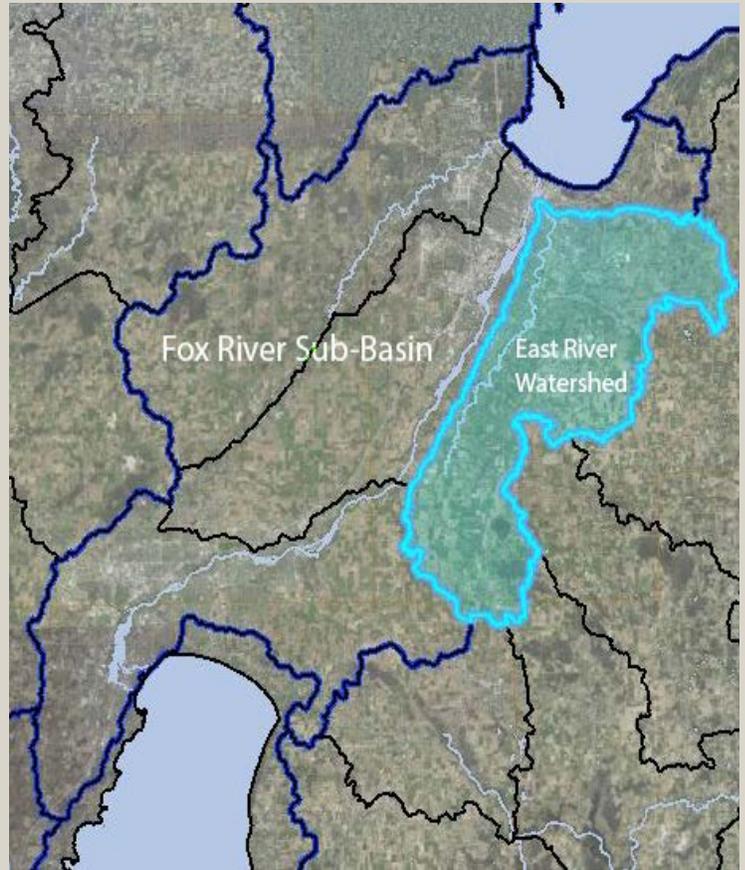
Chapter 1: Introduction

The East River Watershed, a watershed of the Lower Fox Sub-Basin, is located in east central Wisconsin in Brown, Calumet, and Manitowoc counties. The East River joins the Lower Fox River in the City of Green Bay, approximately 1.5 miles from the mouth of the Lower Fox River into Green Bay. The East River Watershed is further divided into two subwatersheds, the Upper and Lower East River subwatersheds. This plan is focused on the riparian lands of the East River in the Lower East River watershed.

The Lower East River watershed drains a total area of 28,696 acres and travels north through Brown County and roughly parallel to the Fox River. The river flows through agricultural lands in the southern portion, then north through the urban areas of Allouez, De Pere, and Green Bay before discharging into the Fox River. Jurisdictional boundaries of the Lower East River watershed include portions of the cities of De Pere and Green Bay; towns of Ledgeview, Rockland, Glenmore, and Wrightstown; and villages of Wrightstown, Bellevue, and Allouez.

The ecological health of the East river has been degraded and continues to be jeopardized by multiple issues that diminish potential uses, influence streambank stability and water quality, and spread invasive species. Although the watershed includes environmental corridors, outdoor recreation, and natural areas, it is negatively impacted by:

- In-river locations with very low concentrations of dissolved oxygen that restrict aquatic life
- High levels of phosphorus and chloride
- High levels of total suspended solids
- Streambed and streambank erosion
- Isolated habitats for wildlife that depend on natural corridors
- Invasive species that can stress native species and degrade natural habitats
- Minimal recreational enhancement and access



PURPOSE, VISION, AND GOALS

The overall purpose of this plan is to identify projects and actions that can be implemented at the local level to help improve water quality, fish and wildlife habitat, and public access within the East River.

The plan includes an inventory and analysis of past and existing conditions and trends and identifies projects at the local level for consideration by local units of government to enhance water quality, fish and wildlife habitat and public access within the Lower East River Corridor. Chapter three of this plan includes individual site recommendations for each municipality in the project area. The individual site recommendations are based on the assessment of existing conditions conducted through field work, research, and spatial analysis. Site recommendations were then selected to include in the Action Plan, found in the final chapter of this plan, for further consideration and development. The Action Plan identifies efforts to meet project goals and provides readers with detailed information about the benefits of implementation, potential funding sources and partners. Additionally, this plan includes a guide for landowners in the appendix, which details common management techniques and tips to help protect and improve water quality and flood storage and mitigate invasive species.

It should be noted that the improvement of the East River for human enjoyment and aesthetic appeal along with the creation of conditions suitable for a diversity of desirable species will require both an attention to small-scale individual land and water improvement projects as well as attention to watershed scale, multi-jurisdictional efforts to control those landscape issues (i.e., land-use practices, flow management, and floodplain connectivity) that ultimately drive the health of the land and waters of the East River.



VISION

A Healthier and More Resilient Lower Corridor East River Ecosystem that Sustains the River's Natural and Built Environment

GOALS

The overall goals of this plan include 1) protect and improve water quality and flood storage, 2) protect and improve fish and wildlife habitat, and 3) protect and enhance public land and park access within the Lower East River Corridor. While these goals are broad, the plan identifies recommendations and actions that are site specific and meet the goals in one or more ways.



PLAN DEVELOPMENT

The Lower East River Restoration Plan was developed by the Bay-Lake Regional Planning Commission in partnership with The Nature Conservancy (TNC). Previous studies and research focusing on the East River provided relevant background information while partner collaboration and public outreach provided additional input on issues and opportunities surrounding the East River. An online application was created to summarize this plan and provide readers with additional information. The online application can be found [here](#). The development of this plan and the online application was made possible through funding from the Wisconsin Coastal Management Program.

PUBLIC OUTREACH

Public outreach was used to gain insight on how the public currently utilizes the East River corridor in terms of recreational activities and access, and what the public would like to see in the future to enhance the East River corridor. Additionally, the public was given the opportunity to attend various steering committee meetings.

A survey was developed to determine how the public utilizes the river for recreational purposes, and to identify existing challenges and deficiencies that may be discouraging active recreation along the river (trail and park usage and access) and within the river (fishing, boating, etc.). A summary of survey results can be found below while Appendix A contains a full list of results.

Overall, the survey respondents felt that water quality is very important when it comes to the East River and one of the most important factors when deciding to visit the East River for recreation purposes. According to the survey, the public felt that water quality, habitat restoration, sustainable development adjacent to the river, and bank stabilization are very important when it comes to the East River.

TECHNICAL ADVISORY GROUP AND PARTNER COLLABORATION

A Technical Advisory Group was established early in the planning process to help guide the development of the plan. The Technical Advisory Group made up of representatives from the Wisconsin DNR (WDNR), TNC, U.S. Fish and Wildlife Service (USFWS), Brown County Land and Water Conservation Department, and local government staff. The Technical Advisory Group met multiple times while developing this plan.

- Andrew J Hudak, WDNR
- Betsy Galbraith, US Fish & Wildlife Service
- Kaurie Mihm, City of Green Bay
- Don Melichar, City of De Pere
- Sarah Burdette, Town of Ledgeview
- Chris Clark, Village of Allouez
- Stephanie Schlag, Town of Ledgeview
- Steven R. Hogler, WDNR
- Mike Grimm, TNC
- Nicole L. Van Helden, TNC
- Adam Waszak, Village of Bellevue
- Michael L. Mushinski, Brown County Land & Water Conservation Department



In addition to the Technical Advisory Group, planners held informational meetings for local government staff and met with the individual municipalities during key stages of plan development.

A kick-off meeting was held to share information about the project and to learn more about the opportunities and challenges that exist along the Lower East River Corridor. Individual municipality meetings were held to learn about the challenges municipalities face when it comes to the East River, current and past management and conservation efforts, planned improvements adjacent to the East River, and more. During final the stages of plan development, planners met with individual municipalities once more to discuss recommendations and project information, potential funding, and implementation.

CONSISTENCY WITH PRIOR PLANS AND STUDIES AND EXISTING PROGRAMS

There have been a number of plans and studies focusing on the Lower Fox River Basin and Lake Michigan developed in recent years that include and or directly relate to the East River. This plan worked to incorporate previous plan elements and recommendations wherever possible to accelerate efforts aimed at improving the East River.

PROJECT AREA AND FOCUS AREA

The "project area", located entirely in Brown County, includes a ½ mile buffer around the East River stretching 15 miles from the Town of Rockland to the Fox River in Green Bay. The project area was refined into a "focus area" to allow for inventory and analysis of direct riparian conditions. The focus area consists of a 300 ft. buffer from the shoreline. A map of the project area can be found in Map 1, while a map of the focus area can be found in the following chapter.

Both the project area and focus area fall within the following municipalities: the cities of De Pere and Green Bay; the Town of Ledgeview; and the villages of Allouez and Bellevue. The East River forms the east and west jurisdictional boundary of the Village of Allouez and the Village of Bellevue respectively. The following pages include demographic information for each municipality as well as a description of the geographic setting and special features related to the East River. Additional information about each municipality is included in Chapter 3.

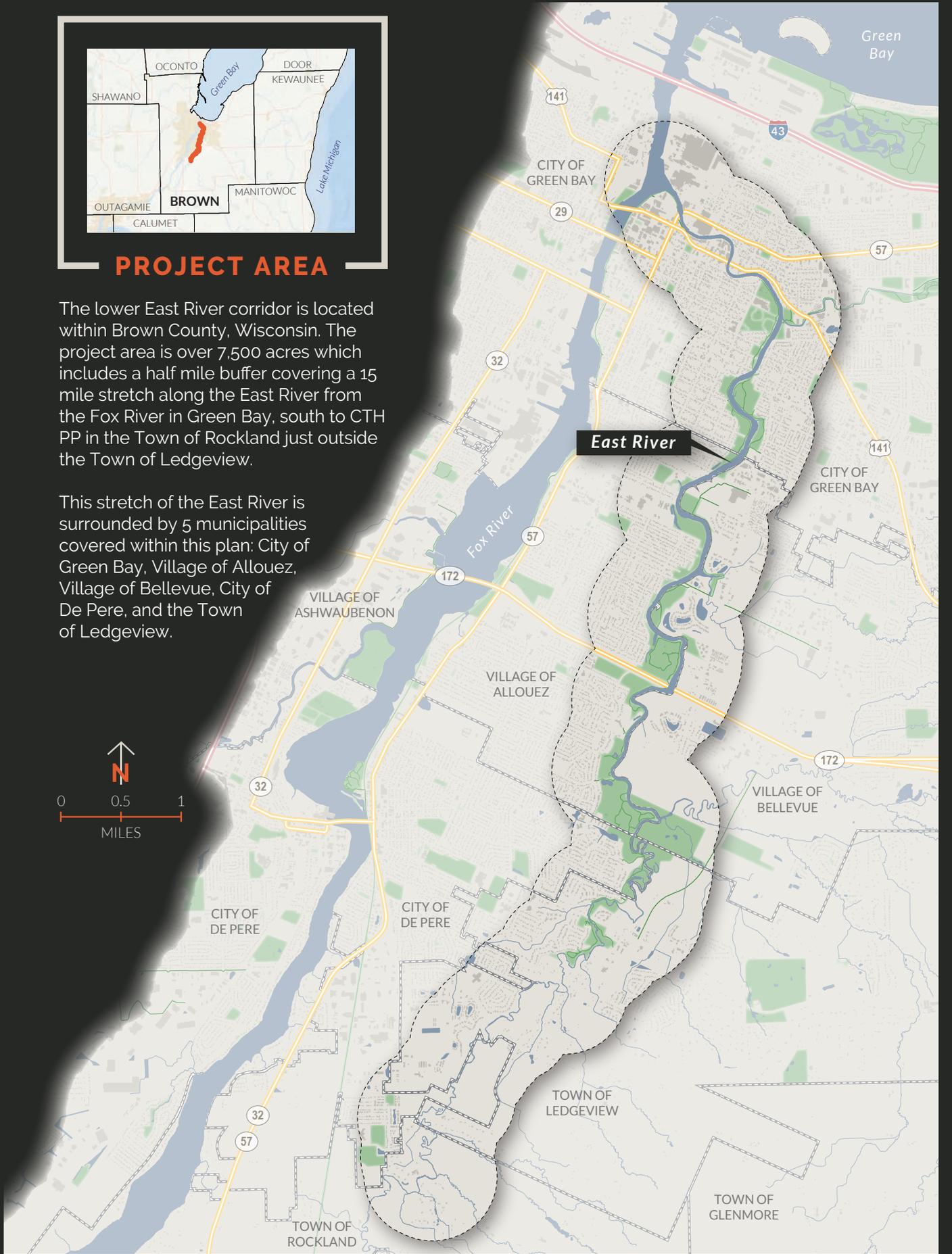
The East River corridor has several geomorphic, ecologic, hydrologic, and anthropomorphic features of significance. These include:

- Large river fringing wetlands with varying, but mostly good, connectivity to the open water of the river and holding examples of both inland emergent marshes and sedge meadows, though in most cases the wetter areas have become dominated by non-native Phragmites and the sedge meadows in several settings have been invaded by reed canary grass;
- Unimpeded open water access for Green Bay migratory fish to wetlands fringing the main stem of the river;
- Coarse woody debris from fallen trees often line the river. This holds both benefits and costs for the communities along the river. Loose debris is a hazard on the river during the high flows in spring, damaging the riverbank, bridges, and private property. Course woody debris can also increase scouring of bottom sediment and bank erosion. On the other hand, coarse woody debris provides fish and wildlife habitat and can slow and deflect the current of the river, in some situations protecting the streambanks from erosion; and
- Much of the floodplain of the river is in public ownership and it appears the communities which line the banks of the river (Green Bay, Allouez, De Pere, Ledgeview, and Bellevue) are seeking to protect these riparian lands as sites for recreation and storm water management projects. This high percentage of public ownership may represent opportunities to partner with these communities for consolidating public ownership of the riparian area for multiple public benefits including protecting, restoring, or rehabilitating fish and wildlife habitat.



The lower East River corridor is located within Brown County, Wisconsin. The project area is over 7,500 acres which includes a half mile buffer covering a 15 mile stretch along the East River from the Fox River in Green Bay, south to CTH PP in the Town of Rockland just outside the Town of Ledgeview.

This stretch of the East River is surrounded by 5 municipalities covered within this plan: City of Green Bay, Village of Allouez, Village of Bellevue, City of De Pere, and the Town of Ledgeview.





CITY OF GREEN BAY

The East River is located east of the Fox River, which splits the City of Green Bay. There are three river miles of the East River that lie within the City of Green Bay's jurisdiction. Additionally, Green Bay contains around 2,124 acres of land within the project area. According to the National Estuary Research Reserve, Green Bay is the world's largest freshwater estuary with significant cultural, economic, commercial, and recreational benefits derived from the water and coastal features of the Bay. However, the Bay of Green Bay and Lake Michigan face many challenges, such as: changing water levels, flooding, coastal erosion, and harmful algal blooms (UWGB, 2020).

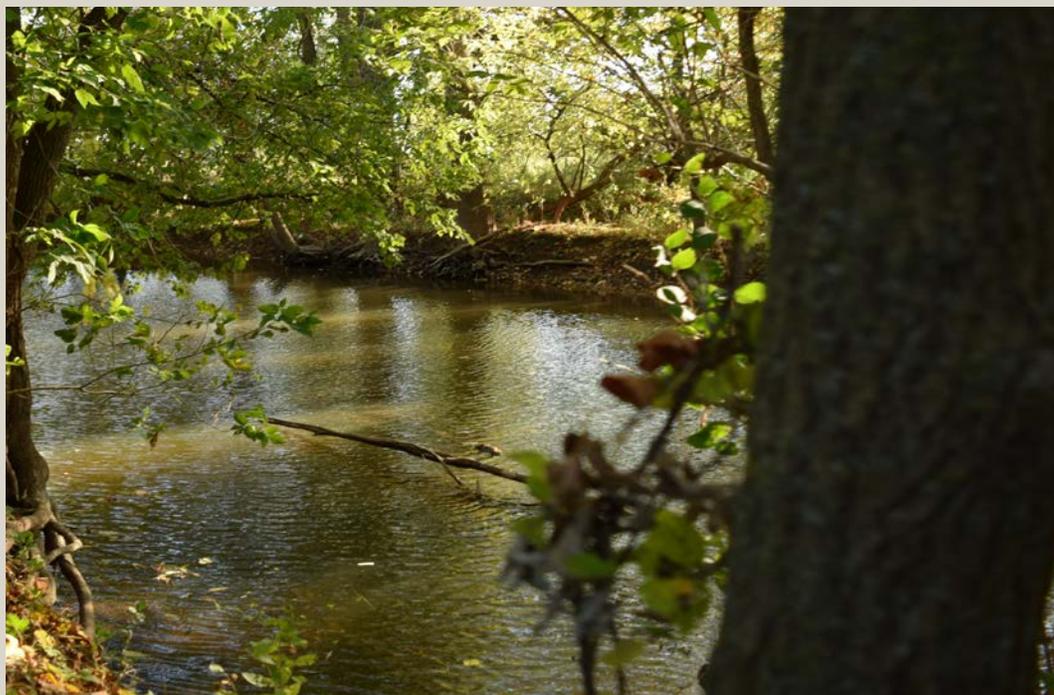
According to the 2010 census, there were 104,057 people living in the city with a population density of 2,288 inhabitants per square mile. There were 45,241 housing units at an average density of 995.0 per square mile. The City of Green Bay is by far the most populated and urban in the project area. The city is projected to continue to increase in population to about 113,500 in 2040.

The City of Green Bay has been experiencing above normal level flood events. Impervious surfaces do not allow for proper infiltration of water that hits the surface. Additionally, much of the natural landscape around the river has been cleared which further promotes runoff and flooding. Improvements to increase flood storage and enhance water quality are included in later chapters of this plan.

Table 1. City of Green Bay Population Snapshot

City of Green Bay					
Population		% Change	Population Projections		% Change
2010 Census	2020 Estimate	2010-2020	2030	2040	2020-2040
104,057	105,599	1.5%	113,850	113,500	7.5%

Source: Bay-Lake RPC; U.S. Census Bureau; WDOA Projections and Estimates.





VILLAGE OF BELLEVUE

The East River acts as a boundary between the Village of Bellevue and the Village of Allouez to the west. There are about five river miles of the East River that exist within the Village of Bellevue. The village frequently experiences flooding from the East River, which impacts residential and commercial areas.

According to the 2010 census, there were 14,570 people living in the village with a population density of 1,016 people per square mile. There were 6,314 housing units at an average density of 440 per square mile. The population of Bellevue is projected to increase to 20,780 by 2040.

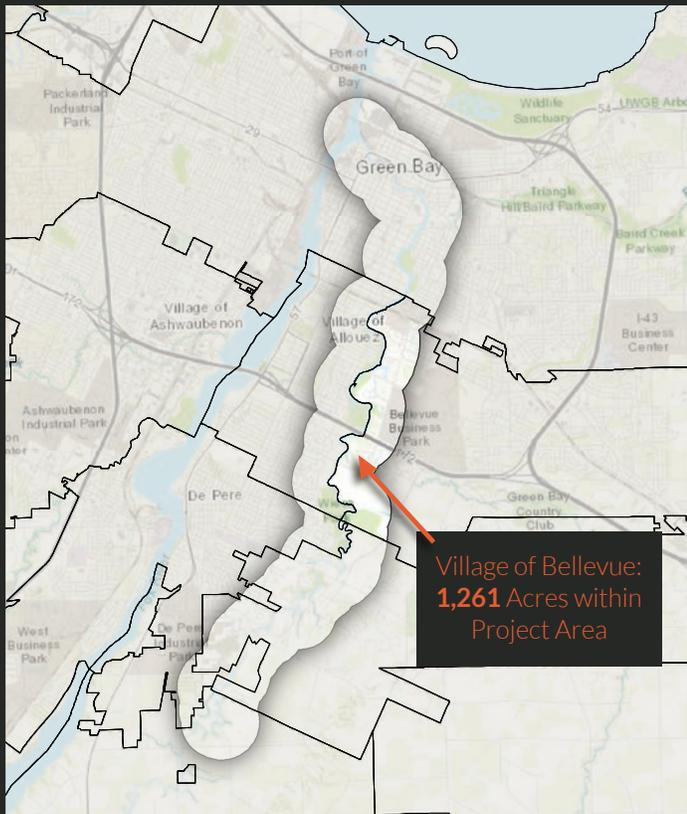
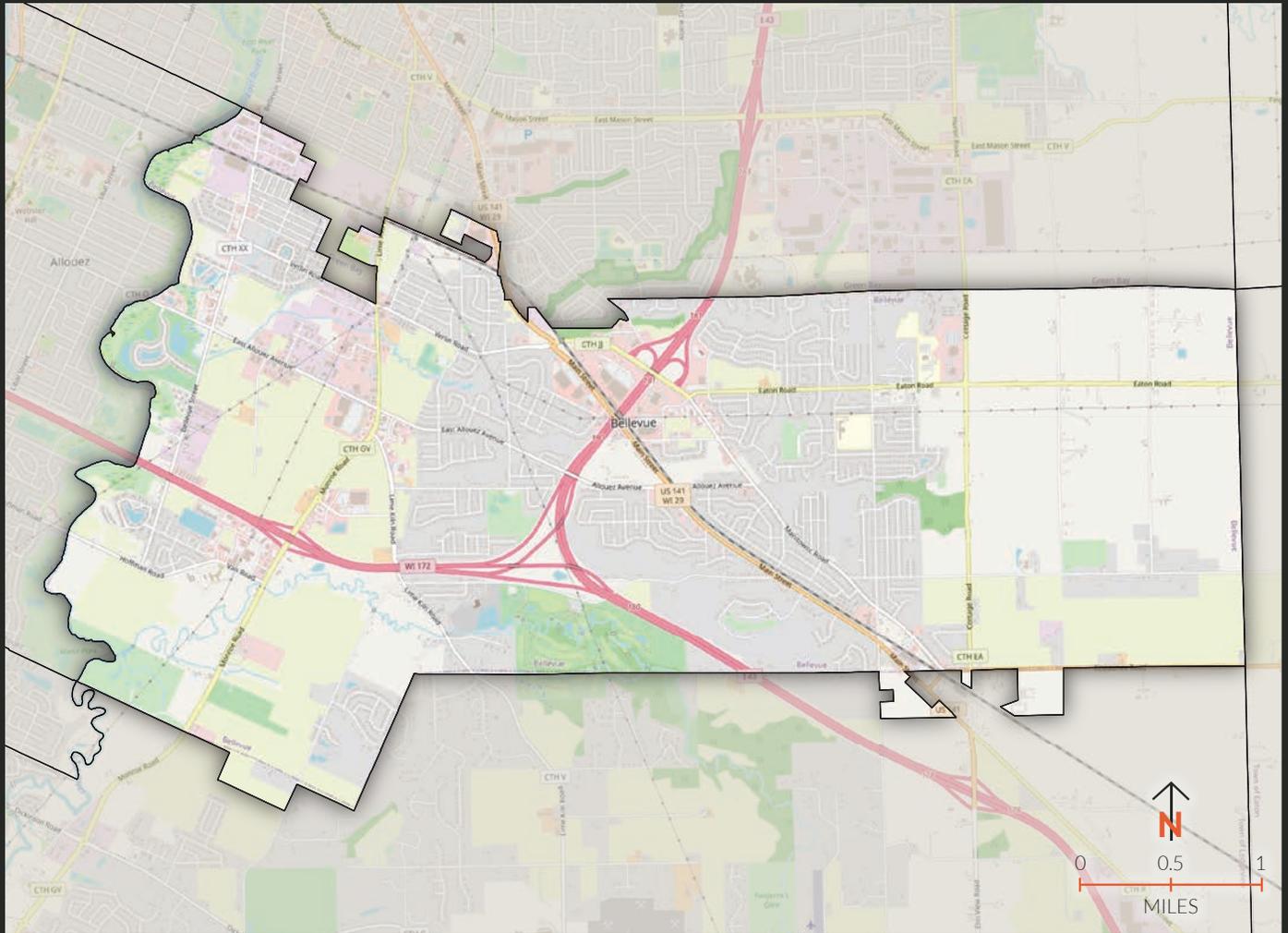
Park and open space surround the East River, creating recreational opportunities for residents and habitat for wildlife. The Village of Bellevue frequently experiences high levels of flooding during spring months and after any major rain event. Water floods in lowland areas causing erosion to the streambank. Recommendations to reduce flooding and improve water quality are included in later chapters of this plan.

Table 2. Village of Bellevue Population Snapshot

Village of Bellevue					
Population		% Change	Population Projections		% Change
2010 Census	2020 Estimate	2010-2020	2030	2040	2020-2040
14,570	15,706	7.8%	19,140	20,780	32.3%

Source: Bay-Lake RPC; U.S. Census Bureau; WDOA Projections and Estimates.





VILLAGE OF BELLEVUE





VILLAGE OF ALLOUEZ

The Village of Allouez is located between the Fox River and East River, directly south of the City of Green Bay and west of the Village of Bellevue. The East River creates the eastern jurisdiction boundary between the Village of Allouez and the Village of Bellevue, while the Fox River acts as a boundary to the west. There are about five river miles of the East River that exist within

the Village of Allouez. Additionally, Allouez contains about 1,340 acres of land within the project area.

According to the 2010 census, there were 13,975 people living in the village. The population density was 3,031.5 people per square mile. There were 5,707 housing units at an average density of 1,238 per square mile. The population is projected to increase to 14,000 over the next decade before decreasing to 13,600 by 2040.

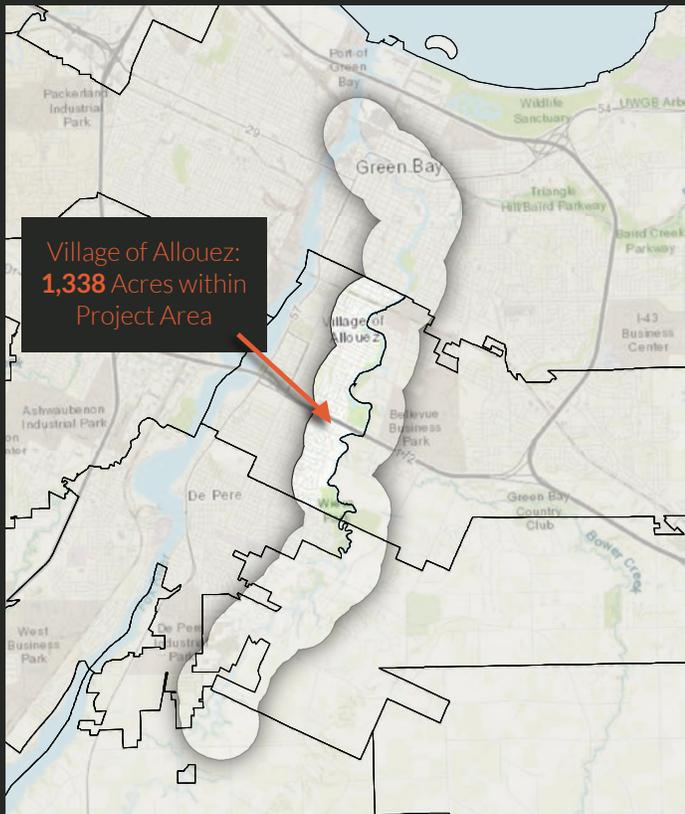
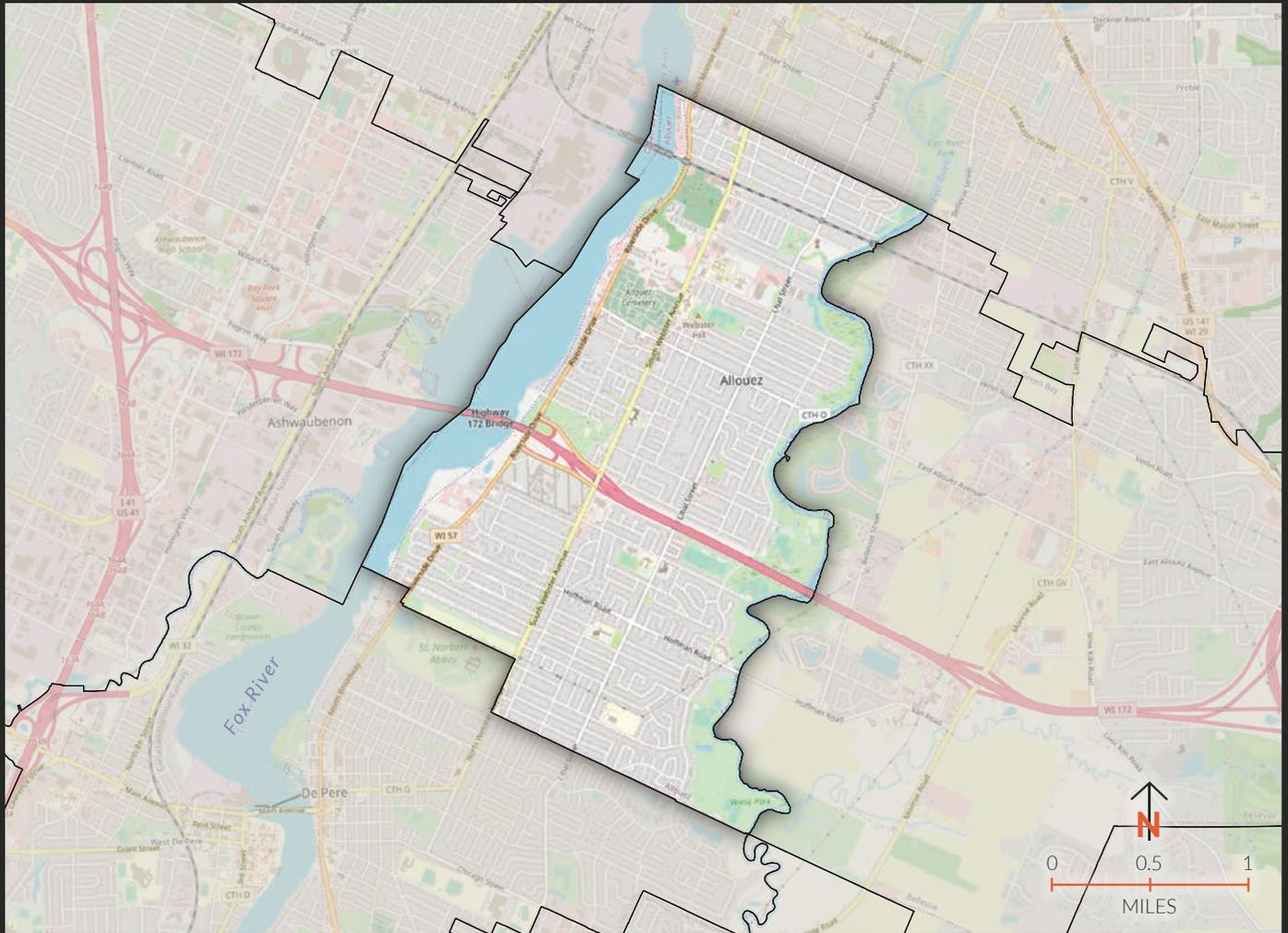
While the village is urban in landscape, the East River is the focus of much of the Village's parks and green space. Given its geographic location, the village is prone to and often experiences flooding, especially in lowland areas. Rising water levels, dated stormwater infrastructure, and development in floodplains are some of the causes for flooding. This plan includes recommendations in later chapters that will help to reduce flooding, improve water quality and improve fish and wildlife habitat in the Village of Allouez.

Table 3. Village of Allouez Population Snapshot

Village of Allouez					
Population		% Change	Population Projections		% Change
2010 Census	2020 Estimate	2010-2020	2030	2040	2020-2040
13,975	13734	- 1.7%	14200	13600	-0.1%

Source: Bay-Lake RPC; U.S. Census Bureau; WDOA Projections and Estimates.





VILLAGE OF ALLOUEZ





CITY OF DE PERE

The City of De Pere is located on both the east and west sides of the Fox River. There are about two river miles of the East River that exist in the western portion of the city. The City of De Pere contains the least amount of acreage in the project area at about 650 acres.

The City of De Pere is the second more populous municipality in the project area. In 2010, there were 23,800 people living in the city with 2,055 people per square mile. There were 9,742 housing units at an average density of 841 per square mile. The population of the city is projected to increase to over 31,000 in 2040.

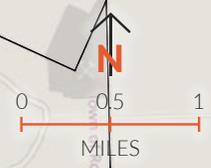
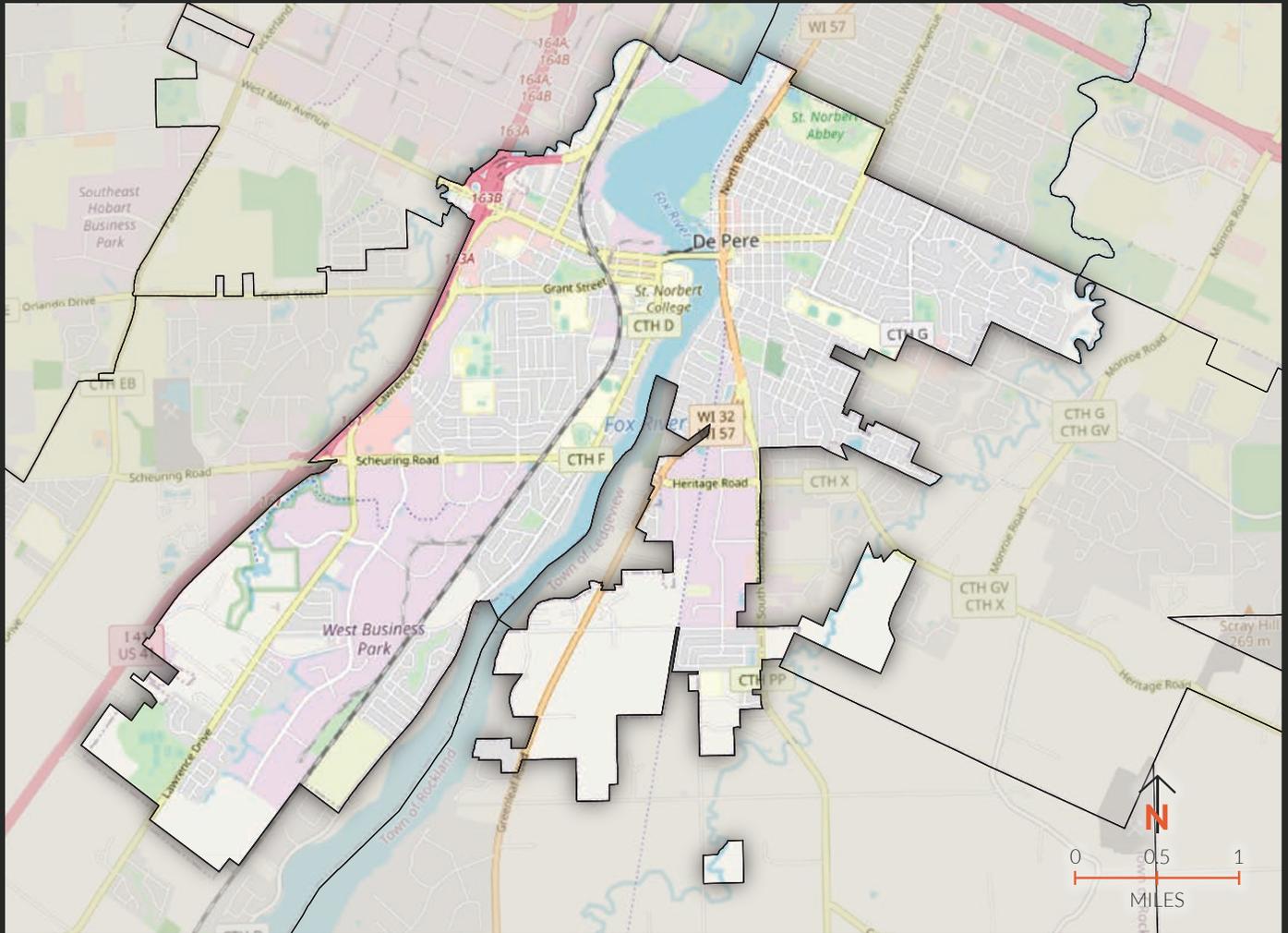
Agricultural lands are located in the southern portion of the city, while urban land uses stretch throughout. Much of the park and open space in the city can be found adjacent to the East and Fox Rivers. While development continues to occur in the southern portion of the city, actions should be taken to preserve natural lands that protect and enhance wildlife habitat, water quality, and flood storage. Recommendations to improve water quality and enhance fish and wildlife habitat are included later in this document.

Table 4. City of De Pere Population Snapshot

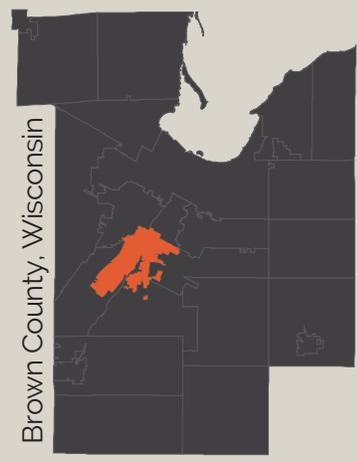
City of De Pere					
Population		% Change	Population Projections		% Change
2010 Census	2020 Estimate	2010-2020	2030	2040	2020-2040
23,800	24,595	3.3%	29,550	31,280	27.2

Source: Bay-Lake RPC; U.S. Census Bureau; WDOA Projections and Estimates.





CITY OF DE PERE





TOWN OF LEDGEVIEW

The East River flows through the western side of the Town of Ledgeview. The Town of Ledgeview contains nearly 1,800 acres of land within the project area and the most East River mileage (5.5 miles) in the project area. Ledgeview is a rapidly developing area in Brown County and projected to grow at a rate higher than other communities in the area.

There were 3,363 people living in the town in 2000, with a population density of about 191 people per square mile and 69 housing units per square mile. The population of the town was 6,555 in 2010 and is projected to nearly double to 12,480 by 2040. This increase in population will have an impact on water quality and fish and wildlife habitat, however, conservation actions could alleviate this.

The Town of Ledgeview contains a higher amount of agriculture and forest when compared to other municipalities in the project area. As development continues, these lands may disappear as they transition commercial and residential land uses. Unless protective measures are taken early, the river is likely to be impacted by the increase in development. Recommendations are made later in this document that will help to improve and protect water quality, flood storage, and fish and wildlife habitat.

Table 5. Town of Ledgeview Population Snapshot

Town of Ledgeview					
Population		% Change	Population Projections		% Change
2010 Census	2020 Estimate	2010-2020	2030	2040	2020-2040
6,555	8,444	28.8%	10,810	12,480	47.8

Source: Bay-Lake RPC; U.S. Census Bureau; WDOA Projections and Estimates.





Chapter 2: Current Conditions of the East River

An inventory and analysis of existing conditions was conducted to determine the trends, challenges, and opportunities that exist within the river corridor. Previous plans and studies, site visits, and spatial analysis identified current and existing conditions. This information creates the framework for identifying the recommended restoration activities presented in later chapters.

BACKGROUND

The Fox River basin, containing the East River subwatershed, is one of Wisconsin's most urbanized and industrialized areas. The Lower East River watershed drains a total area of 28,696 acres and travels north through Brown County and roughly parallel to the Fox River. The north end of the watershed is predominately urban, while the southern portion of the watershed is predominantly agricultural. Urban and agricultural land uses have contributed to major threats to both water quality and fish and wildlife habitat within the East River corridor.

According to recent assessments conducted by the WDNR in 2020, the East River is considered impaired and in poor condition for designated uses which include the quality of fish and aquatic life, recreational use, and public health and welfare (fish consumption and related). Assessment results show water conditions that are potentially harmful for aquatic life use due to values for total phosphorus that fall into the range expected for an aquatic community in poor health, therefore this water is listed as impaired.

HISTORIC LAND USE

A thorough land use analysis was conducted to identify past and current land use conditions, trends, and threats that have resulted from land use development and degradation of sensitive areas.

The East River is a river system that has been profoundly impacted by human activities, especially changes to land uses. Changes to land use locally and in surrounding watersheds has caused significant modification to the East River over the last 300 years. Map 7 shows the pre-settlement vegetation cover developed from an analysis of tree records made by land surveyors in the 1830. Prior to settlement by Euro-Americans in the late 1770s and early 1780s various types of northern mesic forest covered much of Brown County and northern Wisconsin. As shown in the Original Vegetation map, the historic land cover was predominately comprised of species such as sugar maple; basswood; and white, black, and red oak species. About 20% of the project area was covered by marsh and sedge meadow, wet prairie, and lowland shrubs historically.

Little of this pre-settlement vegetation exists today in the Lower East River corridor, and the small patches that do remain have a different character than that observed in the late 19th and early 20th centuries. Beavers and their many hydrologically important dams were lost from the watershed as a result of heavy fur trapping in the 1700s and 1800s. This might be considered the first major step in the ecological decline in the health of the watershed. Impacts from deer herbivory, infestation of invasive plants, and colonization by early successional native plant species have changed the composition and structure of the remaining patches of native forest along the river. Subsequently, the loss of the native forest cover through logging was followed by wetland loss due to the initiation, intensification, and continuation of row cropping and dairy agriculture in the upper watershed. Similarly, urbanization of the lower stretches of the river reduced the forest and wetland acreage and diminished the benefits those natural conditions provided to the people living along the river.

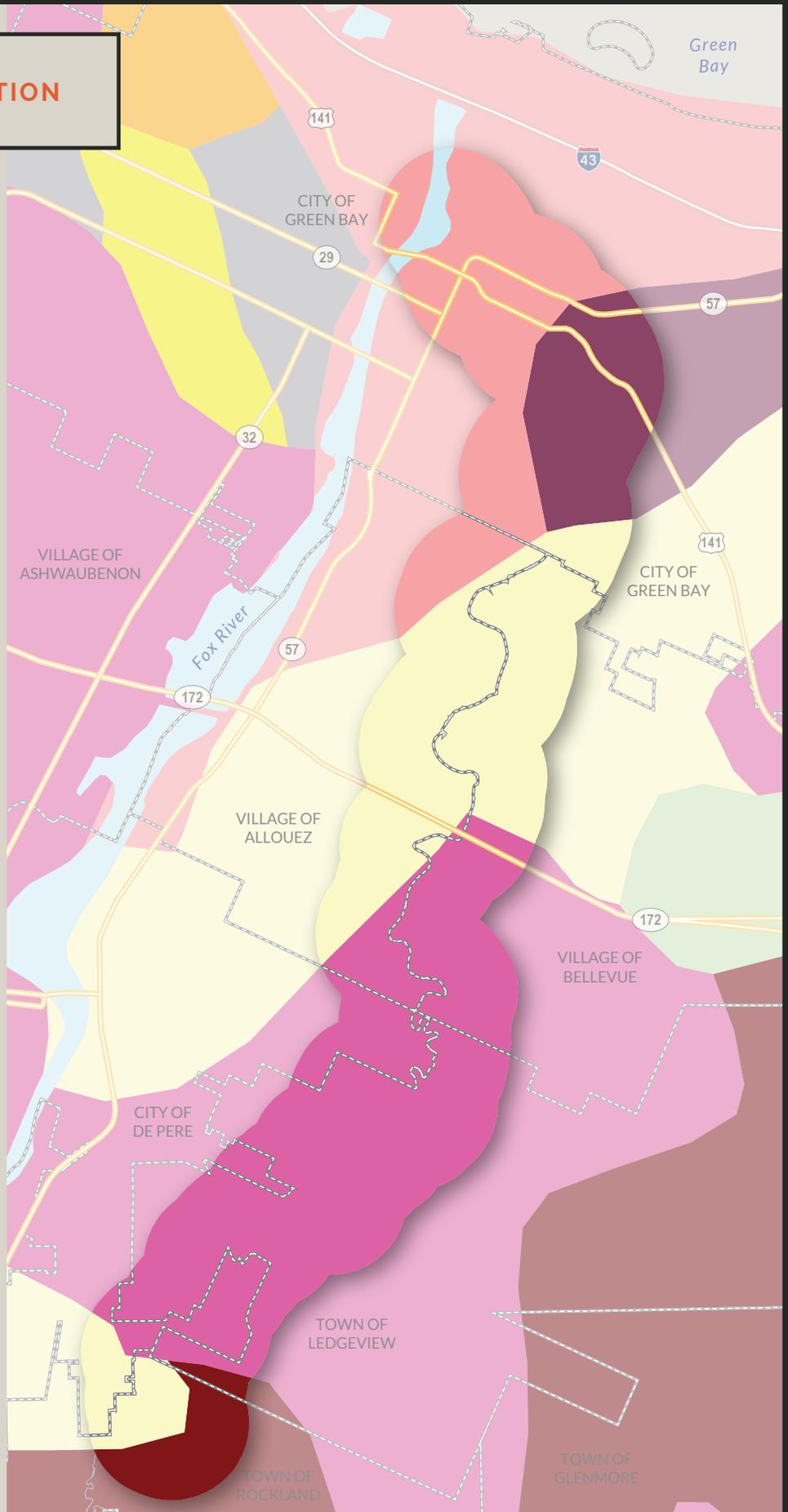
ORIGINAL VEGETATION

- Water
(81.8 acres or 1.1% of original vegetation within Project Area)
- Beech, hemlock, sugar maple, yellow birch, white pine, red pine
- Hemlock, sugar maple, yellow birch, white pine, red pine
- White pine, red pine
- Beech, sugar maple, basswood, red oak, white oak, black oak
(329.3 acres or 4.3% of original vegetation within Project Area)
- Sugar maple, basswood, red oak, white oak, black oak
(2,992.5 acres or 39.5% of original vegetation within Project Area)
- White oak, black oak, bur oak
(2,040.4 acres or 26.9% of original vegetation within Project Area)
- Oak openings, bur oak, white oak, black oak
(739.7 acres or 9.8% of original vegetation within Project Area)
- Prairie
- Brush
- Marsh and sedge meadow, wet prairie, lowland shrubs
(1,401.7 acres or 18.5% of original vegetation within Project Area)



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; Bay-Lake RPC, 2020.

Disclaimer: This map is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information, and data used for reference purposes only. Bay-Lake RPC is not responsible for any inaccuracies herein contained.





EXISTING LAND USE

The landscape of the East River Corridor and watershed today is very different from the landscape observed in the 19th and 20th centuries. Existing land use and land cover in the Lower East River focus area can be found in Map 8. Table 6 shows the acreage breakdown of existing land use data for both focus and project areas. Acreage was broken into five categories: Urban (industrial, residential, transportation, commercial), Agricultural, Parks and Recreation, Natural Areas (woodlands, natural area, open lands), and Water.

Urban and agricultural land uses can have major impacts on watersheds and the river itself. As shown in Table 6, urban land makes up 60% of the land use in the project area, followed by agriculture land use at 16%. Natural areas and park and recreation land uses make up about half of the land use in the focus area, which considers the land uses directly adjacent to the river including the waterbody itself. This is to be expected as many park and recreation opportunities focus on the river. Urban remains a dominant land use in the focus area while agriculture makes up about 10% of the focus area.

Land use can play a major role in the quality of water. Loss of wetlands, reduction of shoreline cover and structure, cultural eutrophication, and siltation have negatively affected water transparency, abundance of macrophyte habitat and even body condition (Casselmann & Lewis, 1996). Agriculture and urban land uses present the greatest threats to the watershed and quality of the East River. Map 9 shows where agriculture and urban land uses exist within the project area.

Land use can play a major role in the quality of water. Loss of wetlands, reduction of shoreline cover and structure, cultural eutrophication, and siltation have negatively affected water transparency, abundance of macrophyte habitat and even body condition (Casselmann & Lewis, 1996). Agriculture and urban land uses present the greatest threats to the watershed and quality of the East River. Map 9 shows where agriculture and urban land uses exist within the project area.

Table 6. Existing Land Use

Land Use Category	Project Area		Focus Area	
	Acreage	Percentage	Acreage	Percentage
Total Urban	4,565	60%	306	24%
Residential	2,460	32%	109	9%
Commercial	349	5%	44	4%
Industrial	367	5%	38	3%
Transportation and Right-Of-Way	1,134	15%	93	7%
Communication/Utilities	57	1%	2	0%
Institutional/Governmental	198	3%	20	2%
Total Agricultural	1,177	16%	132	10%
Total Parks and Recreation	451	6%	199	16%
Total Natural Areas	1,076	14%	421	33%
Natural Area	735	10%	299	24%
Woodlands	286	4%	118	9%
Open Lands	56	1%	4	0%
Total Water	320	4%	207	16%
Land Use Total	7,589	100%	1,264	100%

Source: Brown County Land Use GIS Layer, 2019

FOCUS AREA

The Focus Area consists of a 200 foot riparian buffer around the East River containing 1,262 acres.

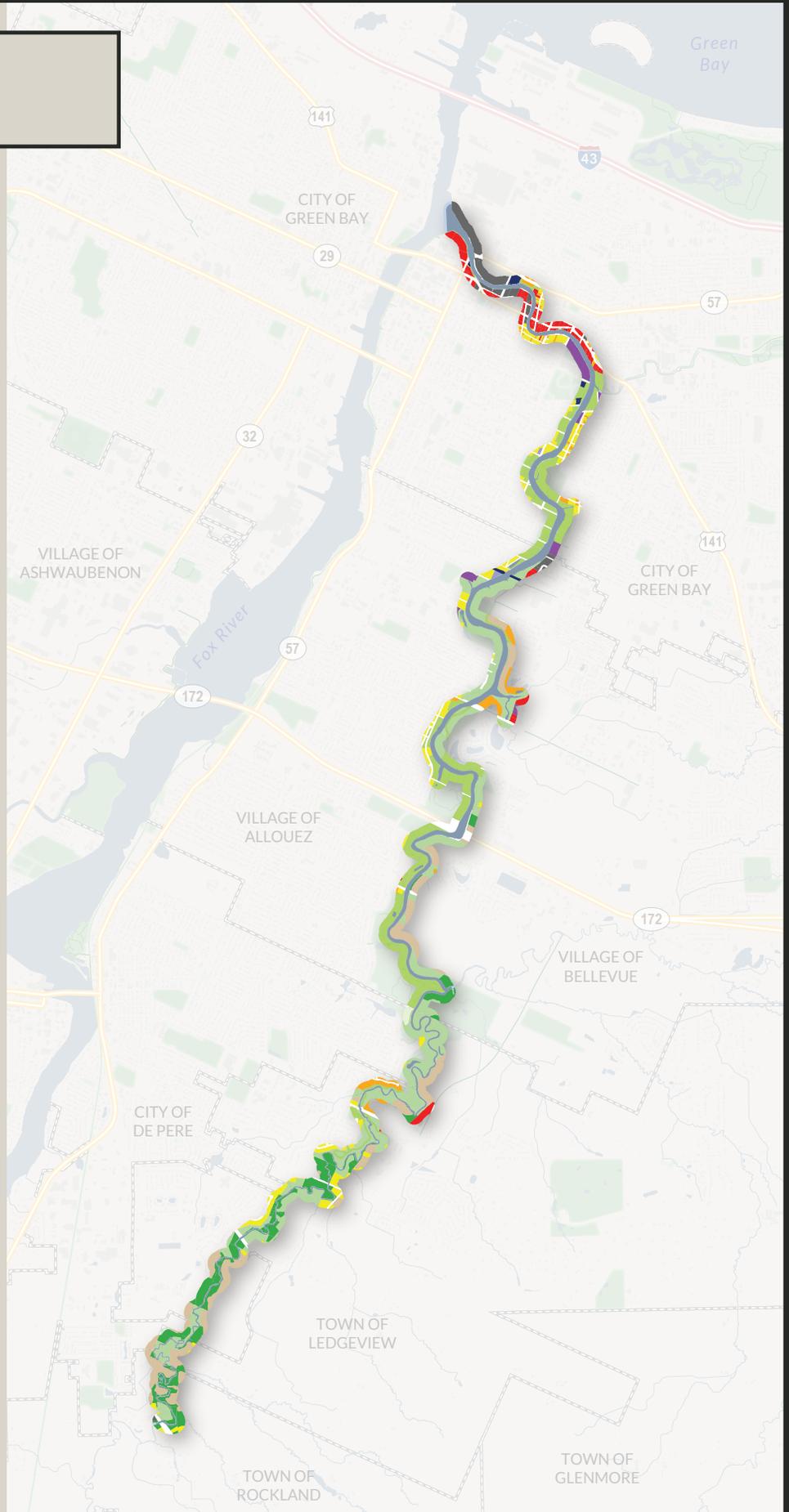
Existing Land Use within the Focus Area:

- Residential
(77.1 acres or 6.1%)
- Multi-Family
(32.0 acres or 2.5%)
- Commercial
(44.4 acres or 3.5%)
- Industrial
(37.6 acres or 3.0%)
- Transportation
(6.5 acres or 0.5%)
- Right-Of-Way
(86.2 acres or 6.8%)
- Communication/Utilities
(2.1 acres or 0.2%)
- Institutional/Governmental
(19.9 acres or 1.6%)
- Agricultural
(131.7 acres or 10.4%)
- Parks and Recreation
(198.6 acres or 15.7%)
- Natural Area
(299.1 acres or 23.7%)
- Water
(207.1 acres or 16.4%)
- Open Lands
(4.0 acres or 0.3%)
- Woodlands
(118.3 acres or 9.4%)



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; Bay-Lake RPC, 2020.

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URBAN AND AGRICULTURAL LAND USES

Negative land uses refers to any designated land usage with impervious surfaces. Examples would be land uses designated as commercial or industrial.

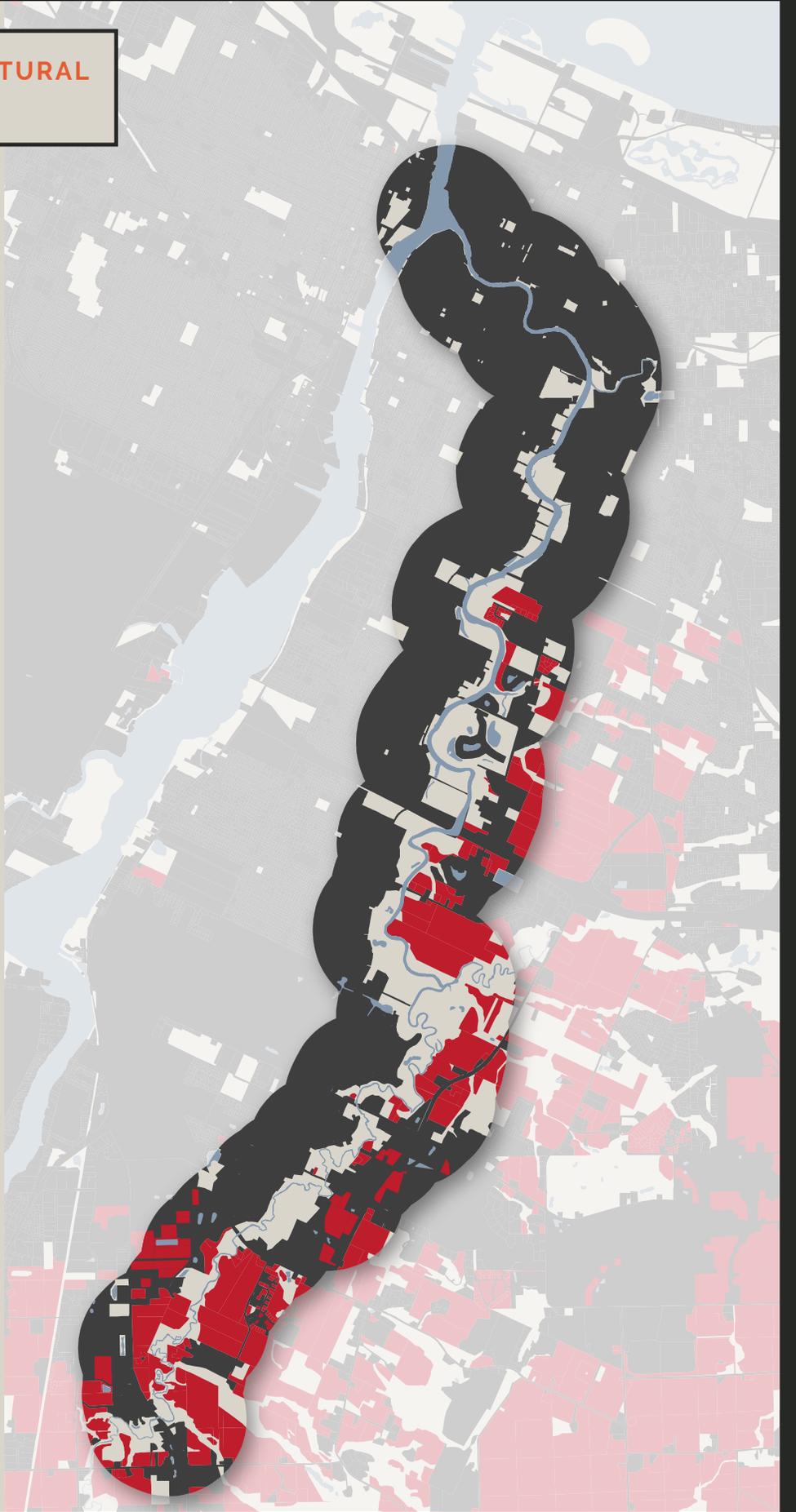
Total negative land uses account for **75.0%** of the Project Area while only covering **34.5%** of the Focus Area.

- Agricultural Land Use
(1,177.3 acres or 15.5% of total project area)
- Developed Negative Land Use
(4,508.6 acres or 59.4% of total project area)



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; Bay-Lake RPC, 2020.

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CHALLENGE 1: POLLUTION AND RUNOFF

According to the WDNR, the East River Watershed is ranked high for runoff impacts on streams and high for runoff impacts on groundwater. There are two sources of point source pollution that have been identified in the Lower East River Watershed. However, many pollutants in the Lower East River Watershed come from nonpoint sources. A nonpoint source cannot be traced back to a point of discharge. Runoff from agricultural and non-regulated urban areas is an example of a nonpoint source. Known pollutants within the river include: unspecified metals, phosphorus and sediment/total suspended solids. Nonpoint sources in the watershed may be caused by any of the following:

- Erosion from stream banks and construction sites
- Runoff from lawns and impervious surfaces
- Failing septic systems
- Pet/animal waste
- Erosion/runoff from agricultural lands
- Tile drainage
- Fertilizer application



According to the WDNR, the East River has been considered impaired since 1998 for total suspended solids, unspecified metals, and total phosphorus. Impairments in the East River have led to chronic aquatic toxicity, low dissolved oxygen levels, degraded biological communities, degraded habitat, and high phosphorous levels. High level of phosphorus was recently added to this already impaired water listing. Assessment results during the 2020 listing cycle show total phosphorus levels too high for healthy aquatic communities, like plants, fish, and bugs, according to 2020 WisCALM standards (WDNR, 2020).

Excessive sediment and nutrient loading to the Lower Fox River and Bay of Green Bay has led to increased algal blooms, oxygen depletion, water clarity issues, and degraded habitat. Algal blooms can be toxic to humans and costly to a local economy. Estimated annual economic losses due to eutrophication in the United States are as follows: recreation (\$1 billion), waterfront property value (\$0.3-2.8 million), recovery of threatened and endangered species (\$44 million) and drinking water (\$813 million) (Dodds, et al 2009).



CHALLENGE 2: STORMWATER RUNOFF AND EROSION

During site visits, varying levels of bank erosion was observed. Excessive runoff is one of the top causes of the stream erosion that takes place in the East River corridor. Impervious surfaces and compacted soil reduce infiltration and causes runoff to enter the river following rain and snowmelt events. Runoff occurs from rain and snowmelt events. Runoff carries pollutants like sediment, nitrogen, phosphorous, trash, chemicals and pesticides, oils, and more that can harm the river. Stormwater runoff is the number one cause of stream impairment in urban areas and can cause major impacts downstream including sever streambank erosion, loss of fish habitat, water quality

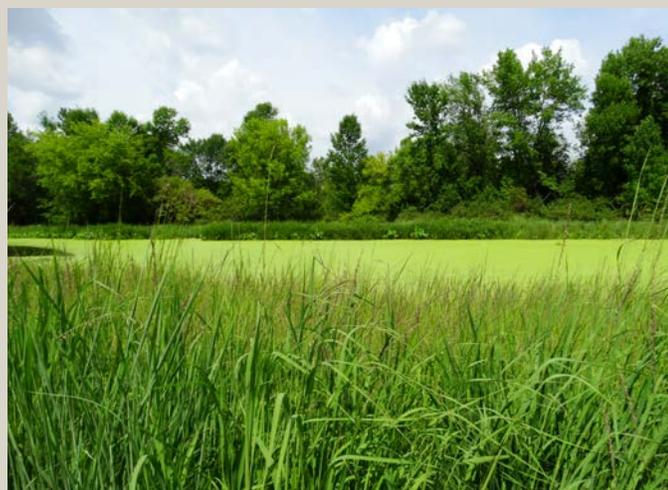
issues, and more. Natural and constructed stormwater management techniques can be effective in slowing, detaining, or reducing the amount of pollutants and runoff that enter waterways.

Regular severe flooding of the East River is common and affects many landowners and businesses in the area. However, flooding has recently become more of a regular occurrence in areas surrounding the East River. Flooding occurs due to several reasons including rising water levels, outdated infrastructure, floodplain development, and wetland degradation and loss.

WETLANDS

Wetlands are important features in the landscape that provide numerous environmental, social, and economic benefits for people and for fish and wildlife. Some important wetland functions include protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters and maintaining surface water flow during dry periods. These valuable functions are the result of the unique natural characteristics of wetlands. According to the USEPA, a typical one-acre wetland can store about 1 million gallons of water (USEPA 2006).

An inventory of wetlands within the project area can be found in Map 10. Table 7 below breaks down acreage and wetland type found in both the project and focus area. The Wetland map was created using the Wisconsin Wetland Inventory derived by the Wisconsin DNR. The project area contains around 600 acres of wetland. While fragmented, there are areas of large areas of intact wetlands that provide valuable fish and wildlife habitat and flood storage. Much of the wetlands in the project area are located on private lands which presents an opportunity for collaboration with landowners.



The dominant wetland type in the project area is forested wetland (240 acres), followed by emergent/wetland meadow (230 acres). Similar to the project area, the focus area, being the riparian lands adjacent to the East River, contains around 140 acres of forested wetland and around 106 acres of emergent/wet meadow. The largest tracts of forested wetland exist adjacent to the river in the Town of Ledgeview and the City of De Pere. Wetland forests, are incredibly important features that act as “filters” of our natural system, combating pollution, removing excess nutrients, and securing fresh drinking water through

infiltration for surrounding and downstream communities. They provide protection from flooding in vulnerable areas and rank among the most important in the nation for carbon sequestration and biodiversity. The villages of Allouez and Bellevue contain the largest portion of emergent/wet meadow wetlands. Wet meadows often occur in areas where farming is prevalent, leading historically to draining and filling of these wetlands for agricultural uses. Wet meadows are important environments that provide vital food and habitat for many insects, amphibians, reptiles,

birds, and mammals. During periods of high rainfall, wet meadows collect runoff, reducing the likelihood of seasonal flooding to downstream low-lying areas. In the process of collecting and storing runoff, the vegetation of wet meadows, similarly to forested wetlands, removes excess nutrients accumulated by the water, acting as a natural filter. (EPA)

Table 7. Wetlands

Project Area			Focus Area	
Wetland Type	Acreage	Percentage	Acreage	Percentage
Emergent/wet meadow	230.7	34.8%	106	34.3%
Forested	240.0	36.2%	139.2	45.0%
Forested, Emergent/wet meadow	69.2	10.4%	32.8	10.6%
Forested, Open Water	0.1	0.2%	0.5	0.2%
Forested, Scrub/shrub	5.8	0.9%	2.2	0.7%
Open Water	63.6	9.6%	7.1	2.3%
Scrub/shrub	1.3	0.2%	1.3	0.4%
Scrub/shrub, Emergent/wet meadow	52.0	7.8%	20.3	6.6%
Total	663.7	100.0%	309.4	100.0%

Source: Wisconsin DNR

CHALLENGE 3: WETLAND LOSS AND DEGRADATION

The Green Bay area contains the largest estuary in the world and the lower west shore of Green Bay contains one of the largest intact wetland complexes in the Midwest. These rich water resources create not only valuable habitat but provide major economic benefits to the region. Wetlands are some of the most important ecosystems on earth. However, wetland loss and degradation can have potential negative influences on biodiversity, local economy, human health, regional climate, and ecological security. Degradation of wetlands is primarily caused when these landscapes are drained for agriculture or development uses. A majority of wetlands in the Lower Fox and East River Corridors have been lost in the last 300 years. Wetlands destruction has increased flood and drought damage, nutrient runoff and water pollution, and shoreline erosion, and triggered a decline in wildlife populations.

Wetland conservation and restoration must be recognized as an urgent national, regional, and local priority. Restoring wetlands in the watershed area will provide water storage and reduce sediment and phosphorus loading. Since it is very unlikely that most agricultural landowners would be willing to give up cropland to restore wetlands, it will also be important to install practices on the landscape such as detention ponds and constructed treatment wetlands designed to store water, retain sediment and nutrients, and mimic pre-settlement conditions in the area.

FISH AND WILDLIFE HABITAT

Despite the water quality impairments of the East River, recent fish surveys conducted by the WDNR in 2017 on the East River found 20 species of fish inhabiting the river, including yellow perch, bluegill, a few largemouth bass, northern pike and many warmwater minnow and other small bodied species. Survey records kept by staff of the Brown County Land Conservation Department indicate adult northern pike commonly run up the East River and its tributaries from Green Bay seeking wetlands for spawning each spring. Based on these surveys, the Brown County

WETLANDS

Wetlands within project area:
663.7 Acres or
8.7% of total area

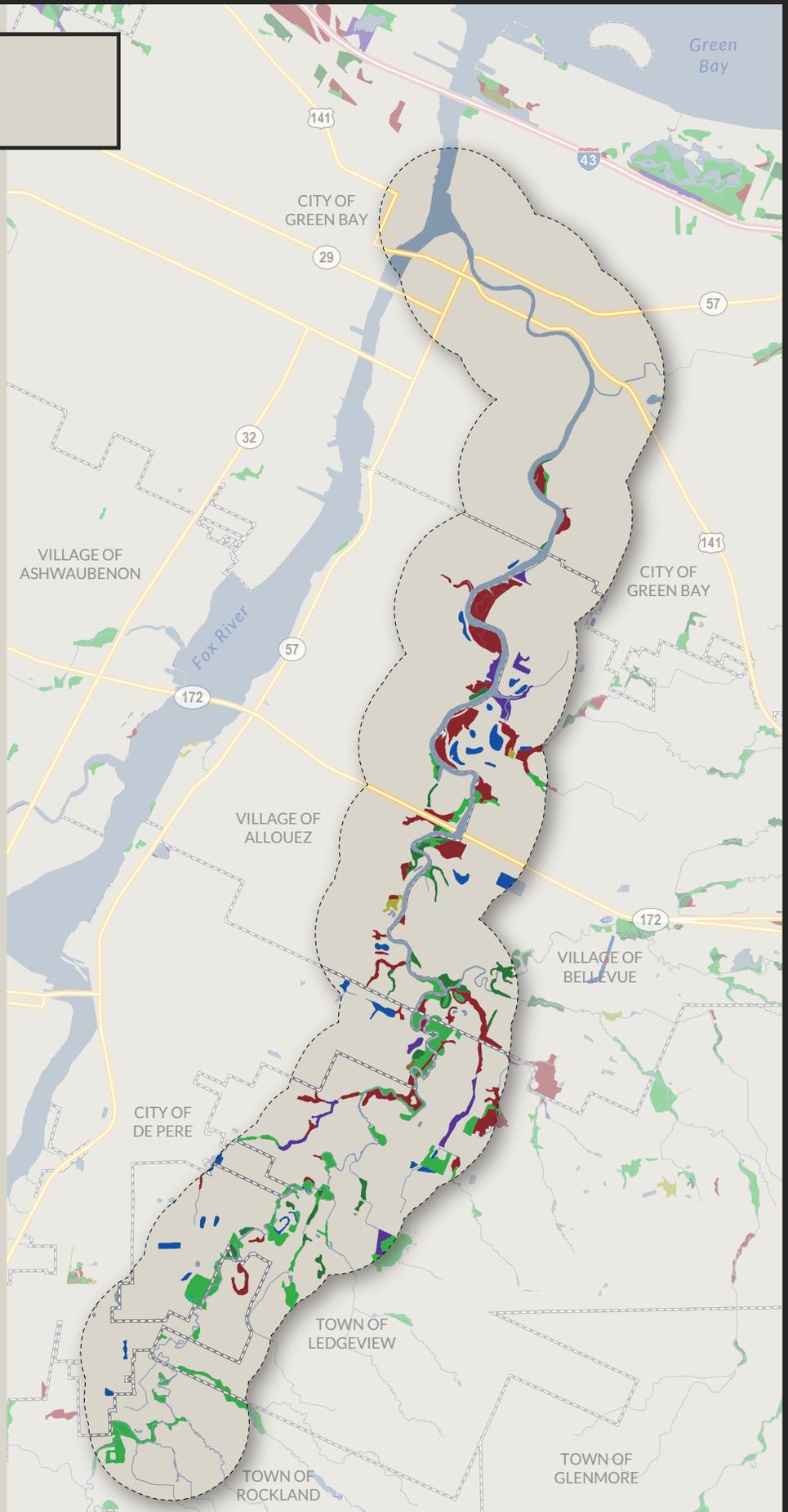
Wetlands within focus area:
309.4 Acres or
24.5% of total area

- Emergent/wet meadow
(230.7 acres or 34.7% of wetlands within Project Area)
- Forested
(240.0 acres or 36.2% of wetlands within Project Area)
- Forested, Emergent/wet meadow
(69.2 acres or 10.4% of wetlands within Project Area)
- Forested, Open Water
(1.0 acres or 0.2% of wetlands within Project Area)
- Forested, Scrub/shrub
(5.8 acres or 0.9% of wetlands within Project Area)
- Open Water
(63.6 acres or 9.6% of wetlands within Project Area)
- Scrub/shrub
(1.3 acres or 0.2% of wetlands within Project Area)
- Scrub/shrub, Emergent/wet meadow
(52.0 acres or 7.8% of wetlands within Project Area)



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; Bay-Lake RPC, 2020.

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Land and Water Conservation Department installed three northern pike/wetland restoration projects on Willow Creek, two in the Village of Bellevue, the other in the City of Green Bay. Habitat changes have significantly affected production of northern pike, especially in the Great Lakes Basin.

COMMUNITY TYPES WITHIN THE EAST RIVER CORRIDOR

A community is a term used to describe an assemblage of different plant and animal species, living together in a specific area, at a particular time, in a specific physical setting. Communities may be named for their dominant plant species, for example, sedge meadows; or a combination of the defining structure of the dominant vegetation and the physical setting, e.g., shrub-carr, floodplain forest, emergent marsh. It is important to note that though we have defined these communities as a certain type today, plant assemblages and their physical settings are dynamic and always changing. See Map 11 for habitat types.

FLOODPLAIN FORESTS

This lowland hardwood forest community type occurs in the low riparian lands bordering the East River that are subject to periodic flooding. Soils supporting this forest type are predominantly well drained silt loams. However, small areas of sandy loams were found as recent over bank flood deposition.

During high water in the spring or when water has backed up into the river driven by winds on Green Bay, these lowland areas may be flooded and confluent with the main stem of the river with river water flowing through the forest. In general, these periodic floods, particularly in the spring, are the key natural disturbance to which species of this community have adapted.

Tree canopy dominants vary along the floodplain of the East River, but include box elder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), swamp white oak (*Quercus bicolor*), bur oak (*Quercus macrocarpa*), and eastern cottonwood (*Populus deltoids*). Black willow (*Salix nigra*), basswood (*Tilia americana*), red oak (*Quercus rubra*), and red maple (*Acer rubrum*) are associated species and may also be found in these forest patches. Hawthorns (*Crataegus* spp.) and the invasive buckthorn (*Frangula alnus*) are especially common along the East River as small trees in the understory or along the edge of floodplain forest patches. Historically, elms were highly significant components of the floodplain forests, but Dutch elm disease eliminated most large elm trees that formerly provided super-canopy structure, snags and den sites, and large woody debris. Unfortunately, a similar loss



of green ash is occurring in these floodplain forests due to the damage caused by the emerald ash borer.

Wood nettle and stinging nettle (*Laportea canadensis*, *Urtica dioica*), sedges grasses (e.g., *Cinna arundinacea*, *Elymus villosus*, *Leersia virginica*), ostrich fern (*Matteuccia struthiopteris*), and green-headed coneflower (*Rudbeckia laciniata*) are important understory herbs, such as Virginia creeper (*Parthenocissus quinquefolia*), grapes (*Vitis* spp.), and poison-ivy (*Toxicodendron radicans*) are often common.

The floodplains found along the East River sometimes consist of several terraces capable of supporting forests that are subject to floods with differing frequencies and levels of inundation. Depending on the frequency of flooding, overstory composition, management history, and soil types, the ground layer herbs can vary from very sparse on the lower terraces with dense box elder stands that experience the most frequent, severe, and long-lasting floods to a more diverse flora similar to adjacent more mesic sites above the floodplain.

SOUTHERN SEDGE MEADOW

While native undisturbed sedge meadows are often typically dominated by tussock sedge (*Carex stricta*) and Canada bluejoint grass (*Calamagrostis canadensis*), reed canary grass (*Phalaris arundinacea*) and common reed grass (*Phragmites australis*), non-native invasive grasses, are often present or dominant in these settings along the East River. If the site is not completely dominated by reed canary grass, other species that may be present include lake sedge (*Carex lacustris*), marsh bellflower (*Campanula aparinoides*), blue vervain (*Verbena hastata*) American water horehound (*Lycopus americanus*), panicked aster (*Symphotrichum lanceolatum*), swamp aster (*Symphotrichum puniceum*), iris (*Iris* spp.), spotted Joe-Pye weed (*Eutrochium maculatum*), marsh fern (*Thelypteris palustris*), and swamp milkweed (*Asclepias incarnate*).

Along the East River plant associations most similar to sedge meadows occur in oxbows or as small open patches intergrading with taller shrubs and lowland forest trees. "Oxbows" are remnants of the old main channel of a river or stream that has been cut off as the river or stream migrates across its floodplain and cuts new channels. The East River, with its sinuous and meandering character in its lower reaches, has numerous oxbow wetlands present in the floodplain of the river, especially at its confluence with Bower Creek. Today these oxbows hold an integrating mix of emergent marsh or sedge meadow species and are intermittently connected to the main flow of the river. They offer wildlife habitat, water quality benefits, aesthetic interest and storm or flood water storage capacity, while enhancing the habitat diversity within the floodplain forest community. The species composition, degree of habitat quality or flood storage provided by these oxbows, in part depends on the water levels of the river, hydroperiod of the oxbow wetland and degree of connectivity with the main channel of the river.

SURROGATE GRASSLAND

The term surrogate grasslands include power line rights-of-way, hayfields, fallow fields, old fields, pastures, and along the East River, and row crops like corn and soybeans. These often thick grass dominated areas often hold non-native grasses such as smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), redtop (*Agrostis gigantea*), orchard-grass (*Dactylis glomerata*), bluegrass (*Poa pratensis* and *P. compressa*), and quack-grass (*Elymus repens*). Common flowering plants include goldenrod (*Solidago canadensis*) and various species of thistle (*Cirsium* spp).

SOUTHERN DRY-MESIC (TO MESIC) FORESTS

Red oak (*Quercus rubrum*) is a common dominant tree of this upland forest community type. White oak (*Quercus alba*), American basswood (*Tilia americana*), sugar and red maples (*Acer*

saccharum and *A. rubrum*), white ash (*Fraxinus americana*), and wild black cherry (*Prunus serotina*) are also present in this forest type along the East River. The herbaceous understory flora is diverse and includes yellow violet, (*Viola pubescens*), rue-anemone (*Anemonella thalictroides*), trout lily (*Erythronium americanum*), may apple (*Podophyllum peltatum*), spring beauty (*Claytonia virginica*), Virginia waterleaf (*Hydrophyllum virginianum*), wood anemone (*Anemone quinquefolia*), and wild geranium (*Geranium maculatum*).

These forest types occur on the loamy soils above the elevation of the floodplain. Based on the early land surveyor notes from this region, this appeared to be a common upland forest type of the region before 1800. Currently these forests are rather rare along the East River as most upland areas were converted to urban development, pastures or row-crop agriculture in the 1800's. In addition, the species composition of any extant patches has likely changed due to logging and infestation by non-native invasive species such as honeysuckle shrubs (*Lonicera* spp.) and buckthorn (*Frangula alnus*).

SHRUB-CARR

A Shrub-carr is a wetland plant association that is defined as having few trees and generally 50% cover of shrubs or more. As elsewhere, along the East River, shrub-carrs intergrade with patches of sedge meadow and often appear to form a structural transition between sedge meadows and the floodplain or upland forest types. Most of the shrub-carr sites along the lower East River have various willows (*Salix* spp.) or the invasive glossy buckthorn (*Frangula alnus*) as the dominant shrubs with lesser numbers of red-osier dogwood (*Cornus sericea*), meadowsweet (*Spiraea alba*), and various other willows (*Salix* spp.). These shrubs can grow densely and often become nearly impenetrable thickets.

Given the density of growth, these sites are often hold wide diversity of bird species as feeding, refuge or nesting habitat. Typical common birds associated with these habitats include yellow warblers, common yellow throat warblers, catbirds, woodcock, song sparrow, and northern cardinal. It is thought that shrub-carrs are a rather stable type of plant community and can persist at a given site for a very long time if natural hydrologic cycles are maintained.

EMERGENT MARSH

Emergent marshes are characterized by the presence of robust, large emergent wetland, non-woody plants, in homogeneous stands of one species or in various mixtures. In the absence of aggressive non-native plants such as Phragmites, and narrow leaf cattail (*Typha angustifolia* and hybrids) native species include cattails (*Typha* spp.), bulrushes (particularly *Schoenoplectus acutus*, *S. tabernaemontani*), bur-reeds (*Sparganium* spp.), water-plantains (*Alisma* spp.), arrowheads (*Sagittaria* spp.), and occasionally sweet flag (*Acorus calamus*) can be found in the emergent marshes along the lower East River. Emergent marsh occur as riparian wetlands connected to the main stem of the river, in oxbows and edging the open water of numerous water quality basins in the riparian lands bordering the river.

Emergent wetlands provide several important functions as breeding sites for fish, amphibians, important insect predators (e.g., dragonflies and damselflies), and marsh nesting birds. They also filter sediment from the water and seasonally absorb nutrients from incoming water before it reaches the main stem of the river. In addition, many of wetland plants (e.g., various smartweeds, *Persicaria* spp.) produce seeds that are eaten by a waterfowl and other birds. The riparian wetlands are also important in stabilizing the soft sediments and reducing shoreline erosion.

OTHER FOREST

The term 'Other Forest' is used to designate those stands of trees with a species composition that

does not align with natural forest types. These would include tree plantations, park plantings, and highly managed remnants of natural forests, such as park lands. Tree species found in these settings could include native trees or any of several species not usually considered native to this area, e.g., white spruce (*Picea glauca*), Norway spruce (*Picea abies*), Norway maple (*Acer platanoides*), non-native lindens (*Tilia* spp.), and flowering crab apples (*Malus* spp.) etc. As this is not a natural assemblage of species, these settings provide habitat value to a limited number of species and are usually created for other purposes.

CHALLENGE 4: FISH AND WILDLIFE HABITAT DEGRADATION

Degradation of the above community types and wetlands can create major challenges for fish and wildlife and can be detrimental to the economy as recreational activities like fishing, hunting, and wildlife watching, etc. may diminish. Wetlands are critical habitat for fish, wildlife, and plant species and nearly one third of currently listed endangered species are dependent on wetlands. Preserving natural lands and wetlands, and planting native coverage will help provide habitat for fish and wildlife species.

CHALLENGE 5: INVASIVE SPECIES

The urbanized corridor of the East River holds many plant species that are not native and invasive to the native plant associations of the region (Table 8 below). The riparian emergent marshes along the East River have become heavily infested with *Phragmites australis* (phragmites), *Phalaris arundinacea* (reed canary grass), and *Typha angustifolia* (narrow-leaved cattail), which are all non-native and considered aggressive, system altering species. On damp soil habitats, *Rhamnus frangula* (alder buckthorn) and *Phalaris arundinacea* are often common species. On drier upland forest habitats, *Rhamnus cathartica* (common buckthorn), *Clynoglossum officinale* (hound's tongue), *Hesperis matronalis* (dame's rocket), *Lonicera tatarica* (honeysuckle), and other non-native species of the *Lonicera* genus are common. (Casselman & Lewis, 1996) (Casselman & Lewis, 1996)

Table 8. Invasive Species

Habitat Types	Significant Invasive Species Encountered
Surrogate Grassland Old field	Generally dominated by non-native grasses (e.g., <i>Bromus inermis</i> , <i>Phalaris arundinacea</i>) and non-native herbs (e.g., <i>Cirsium arvense</i> , <i>Allaria petiolate</i> , <i>Daucus carota</i> , <i>Melilotus alba</i> , <i>Coronilla varia</i>)
Hardwood swamp	Understories often hold high densities of <i>Phalaris arundinacea</i> ; <i>Rhamnus frangula</i> , <i>R. cathartica</i>
S. dry mesic forest	<i>Rhamnus cathartica</i> , <i>Clynoglossum officinale</i> , <i>Allaria petiolate</i> , <i>Hesperis matronalis</i> , <i>Lonicera tatarica</i> , or other non-native species of the <i>Lonicera</i> genus are common in these habitats
Emergent marsh (riparian)	<i>Phragmites australis</i> (treated along the lower East River in 2016 and most stands showed major dieback), <i>Phalaris arundinacea</i> , <i>Typha angustifolia</i>
S. sedge meadow	<i>Phalaris arundinacea</i> , <i>Typha angustifolia</i> , are common invasive species
Shrub carr	<i>Rhamnus frangula</i> , <i>Phalaris arundinacea</i> are common
Other forest types	<i>Rhamnus cathartica</i> , <i>Allaria petiolate</i> , <i>Lonicera tatarica</i> , or other non-native species of the <i>Lonicera</i> genus

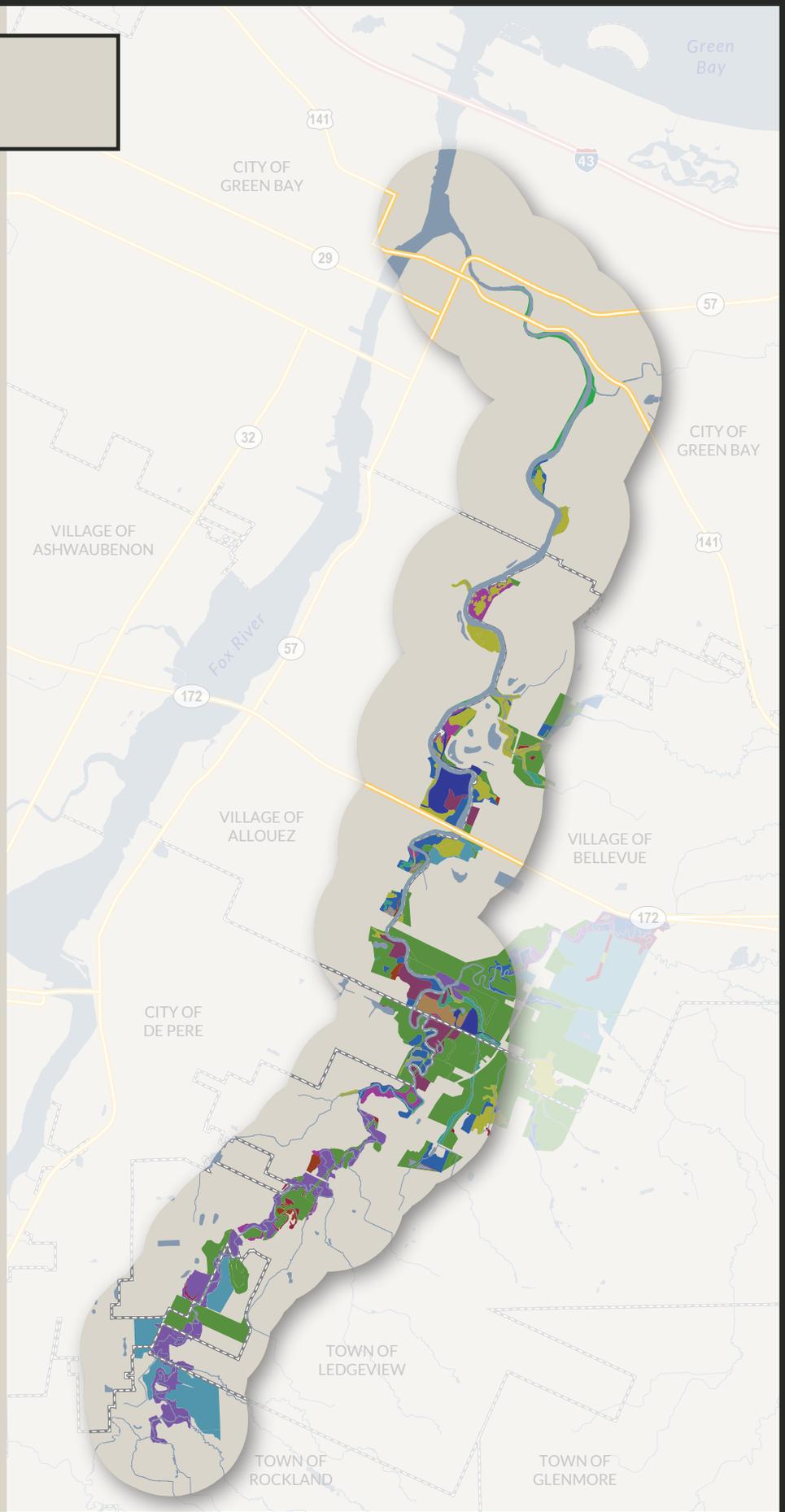
HABITAT TYPE

- Active rowcrop ag
(58.4 acres or 4.1% of types within project area)
(30.3 acres or 4.2% of types within focus area)
- Emergent marsh inland
(142.8 acres or 10.0% of types within project area)
(73.3 acres or 10.1% of types within focus area)
- Floodplain forest
(191.5 acres or 13.5% of types within project area)
(162.5 acres or 22.5% of types within focus area)
- Hardwood swamp
(106.8 acres or 7.5% of types within project area)
(64.5 acres or 8.9% of types within focus area)
- Open water
(141.1 acres or 9.9% of types within project area)
(140.3 acres or 19.4% of types within focus area)
- Open water inland
(20.8 acres or 1.5% of types within project area)
(5.8 acres or 0.8% of types within focus area)
- Other
(54.5 acres or 3.8% of types within project area)
(22.8 acres or 3.1% of types within focus area)
- Other forest
(11.9 acres or 0.8% of types within project area)
(4.7 acres or 0.6% of types within focus area)
- Shrub carr
(31.8 acres or 2.2% of types within project area)
(3.3 acres or 0.5% of types within focus area)
- Southern dry mesic forest
(71.6 acres or 5.0% of types within project area)
(54.1 acres or 7.5% of types within focus area)
- Southern sedge meadow
(41.6 acres or 2.9% of types within project area)
(33.1 acres or 4.6% of types within focus area)
- Surrogate grassland (old field)
(529.8 acres or 37.2% of types within project area)
(120.5 acres or 16.7% of types within focus area)
- Surrogate grassland restored
(21.2 acres or 1.5% of types within project area)
(8.6 acres or 1.2% of types within focus area)



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.

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PUBLIC AND RECREATIONAL OPPORTUNITIES

Appendix B shows a list of all the publicly owned lands within the project area and focus area, the type of public land, the total acreage, and the address of each location. There are nearly 840 acres of publicly owned lands within the East River project area and about 430 acres located along the riparian shoreline within the focus area. Map 12 shows the trails, parks, DNR managed land, and municipal owned land within the project area. These areas can be effectively managed to meet the plan goals when owned by local governments, land trusts, etc.

Recreational trails were inventoried to determine where gaps and opportunities may exist to enhance or expand recreational access within the project and focus area. Trails are often found in public parks and along the East River shoreline. There are nearly 17 miles of trails that fall within the project area, and approximately 11 within the focus area. The East River Trail is a multi-use trail that presents the greatest opportunity for recreation directly adjacent to the East River. The East River Trail was developed in 1990 and connects the communities of Green Bay, Bellevue, Allouez, De Pere, and Ledgeview. Additional sections, some disconnected from the others, were added over the years. Another notable trail that falls within the project area is the Fox River Trail located adjacent to the Fox River, just a few blocks from the East River Trail. This multi-use trail extends 25 miles along a former rail line from downtown Green Bay south to Greenleaf, connect multiple parks and municipalities. The Fox River Trail is the second longest trail within the project area. Table 9 below you will find a list of the trails within the project area and focus area.

Table 9. Trails in Project Area*



<i>Trail Name</i>	<i>Mileage</i>	<i>Percentage</i>
Multi-Use Trail (No Name)	0.2	0.9%
Trail (No Name)	0.5	2.9%
Multi-Use Trail (No Name, alongside Monroe Rd in Ledgeview)	0.1	5.7%
Baird Creek Trail	0.6	3.7%
Bay Beach Wildlife Sanctuary Trail	0.4	2.6%
Cora VanderPerren Trail	0.4	2.2%
East River Trail	11.6	67.6%
Fox River Trail	0.9	5.3%
Green Isle Park Trail	0.9	5.2%
Wiese Family Park Trail	0.7	3.9%
Total	17.1	100.0%

Source: Brown County Trails GIS Layer, 2020

*Refers to in or partially in trails of designated areas. Mileage shown is reflective only on trail portion within stated areas, percentages shown reflect to trail mileage total.

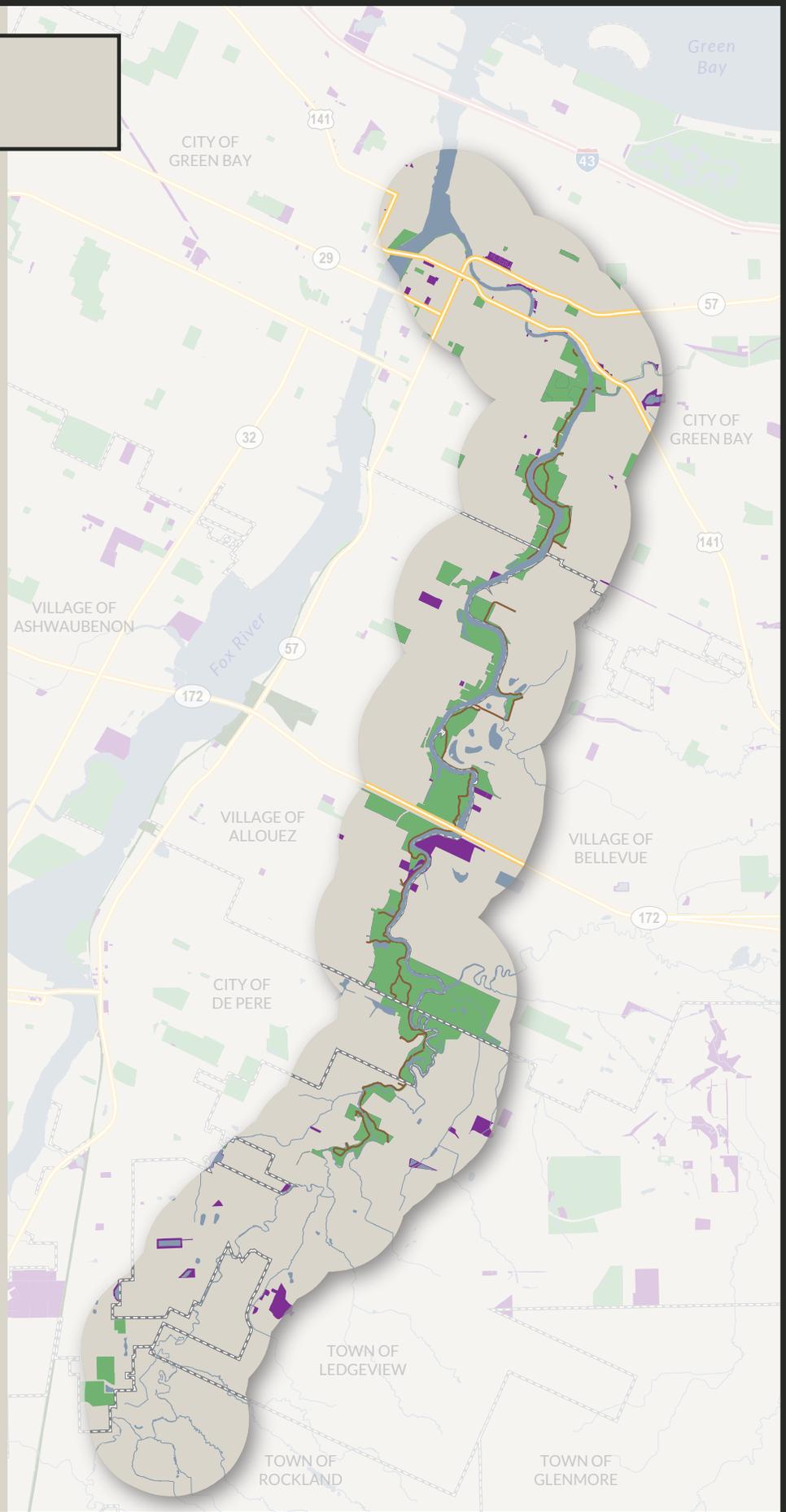
PUBLIC LANDS

-  Trail
(17.1 miles within project area)
(10.9 miles within focus area)
-  Park
(41 parks in or partially within project area
accounting for 839.2 acres)
(20 parks in or partially within focus area
accounting for 428.4 acres)
-  DNR Managed Land
-  Municipal Owned Parcel



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; Bay-Lake RPC, 2020.

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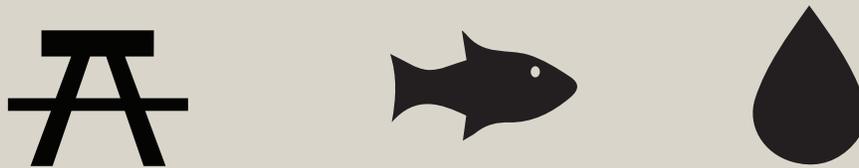


Chapter 3: Recommendations

This section of the plan identifies site specific recommendations for each municipality that are meant to improve fish and wildlife habitat; river, stream, and wetland bank stability; water quality; flood resilience; aesthetic appearance and public enjoyment of the East River. These recommendations, at this stage, are simply a set of project ideas; concepts to be considered and developed more thoroughly, if accepted. These project ideas may be modified or abandoned after detailed site inspection and assessment, resource mapping, and financial and public benefit consideration by the municipalities and the public.

The recommendations presented in this chapter are broken up by “sites”, with each site being a section of a parcel or set of parcels that are publicly owned along the East River. Map 13 shows the location of all recommended projects. Various site-specific recommendations are noted on the following pages for each municipality, followed by general recommendations for each municipality. Photos and maps illustrate the location and general configuration of the projects and each recommendation has information on the ecological and human use benefits of the projects and a brief description of the project.

Site recommendations were developed by The Nature Conservancy in partnership with the Bay-Lake Regional Planning Commission and presented to willing local government staff. Recommendations were identified based off-site visits, meetings with municipalities and partners, and spatial analysis. Projects were then further considered to be included in the following chapter of this plan, the Action Plan. Projects that are listed in the Action Plan in Chapter 4 can be identified by the icons shown below.

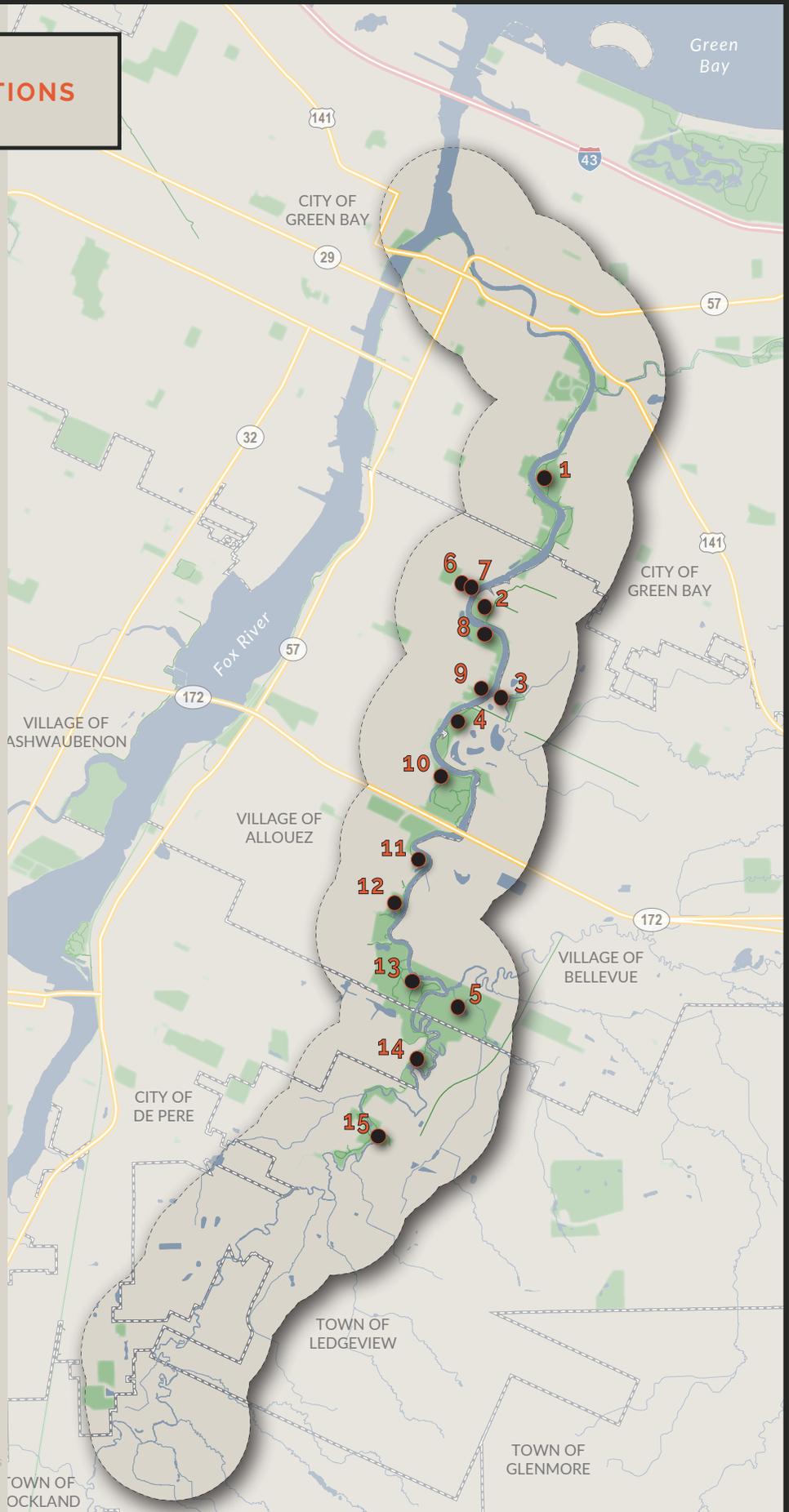


It is important to note that for all municipalities along the lower East River, the improvement of the East River for human enjoyment and aesthetic appeal along with the creation of conditions suitable for a diversity of desirable species will require both an attention to small-scale individual land and water improvement projects as well as attention to watershed scale, multi-jurisdictional efforts to control those landscape issues (i.e., land-use practices, flow management, and floodplain connectivity) that ultimately drive the health of the land and waters of the East River.

The set of recommended projects found in Map 13 of this chapter, fall into the category of small-scale riparian and stream bank habitat and human use improvement projects. These projects will provide added public enjoyment of the East River and its riparian lands, as well as provide additional and improved habitat conditions for many desirable and perhaps emblematic East River species. Addressing watershed scale issues can only be dealt with through a collaborative process involving the multiple municipalities, various units of government, and private stakeholders of the watershed. The municipalities that boarder the East River can and should be involved as a leader or participant with that broader more comprehensive, higher impact, and likely more sustainable approach to the revitalization of the East River.

SITE RECOMMENDATIONS

1. Van Beaver Park Area
(City of Green Bay)
2. "Railroad Track" Site
(Village of Bellevue)
3. Willow Creek Complex
(Village of Bellevue)
4. Vanden Heuvel Park Area
(Village of Bellevue)
5. Bower Creek/East River
Conservation Area
(Village of Bellevue)
6. Optimist Park Area
(Village of Allouez)
7. East of Kalb Avenue
(Village of Allouez)
8. East end of St. Joseph Street
(Village of Allouez)
9. Memory Avenue and
Brookridge Street
(Village of Allouez)
10. Green Isle Park
(Village of Allouez)
11. Broadview Drive and
Hoffman Road Riverfront
(Village of Allouez)
12. Hoffman Road Area
(Village of Allouez)
13. Wiese Park Area
(Village of Allouez)
14. Black Earth Drive Area
(City of De Pere)
15. Ledgeview Park
(Town of Ledgeview)



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.

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CITY OF GREEN BAY

Currently, riparian lands along the East River in Green Bay are owned both by the city and private landowners. On those lands owned by the city, there are several areas where the city could explore options to increase public enjoyment, improve fish and wildlife habitat, and reduce stormwater and flood water problems. These opportunities are the site recommendations found in Map 14 and are described in greater detail below.

The East River takes a meandering path through the city bordered in places by wide emergent wetlands, hedgerows of small trees and shrubs, small fields of grass, and residential and commercial developments. While reduced in size, quality and natural diversity from pre-settlement conditions, these riparian woodlots and wetlands still hold important and interesting native plants and animals. The prevalence of this situation is reflected in the diversity of bird species (e.g., song sparrow, goldfinch, yellow warbler, common yellowthroat, gray catbird, northern cardinal, indigo bunting) that can be found along the river associated with these habitat patches. These natural systems also provide important functions of storing storm and flood waters, as well as capturing nutrients and sediment from the water. Lastly these natural lands along the East River provide places for public recreation and enjoyment.

Through this stretch, the East River flows slowly as a broadly meandering warm water, 5th order stream influenced both by the hydrology and water quality of the upstream watershed and the periodic upstream flow of water from Green Bay via the Fox River during high water seiche events. The landscape covered in this assessment comprises small patches of riparian forest, both upland and lowland or floodplain; extensive wetlands fringing the main stem of the river; recreational parks; and areas of commercial and residential development.

For the most part, the assessed area lies within the mapped Environmentally Sensitive Areas (ESAs) and Shoreline Zones for Brown County. The ESAs for Brown County include floodways and their 35-foot buffers, wetlands with a 35-foot buffer, navigable and non-navigable streams with 75 and 35 foot buffers, respectively and several other natural features. The assessed area lies entirely within the mapped Flood Hazard Areas (Zones A and AE: the 100-year floodplain, i.e., areas subject to inundation by the 1 percent annual chance flood event) of the East River.

SITE 1: VAN BEAVER PARK AREA

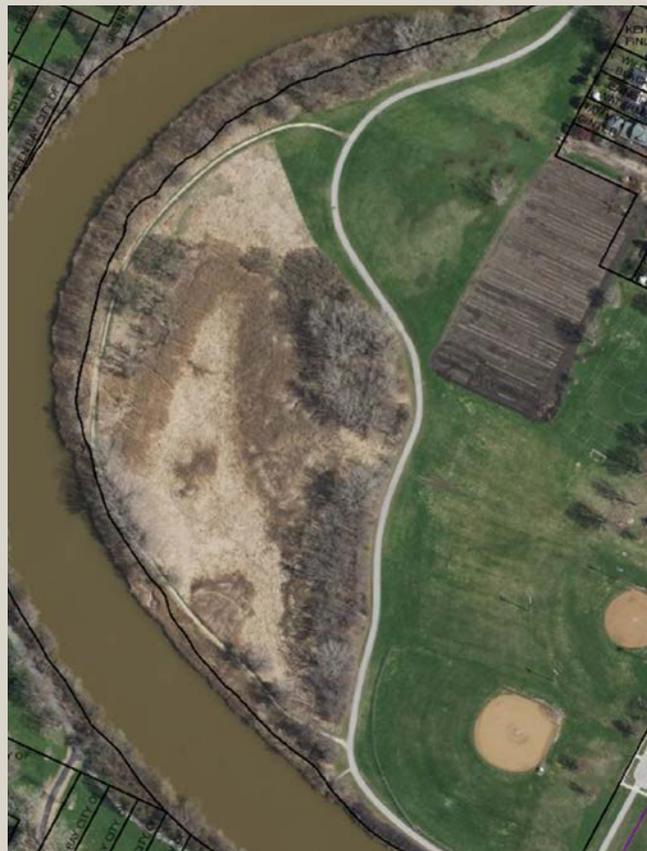
The Van Beaver Park Area is 44-acres of publicly owned land in the City of Green Bay. There are opportunities for wetland improvement in two areas of the park, both located on the east side of the river. Site 1.1 is located .24 miles upstream of the East Mason Street Bridge. The open water of the Fox River is 2.5 river miles from this wetland. Site 1.2 is located .25 miles upstream of site 1.1. The open water of the Fox River is 2.75 river miles from this site.

SITE 1.1: The northern Van Beaver Park wetland is a semi-isolated riparian wetland complex comprising a central emergent marsh grading into shrub carr and lowland hardwood vegetation on its fringe. The site is laterally connected to the main stem of the East River via a single large



culvert under the shoreline walking trail. Historic photos indicate fill was added to the northern portion of the site sometime in the late 1950's and the shoreline separating the wetland from the main flow of the river is lined with blocks of concrete rip-rap.

Today, non-native vegetation dominates the upland and wetland soils of the site. Phragmites and reed canary grass dominate the core of the emergent wetland, though the condition of the Phragmites has been severely degraded by a fall 2016 herbicide treatment and the current high water (2020) may degrade the species viability at the site. Historic photos indicate a central U-shaped body of open water will form during periods of high water. The shrub carr habitat is confined to small patches and comprises mostly sand-bar willow. The lowland hardwood forest comprises scattered, large cottonwoods with green ash to form a canopy over box elder, buckthorn (*Rhamnus cathartica*), and hawthorn. Box elder and black willow mix with the hawthorn, buckthorn, non-native honeysuckle, and black locust along the edge of the site. Non-native herbaceous vegetation (e.g., dame's rocket, sweet white clover, motherwort, hound's tongue, garlic mustard) form the dominant ground cover on the upland areas of the site.



The site offers ecological functions including migratory and breeding habitat for urban waterfowl, migratory feeding habitat for land birds, habitat for riparian woodlot and edge land birds, sediment and nutrient capture from the main flow of the East River, urban storm water sediment and nutrient capture, and flood storage capacity.

Table 10. Habitats Present at Van Beaver Park North Wetland

Habitat Type	Acres
Hardwood Swamp	8.9
Emergent Marsh Inland	8.7
Shrub Carr	3.2
Surrogate Grassland (old field)	1.4
Total	22.2



Recommendations for this site include the continued treatment of phragmites in wetland areas along the river on an “as needed basis” and implementing shoreline stabilization techniques using natural materials that offer comparable stability to rip-rap. A combination of ‘hard’ and ‘soft’ (i.e., vegetation) materials can provide bank stability, as well as greater fish and wildlife habitat than concrete riprap. Lastly, it is recommended that this site is monitored for northern pike spawning use. If the site is used by pike for spawning, consult with the Brown County Land and Water Conservation Department on improving the site for this species.

SITE 1.2: The southern Van Beaver Park wetland is a 15-acre wetland comprised almost entirely of an emergent marsh recently dominated by Phragmites and reed canary grass.

The site is laterally connected to the main stem of the East River along its entire length (about 1.7 miles) and no rip-rap fill was noted at the site. An urban storm water drain enters the site from the northeast through a shrub thicket lined channel, and a minor intermittent flow path drains the middle portion of the wetland in low water years. Historic photos indicate the site was used in times of low water for agriculture (hay meadow), but no evidence of fill (other than garbage) was noted.

The site offers ecological functions including migratory and breeding habitat for urban waterfowl, fish spawning site, sediment and nutrient capture from the main flow of the East River, urban storm water sediment and nutrient capture, and flood storage capacity. Phragmites and reed canary grass dominate the core of the emergent wetland, though, as in Site #1, the condition of the Phragmites has been severely degraded by a fall 2016 herbicide treatment.

Recommendations for this site include the continued treatment of phragmites along the river on an “as needed basis”, as well as the development of a stormwater treatment system at the outlet of the stormwater drain that enters the wetland from the northeast. This drainage contributes nutrients and trash to the site and the river.



GENERAL RECOMMENDATIONS FOR THE CITY OF GREEN BAY

Based on the identified resources and opportunities, the following general management recommendations will increase benefits to fish and wildlife habitat, the City of Green Bay, and the public. These general recommendations include:

- The East River flows through multiple government bodies and past many private lands in its course from its headwaters in southern Brown County north to its confluence with the Fox River. To address issues of water quality, reduction of damaging flooding, and improvement of fish habitat, a cooperative planning and project implementation approach with all the government bodies in the watershed is needed. The City of Green Bay, like the City of De Pere, villages of Allouez and Bellevue, and other upstream communities that lie in the lower stretch of the East River, is impacted by the land cover and land uses that occur in the upper watershed of the river. Addressing those upper watershed land use issues that most severely impact the quality of life and quality of the water in the downstream communities can only be handled through a united cooperative and collaborative approach amongst these communities and units of government. It is recommended that the City of Green Bay seek opportunities to work with its neighboring upstream communities to develop a cooperative long-term effort to address the land use issues of most concern affecting the East River.
- Look for opportunities in the riparian and delineated flood zone areas along the East River to work with private landowners to utilize natural materials to stabilize their riverbank.
- Look for opportunities to restore or create wetlands for both fish and wildlife habitat, flood mitigation, and water quality benefits at the headwaters and upper segments of Willow Creek.
- Improve habitat quality on lower quality lowland and upland forest habitat patches through targeted, judicious control of non-native invasive plants (particularly common buckthorn), and support of white-tailed deer harvest / control efforts where possible.
- Restore forest habitat on select riparian old fields; (especially if these lands were prior wetlands) to increase the patch size of existing forest, connect existing forest patches and provide water quality benefits.
- Examine current storm water system looking for opportunities to install systems to protect the water quality of the stream. Installation of possible upland projects including bioretention areas, dry ponds, or storm water infiltration systems to reduce runoff and pollutants entering the East River would provide benefits to water quality, the river, and the public.

VILLAGE OF BELLEVUE

Today, the East River takes a meandering path past the Village of Bellevue bordered by a narrow band of hardwoods, wet thickets, hedgerows of small trees and shrubs, old field grasslands, agricultural fields, recreational parks, and areas of commercial and residential development. Habitats include upland dry-mesic hardwood stands, sedge meadows, shrub / grassland mix, ephemeral ponds and transitional habitats between the ones mentioned. While reduced in size and natural diversity, these riparian woodlots and wetlands still hold many important and interesting native plants and animals.

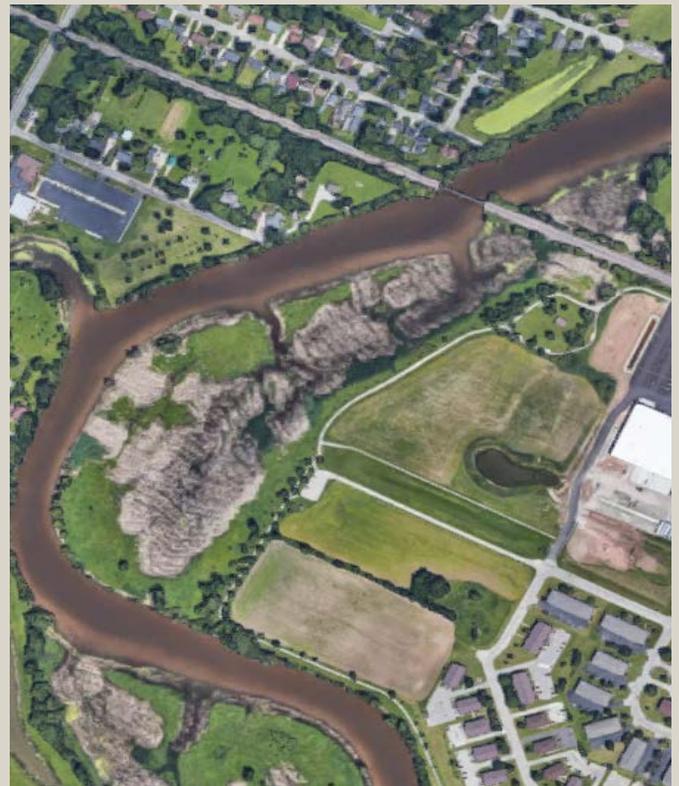
On its way to the Fox River, the East River passes the Village of Bellevue flowing through the relatively flat alluvial plain of the Bay of Green Bay and close enough to the bay to be influenced by occasional wind driven upstream flows (i.e., seiches) from the bay. As the river flows past the village, it increases in size by gathering water from two important tributaries, Willow Creek and Bower Creek. Through this stretch, the East River flows slowly as a sinuous, meandering warm water, 5th order stream influenced both by the hydrology and water quality of the upstream watershed and the periodic upstream flow of water from Green Bay via the Fox River during high water seiche events.

The set of recommendations for the Village of Bellevue contained on the following pages aim to provide added public enjoyment of the East River and its riparian lands, as well as additional and improved habitat conditions for many desirable and perhaps emblematic East River species.

SITE 2: RAILROAD TRACK WETLANDS

This site lies in the Environmentally Sensitive Area and Shoreline Zone (ESA & SZ) bordering the East River both upstream and downstream of the railroad bridge crossing the East River between the villages of Bellevue and Allouez. The confluence of the East and Fox rivers is about 3.33 river miles downstream from this area.

This site comprises a large area of riparian emergent marsh, and a narrow stand of riparian hardwoods downstream of the railroad bridge. The riparian emergent wetlands are partially disconnected from the main stem of the East River by banks of riprap, but long stretches of the wetland are clear of riprap and river water inundates the wetlands during high water periods. Several flow paths drain the interior of the wetlands. Historic photos indicate the wetlands were under agricultural use (pasture / marsh hay) in the late 1930s, but the area has been under natural cover since the late 1970s and currently (2020) inundated by the high-water levels of the river.



Non-native vegetation dominates the wetlands of the site with Phragmites and reed canary grass being the primary cover in emergent wetland area. However, the stand of Phragmites has been severely degraded by a fall 2016 herbicide treatment. Remnant patches of sedge meadow were found scattered along the fringes of the wetland and the site may have potential to restore this habitat type.

Recommendations for this site include working with private landowners to manage wetlands for migratory/breeding waterfowl and fish habitat, and implementing shoreline stabilization techniques using natural materials that offer comparable stability to rip-rap in addition to more habitat and improved aesthetics.

SITE 3: WILLOW CREEK COMPLEX

This site focuses on the confluence of Willow Creek and the East River and the riparian lands just downstream of the mouth of Willow Creek. Willow Creek winds through the junction of Bellevue Street and Allouez Avenue and lies about 3.61 miles upstream of the Fox River. Multiple landowners are present in this site.

Willow Creek is a second order stream that collects water from a series of small perennial and intermittent flows and enters the East River after passing through a large floodplain fragmented by roads and commercial and residential development. While the upper portions of Willow Creek and its tributaries have retained some of their natural morphology and riparian habitat, many of the streams draining this watershed show signs of ditching and straightening as they cross the East River floodplain before coalescing at the mouth of the creek. Much of the remnant natural habitats (e.g., emergent marsh, shrub carr and hardwood swamp) have been reduced in size and degraded by the presence of non-native aggressive species. However, some habitat persists as riparian habitat along these stream and flow paths.



The riparian emergent wetland habitat of the site fringes the mouth of Willow Creek and is dominated by Phragmites and narrow-leaved cattail, both aggressive invasive species. Historic photos indicate much of the floodplain portions of the site were under agricultural use (row cropping and pasture) in the 1930s and some of the now straightened natural meanders of Willow Creek above Bellevue Street can be seen in the old aerial photos. Currently, much of the floodplain at this site is typed as “Potentially Restorable Wetlands” and presents opportunities for enhancing or restoring fish spawning and wildlife habitat.

Recommendations for this site include restoring the meanders of Willow Creek between Bellevue Street and Allouez Avenue to provide additional water quality treatment, fish and wildlife habitat and flood storage; monitoring invasive species populations in wetlands along Willow Creek; and supporting the installation of water quality focused best management practices offered by the City of Green Bay or the Brown County Land and Water Conservation Department throughout the upper watershed of Willow Creek. It is also recommended that the village continues partnering with the Izaak Walton League and the Brown County Land and Water Conservation Department on improvement of the Willow Creek Waterway for northern pike spawning and wetland water quality projects.



SITE 4: VANDEN HEUVAL PARK

Vanden Heuval Park is located adjacent to the East River on the western side of the village. The park is part of the East River Parkway and is split by HWY 172. The northern portion of the park, located at 2282 Bellevue Street, stretches from Allouez Avenue at the downstream end towards Highway 172 bridge at the upstream end. The southern end of Vanden Heuval Park comprises the riparian lands between Highway 172 at its downstream end to East Hoffman Road at the upstream end. A portion of the southern section of the park is also known as the Bellevue Community Dog Park/Mossakowski Family Dog Park. The villages of Bellevue and Allouez own considerable acreage in this site as parkland on both sides of the river.

SITE 4.1: This site focuses on two wetlands located in the northern portion of Vanden Heuval Park that lie within the Flood Zone AE and its Floodway of the East River. The first riparian emergent wetland, shown below, is not rip-rapped and open to flooding by the river. The wetland holds remnant sedge meadow patches scattered through the dominant growth of reed canary grass and cattail. Phragmites stands growing along the open water edge of the wetland have been treated in 2016.



The other significant riparian emergent wetland, shown to the left, occurs just upstream of the canoe/kayak launch on the east side of the river. This wetland grades into the river in a slack water, silty area that is also open to inundation during high water periods. From the open water, the gently sloping grade holds a natural transition from river emergent marsh through shrub carr to lowland forest. This is

one of the few places along the river where the complete transitional gradient from open water to lowland forest occurs.

Recommendations for this site include enhancing current management of existing wooded wetlands by targeting invasive species control and possible canopy thinning with underplanting of native herbaceous and woody species. Additionally, the village should aim to protect wooded wetland along the East River that lie in the Floodplain or ESA and shoreline zoning area.

SITE 4.2: The site is located in the southern portion of Vanden Heuval Park and lies entirely within the Environmentally Sensitive Area and Flood Zone Area of the East River corridor. A large complex comprising emergent marsh and lowland hardwood forest dominates the east shore of the site just upstream of Highway 172. This lowland forest occupies a point bar of the river with several meander scars, or natural levees, present forming a gentle ridge and swale pattern across the low river terrace. Pole size basswood, green ash, and elm grow beneath larger cottonwoods in the core of the stand, as box elders and black willows arch out over the river at the forest edge. Rip-rap, up to 8 feet above present water line, armors the riverbanks on the outside bends of the river, and is overgrown with shrubs (e.g., ninebark, red-twig dogwood, sumac, non-native honeysuckle, nannyberry) and wild grape.



Patches of submerged aquatic vegetation which began to appear just downstream of the Highway 172 bridge, are more obvious here in the nearshore areas of the river. Common species included coontail, long-leaf pondweed, and sago pondweed.

Recommendations for this site include implementing shoreline stabilization techniques using natural materials that offer comparable stability to rip-rap. It is also recommended that an inventory of the species diversity and ecological condition of the floodplain forest and emergent wetland be conducted on village owned property south of Highway 172. The inventory would offer additional information about the presence of important wildlife features, significant natural plant assemblages or rare and invasive species, and would help to identify issues regarding erosion, local flooding patterns, and possible impairments to future infrastructure. Additionally, the village should aim to protect property within floodplain or environmentally sensitive areas and shoreline zoning. This would allow restoration of ecological function to those tracts for public benefit and provide additional fish and wildlife habitat.

SITE 5: EAST RIVER/BOWER CREEK OXBOWS CONSERVATION AREA

This large natural habitat complex is located at the confluence of Bower Creek and the East River. The center of the site is about 7.43 miles from the confluence of the East and Fox rivers and lies entirely within the East River Flood Zone and most of the site lies with the mapped ESA for the East River. There are multiple landowners within the site, including private, public (villages of Allouez and Bellevue and the City of De Pere) and a non-profit conservation organization (Izaak Walton League) which leases land from the Village of Bellevue.

The landscape at the confluence of Bower Creek and the East River comprises meandering perennial and intermittent stream channels, oxbow wetlands, and riparian wetlands adjacent to uplands holding old-growth hardwood stands, young forest, old field grasslands, and agricultural fields. East of County Road GV, the floodplain which drains to this site holds a large acreage of existing and potentially restorable wetlands connected to the main stem of the East River by a network of intermittent or perennial flow paths and wetlands.

Habitats present include emergent marsh (riparian), hardwood swamp, upland dry-mesic forest, sedge meadow, restored grasslands, and shrub carr with transitional ecotones present between these habitats throughout the site.

One of the most prominent hydrogeologic features of this landscape are the multiple intact oxbow wetlands in the floodplain at the junction of Bower Creek and the East River. These oxbow wetlands hold sedge meadow habitat in varying degrees of quality, in part dependent on the river water levels, hydroperiod of the wetland, and degree of connectivity with the main flow of the East River and Bower Creek. These floodplain wetlands present good opportunities for fish and wildlife enhancement projects.



Above the confluence of Bower Creek and the East River, the East River narrows considerably, and large oaks and basswoods begin to over arch the river, in some cases with branches that reach across the width of the stream. Consequently, the river becomes shadier above this point and exposed mud flats and stream banks begin to appear along the edge of the river. Coarse woody debris remains scattered and of small diameter further downstream, but the potential for branches and boles of these large riverbank trees to fall and add material to the stream bed is high.

This site offers neighboring municipalities an opportunity to develop a 'regional' or collaborative park to preserve the high number of significant and interesting geologic features present and to provide nature based recreational activities in a natural setting adjacent to a large urban area. The East River walking and biking trail on the west side of the river and the Osprey Point Conservation Area on the east side of the river are already established points of entry for people into this area.

It is recommended that the village meets with neighboring municipalities and Brown County to explore the potential of establishing an open space park at the confluence of Bower Creek and the East River to protect the impressive assemblage of natural features present and to develop a hub for public recreation and educational experiences focused on the East River and its riparian lands. Other recommendations include supporting the installation of stormwater trapping practices in the headwaters of the Bower Creek watershed and conducting an inventory of the species diversity and biophysical conditions of the landscape.

VILLAGE OF BELLEVUE SITE RECOMMENDATIONS

Map Location →



Site 2: Partner with private landowners of the site to manage these wetlands for migratory and breeding waterfowl and fish habitat, seek to minimize hard rip-rap solutions for any necessary riverbank stabilization projects

Site 3: Continue improvement of the Willow Creek waterway for northern pike spawning and wetland water quality projects, consider restoring the meanders of Willow Creek between Bellevue St and Allouez St, work with or support conservation work by the City of Green Bay or the BCLWCD on installation of water quality focused best management practices throughout the upper watershed of Willow Creek

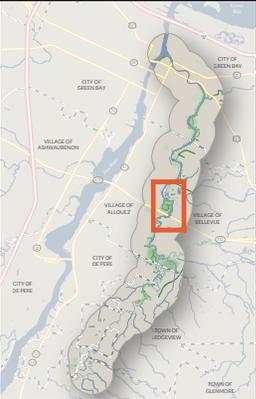
Action Plan Item: Water Quality Site Fish and Wildlife Site Park Improvement Site

Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
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VILLAGE OF BELLEVUE SITE RECOMMENDATIONS

Map Location →



Site 4.1: Vanden Heuvel Park - North Site, management of existing wooded wetlands should include targeted invasive species control, possibly canopy thinning with underplanting of native herbaceous and woody species 🐟

Site 4.2: Vanden Heuvel Park - South, seek to minimize hard rip-rap solutions for any necessary riverbank stabilization projects, inventory the species diversity and ecological condition of the floodplain forest and emergent wetland that the Village owns upstream of highway 172 💧 🐟

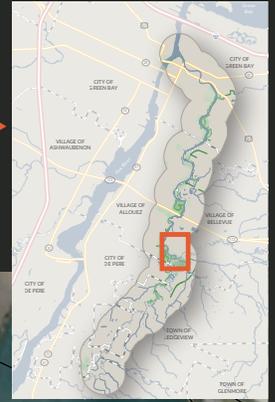
Action Plan Item: 💧 Water Quality Site 🐟 Fish and Wildlife Site 🏞️ Park Improvement Site



Sources: Brown County, 2019; WisDOT, 2020; WDNr, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
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VILLAGE OF BELLEVUE SITE RECOMMENDATIONS

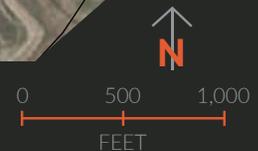
Map Location →



Site 5: East River/Bower Creek Oxbows Conservation Area, inventory of the species diversity and biophysical conditions of this landscape, support Brown County LWCD to continue installation of practices in the headwaters of Bower Creek watershed to continue movement towards higher water quality ➡ 🌿 💧

Action Plan Item: 💧 Water Quality Site ➡ Fish and Wildlife Site 🌿 Park Improvement Site

Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
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GENERAL RECOMMENDATIONS FOR THE VILLAGE OF BELLEVUE

The following general management recommendations will provide population support to priority species and protect habitat essential to many species in the East River watershed:

- Inventory the riparian damp old fields, oxbow settings, and small intermittent lateral flows for evidence of historic sedge meadow habitat. This is a rare plant community in the region and restoration or protection of these sites are of high conservation importance in the area;
- Focus habitat protection and restoration work on projects that benefit those habitats favored by highly mobile priority species; e.g., fish, bats, and birds. Species with high mobility can more reasonably be expected to be supported by dispersed favored habitats over a wider geography such as that found in the fragmented landscape along the East River. However, look for habitat protection or restoration opportunities in any project to incorporate benefits for other priority species of lower landscape mobility (e.g., turtles, frogs, and other amphibians);
- Target shrub carr restoration (maintain high quality sites by removal of encroaching invasive plants, maintain, restore or recreate sustaining hydrologic processes) in conjunction with sedge meadow restoration;
- Identify impassable fish barriers on any of the tributaries to the East River and target for replacement of those barriers that are embedded in larger blocks of natural riparian cover; are on streams with good mussel habitat; or have high-water quality;
- Restore floodplain reconnection and fish and wildlife habitat enhancement through targeted improvement of concrete stream bank riprap;
- Look for opportunities to create 'sand seepage' wetlands in lower order side tributaries to increase ground water infiltration, capture sediment and nutrients, and restore fish and wildlife habitat;
- Improve habitat quality on lower quality lowland and upland forest habitat patches through targeted, judicious control of non-native invasive plants (particularly common buckthorn), and support of white-tailed deer harvest / control efforts, where possible;
- Restore forest habitat on select riparian old field and abandoned agricultural land (especially if these lands were prior wetlands) to increase the patch size of existing forest, connect existing forest patches and provide water quality benefits;
- Work with the relevant municipal governments to examine storm water management practices and look for opportunities to install systems to protect the water quality of the stream. Installation of possible upland projects including bioretention areas, dry ponds, or step pond storm conveyance systems, or storm water infiltration systems to reduce runoff and pollutants entering the East River; and
- Seek non-motorized boat ordinances on the section upstream of the kayak / boat launch across from Green Isle Park on the East River and provide additional access points for non-motorized watercraft downstream of this launch.

VILLAGE OF ALLOUEZ

The Village of Allouez is positioned to be a leader in urban river and riparian lands improvement and management by utilizing the lands it owns along the East River. Within the Village of Allouez, the riparian land directly abutting the East River is primarily owned by the village, with nearly all of it considered park and public green space. The site recommendations for the Village of Allouez focus on the publicly owned park and greenway land within East River Parkway, Optimist Park, Green Isle Park, Kiwanis Park, and the Wiese Family Park.

To keep operations and maintenance requirements and costs at a minimum and to incorporate long-term resilience into these actions, the principle of 'self-design' was incorporated as much as possible. That is, once the practices or projects are installed, the condition and evolution of the site are meant to be driven by the site's hydrology, the influence of the adjacent lands, and the species that colonize and utilize the site; hopefully keeping maintenance costs to a minimum.

The project ideas offered here are based on several site visits in 2019 and therefore provide a limited view of the opportunities presented for improvement projects or a complete understanding of the dynamics of the East River as it flows past the village. Evidence of high water, severe bank erosion and poor water quality were noted and opportunities for new habitat projects were noted during those visits. However, it must be emphasized that these visits represent a cursory look at the issues and opportunities possible in the lands along this stretch of the East River.

For the most part, the assessed area lies within the mapped Environmentally Sensitive Areas (ESAs) and Shoreline Zones for Brown County. The ESAs for Brown County include floodways and their 35-foot buffers, wetlands with a 35-foot buffer, navigable and non-navigable streams with 75 and 35 foot buffers respectively and several other natural features. The assessed area lies entirely within the mapped Flood Hazard Areas (Zones A and AE: the 100-year floodplain, i.e., areas subject to inundation by the 1 percent annual chance flood event) of the East River.

SITE 6: OPTIMIST PARK AREA

Optimist Park is a 10-acre park located in the northern side of the village that offers several opportunities to install practices to improve visitor experience, flood storage, surface drainage water quality entering the East River and provide or improve habitat for several species of interest. Most of these practices involve modifications to the small tributary of the East River that flows through Optimist Park and its adjacent riparian lands.

SITE 6.1: Recommendations for this site include the creation of a small seasonal wetland in the present ephemeral flow path to provide occasional spawning habitat for northern pike, improve surface water quality and create additional riparian flood storage capacity. This would entail a deepening of the flow path to hold spring runoff waters long enough to allow spawning and out flushing of young northern pike from the wetland. Whether this can be accomplished could be determined by an assessment of the hydrology of the site by staff of the Brown County Land and Water Conservation Department. It is expected that this site would be utilized by northern pike in periods of high water and good spring rains.



SITE 6.2: Recommendations for this site include planting native trees (e.g., red, and white oak, shagbark hickory, ironwood, black cherry, juneberry) on the upland area south of the upper wetland and manage the area as a natural setting, lowering long-term maintenance requirements, providing a pleasing outdoor aesthetic experience to visitors (if a short trail were installed) and providing some wildlife habitat benefit, primarily to migratory and resident songbirds.

SITE 7: EAST END OF KALB AVENUE

The East River Parkway is a 102 acre greenway located along the East River. The East River Parkway itself is fragmented but connects to other parks in various areas. Site 7 is located within a portion of the East River Parkway between Kalb Avenue and Libal Street, directly east of Optimist park.

SITE 7.1 : This site proposes the creation of a pike spawning wetland near the mouth of a small tributary (shown in blue). A pike spawning wetland here would likely serve spawning fish in most years as adequate water levels would be more reliable.

The creation of a wetland, as recommended here and in site 6.1, would not only offer valuable spawning habitat, but would also slow the flow of seasonal heavy rains to the East River, increasing the river's riparian and tributary water storage capacity and reducing peak flows in the river. These small wetlands would contribute to improvement of water quality in the river by capturing sediment from the watershed of this tributary, and marginally reduce nutrient loads to the river.



SITE 7.2: Recommendations for this site include an upgrade of the current concrete slab / rubble bank stabilization material lining the bank of the East River to a more natural and visual pleasing streambank stabilization approach. The local Natural Resource Conservation Service (NRCS) or Brown County Land and Water Conservation Department staff could work with the village to recommend alternative stabilization techniques and materials for this situation. Techniques and materials (some combination of lowering slopes, installing tree roots, large boulders and living material) could be utilized that would deflect stream flow away from the bank providing streambank protection, while also increasing aesthetic appeal and providing fish and wildlife habitat benefits.

SITE 8: EAST END OF ST. JOSEPH STREET

Site 8 focuses on an existing wetland located in the East River Parkway between Libal Street and East Saint Joseph Street. This large riparian wetland, shown to the right, provides a great opportunity to increase flood storage, improve water quality and create new



fish and wildlife habitat along the river.

SITE 8.1: This site takes advantage of small existing flow paths through the homogenous and floristically degraded wetland to create a northern pike spawning and flood water storage wetland. This action would entail the contouring of these flow paths to create seasonally flooded wetlands suitable for pike spawning as well as provide increased flood water storage and sediment capture. The modification of this wetland would create additional habitats for other fish, invertebrates and wetland associated birds.

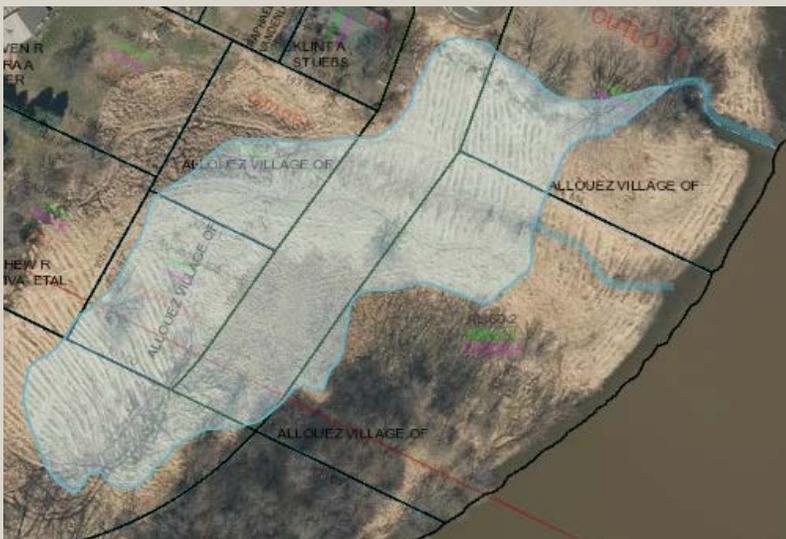
SITE 8.2: It is recommended that native floodplain adapted trees (e.g., silver maple, cottonwood, disease resistant varieties of American elm) are planted on the low river terrace ridge that parallels the river in the southeast portion of this wetland. This area is currently occupied by a few trees and reed canary grass. Success of this planting would require initial maintenance to protect the trees from deer browsing and competition from the reed canary grass. Establishing this patch of floodplain forest would benefit river associated birds and wildlife and improve the aesthetic experience of canoeists.



SITE 9: MEMORY AVENUE AND BROOKRIDGE STREET

This proposal explores an opportunity to improve the degraded, homogeneous condition of a riparian wetland to increase flood storage, improve water quality and create new fish and wildlife habitat. This site is located within the East River Parkway area east of residential Memory Avenue and Brookridge Street.

The creation of a seasonal wetland in the present riparian wetland is recommended to provide occasional spawning habitat for northern pike and other fish, diversify the wildlife habitat of the currently degraded wetland, improve surface water quality and create additional riparian flood storage capacity. This action would entail a deepening of a section of the wetland to hold spring runoff waters or high spring river waters long enough to allow spawning and out flushing of young northern pike from the wetland. The two outlets to the river would be designed to allow ingress of adult northern pike and later, egress of the larvae / fry. Whether this can be accomplished could be determined by an assessment of the hydrology of the site by staff of the Brown County Land and Water Conservation Department.



SITE 10: GREEN ISLE PARK

Green Isle Park is a 51-acre park that offers several opportunities to improve visitor experience, water quality, fish and wildlife habitat and increase flood water storage along the river. Features

of ecological value within the park include the stand of mature oak woodland which borders the river, the slough that borders the west and south boundary of the park, and the river's edge. The woodlot bordering the river comprises one of the largest stands of mature trees along the lower river and efforts to maintain or improve the health of this stand are important to park aesthetics and wildlife species that utilize this riparian habitat. One main concern of this area is the infestation of non-native buckthorn in the understory of the stand. This species will shade out native woodland flowers and reduce survival of tree seedlings. Reducing the abundance of this species should be considered.

SITE 10.1: This site addresses the condition of the slough bordering the northeast portion of the park (shown in green to the right). The east bank of the slough could be improved with the removal of the non-native shrubs blocking views to the water's edge, installing a canoe / kayak launch, installing tree boles extending out from shore as wildlife and fish habitat features, and stabilizing the exposed late summer shoreline mud flats with native emergent wetland plantings.

SITE 10.2: It is recommended that a fish passage assessment is conducted on the culverts located beneath Green Avenue. Both culverts, shown in red, should be upgraded as necessary to assure road stability and safety and to allow passage of fish into the swale and pond upstream of the road crossings.

SITES 10.3: It is recommended that the wetland swale between the road crossings be assessed for improvement as a northern pike spawning habitat. Practices like deepening and widening the swale will improve fish passage and the inclusion of spawning habitat features.

SITE 10.4: Just like SITE 10.3, it is recommended that the pond in the southwest corner of the park be assessed for improvement as a northern pike spawning habitat. Dredging the pond would remove sediments and nutrients, increase flood storage, and improve fish habitat which could improve visitor interest.



SITE 11: RIVER FRONT BETWEEN BROADVIEW DRIVE AND HOFFMAN ROAD

This site is located in the East River Parkway between Broadview Drive and Hoffman Road. Along with an opportunity to restore woodland habitat in one area, this site holds two fair to good quality distinct native plant communities with opportunities to protect and improve wildlife habitat quality and visitors' experience. The plant community that weaves through the center of this site holds small uninvaded patches of native sedge meadow – a relatively uncommon plant community in the Green Bay area. The open sedge areas with patches of wetland shrubs (red-osier dogwood and willow) form a natural association called a shrub carr. This small complex of sedge meadow and shrub carr together create a high valued wildlife habitat and supports numerous attractive

summer bird species such as yellow-throat, chestnut-sided, and yellow warblers. The other native plant community present at this site is the patch of lowland or floodplain hardwood forest found along the trail and between the sedge meadow / shrub carr and the storm water pond. This woodland holds a young stand of green ash, elm, basswood, and cottonwood.

SITE 11.1: Recommendations include planting native hardwoods and small flowering trees in the small open field west of the river trail. This will provide some screening from the neighboring homes, habitat for songbirds, and over time, reduced maintenance costs. Tree species to consider planting in this area include oaks (red and white), hickories (shagbark and yellow bud), ironwood, American basswood, red maple, black cherry, and native hawthorns. Planting trees irregularly at 8 to 10 feet apart would in time produce a tight canopy shading out the grasses and allowing for planted or seeded native woodland flowers and understory plants to colonize the area.

SITE 11.2: It is recommended that the stand of lowland hardwoods that border the East River Trail, (shown in light green to the right) are managed. Control the non-native buckthorn present in the stand and mitigation for any loss of green ash trees in the stand are the two dominant management actions to consider here.

SITE 11.3: The quality of the native sedge meadow / shrub carr habitat present at this site warrants an exploration into maintaining or improving its condition. This native habitat type was once common in the lower Fox River and lower Green Bay area but with urbanization of the riparian areas of the Fox and East rivers, much of this habitat has been lost. Though this is a small patch, its local rarity makes it a significant natural feature along the river. Other sedge meadow / shrub carr patches of similar size and quality exist on village lands along the river and should be similarly assessed for their long-term viability and management needs.

SITE 12: HOFFMAN ROAD AREA

Site 12 is located in the East River Parkway, between East River Drive and Hoffman Road. This site contains small patches of good quality sedge meadow, shrub carr, and lowland hardwood woodland on the lands owned by the village along the East River. Because of this, the site has habitat features, and management issues and opportunities similar to the above-mentioned sites.

SITE 12.1: A small, degraded wetland present in the center of this site holds potential as a northern pike spawning wetland. However, there are several issues that may affect this action. The footprint of the wetland runs into an adjoining privately owned



parcel, the level of connectivity to the river may need to be improved, the seasonal hydrology of the site needs to be assessed, and currently a heavy stand of phragmites occupies the wetland which would have to be addressed.

SITE 12.2: It is recommended that invasive species, such as buckthorn, are managed to reduce negative impacts to the understory.

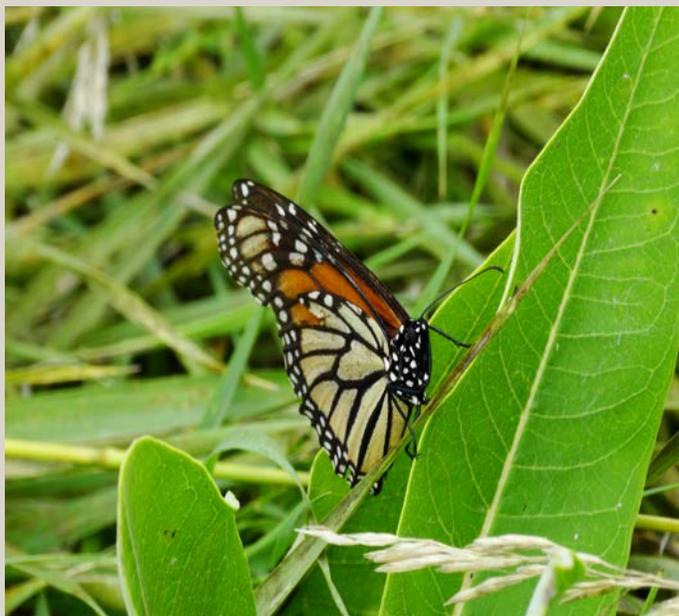
SITE 12.3: It is recommended that a management plan is developed to preserve and improve the quality sedge meadow and shrub carr habitat present at this site.

SITE 13: WIESE PARK AREA

Site 13 is located in the section of publicly owned park land located in the southernmost point of the village. This area includes Kiwanis Park, the southernmost portion of the East River Parkway, and Wiese Family Park. This extensive landscape of riparian woodland, open wet swales, broad grassy fields, and open water offers multiple opportunities to present a variety of natural lands experiences to walkers, bikers, or canoeists along this stretch of the East River. The contiguous nature of this landscape, without sharp artificial breaks (excepting the walking/biking path), is a primary visual characteristic of the site. Efforts to maintain this natural flow of one habitat type into another should be promoted. Additionally, The grading of forest into open grassy areas with a soft edge of native flowering shrubs, are the existing edge habitats here that should be encouraged as those habitats are often areas of high bird and insect pollinator diversity. Attractive birds such as song sparrows, common yellowthroat and yellow warblers, and indigo buntings are attracted to this kind of forest edge habitat.

The East River trail runs through the park meandering through various landscapes but similar to other areas of the trail, flooding often causes major issues for users. The several intermittent flow paths that enter and cross the western edge of this site may offer the village opportunities to contribute to water quality, flood storage and wildlife habitat improvement projects.

SITE 13.1: Located in portions of the East River Parkway and Kiwanis Park, this site offers opportunities to install several water quality and habitat improvement practices. The area (shown in the blue areas shown on the following page) contains both existing designated wetlands and "Potentially Restorable Wetlands" with potential to contribute important wetland functions. The flow paths that enter the site from the west and coalesce on this property may be suitable areas in which to develop a set of wetland scrapes to serve as northern pike spawning wetlands while also increasing the flood storage capacity of the landscape and providing some water quality benefits. Most of this small basin drains through a culvert under the walking / biking trails, which would



have to be assessed for the hydraulics and fish passage in conjunction with this project.

SITE 13.2: This riparian woodlot of native hardwoods located in Wiese Park, shown in red, faces the same management issues as other stands of lowland hardwoods along the river. Non-native buckthorn has established itself here as the major understory species. Control of this invasive species and the mitigation of any loss green ash trees is recommended here.

SITE 13.3: It is recommended to manage this open area, shown in yellow, as mesic or wet-mesic prairie/open grassland for aesthetics, water quality and wildlife benefits.

SITE 13.4: This open area fronting the riparian woodlot, shown in green, offers a good opportunity to manage the site as surrogate grassland habitat, wet-mesic prairie, or savannah in a manner similar to the Izaak Walton property across the river. Prairie plantings such as those the village has installed around their storm water ponds would be suitable for this site.



VILLAGE OF ALLOUEZ SITE RECOMMENDATIONS

Map Location →



Site 6: Assess potential to create northern pike spawning and flood storage wetlands, manage area as oak opening natural area, trails, picnic areas, signage, pollinator plantings 🐟 🌿

Site 7: Upgrade riverbank stabilization using materials beneficial to wildlife/fish 💧

Site 8: Assess potential to create northern pike spawning and flood storage wetland, possible floodplain tree plantings for habitat diversification and aesthetics on the low ridge 🐟

Site 9: Assess potential to create pike spawning and flood storage wetland 🐟

Action Plan Item: 💧 Water Quality Site 🐟 Fish and Wildlife Site 🌿 Park Improvement Site



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
Disclaimer: This map is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information, and data used for reference purposes only. Bay-Lake RPC is not responsible for any inaccuracies herein contained.

VILLAGE OF ALLOUEZ SITE RECOMMENDATIONS

Map Location →



Site 10.1: Clean debris and improve stream bank habitat of the tributary channel, create walk boat access

Site 10.2: Assess fish passage on culverts within Green Isle Park, a project to support fish access to spawning/nursery areas

Site 10.3: Potential for tributary spawning fish habitat

Site 10.4: Consider dredging to increase fish and wildlife habitat, phosphorus removal, flood storage and aesthetic benefits

Action Plan Item: Water Quality Site Fish and Wildlife Site Park Improvement Site



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
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VILLAGE OF ALLOUEZ SITE RECOMMENDATIONS

Map Location →



Action Plan Item: Water Quality Site Fish and Wildlife Site Park Improvement Site



Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
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GENERAL RECOMMENDATIONS FOR THE VILLAGE OF ALLOUEZ

Based on the identified resources and opportunities, the following general management recommendations will increase benefits to fish and wildlife habitat, the village and the public. General recommendations may not apply to all sections of the river. These recommendations include:

- As the East River flows through multiple government bodies and past many private lands, the restoration of water quality, reduction of damaging flooding and improvement of fish habitat will best be accomplished through the cooperative planning and project implementation with all the government bodies in the watershed. The Village of Allouez, cities of De Pere and Green Bay, and other neighboring municipalities that in the lower stretch of the East River are impacted by the land cover and land uses that occur in the upper watershed of the river. Addressing those upper watershed land use issues that most severely impact the quality of life and quality of the water in these downstream communities is best handled through a united cooperative and collaborative approach amongst these downstream communities. It is recommended that the Village of Allouez seek opportunities to work with its neighboring downstream and upstream communities to develop a cooperative effort to address the land uses issues of most concern affecting the East River.
- Continue the good conservation practices completed by the village regarding stormwater management, the East River Trail network, and vegetation management along the riparian corridor of the East River.
- Work with neighborhood groups, school groups, local conservation groups etc., on East River improvement projects that could include streambank cleanup projects, riparian woodlot tree thinning to increase sunlight penetration to the ground and underplant with herbaceous, soil stabilizing species; installing, expanding and maintaining prairie / pollinator plantings around the stormwater ponds in the village; and tree planting along the walking / biking trail to screen the houses and provide shade for trail users.
- Protect existing good to high quality riparian upland and lowland forest habitat through acquisition from willing landowners or management of lands currently owned by the village.
- Look for opportunities to restore or create wetlands for both fish and wildlife habitat, flood mitigation and water quality benefits.
- Replace poor culverts that present fish passage barriers in the tributary network, targeting those barriers that are embedded in larger blocks of natural riparian cover.
- Improve fish and wildlife habitat and river front aesthetics through targeted removal of concrete block and rubble stream bank riprap and replacement with habitat enhancing stream bank stabilization structures.
- Improve habitat quality on lower quality lowland and upland forest habitat patches through targeted, judicious control of non-native invasive plants (particularly common buckthorn), and support of white-tailed deer harvest / control efforts where possible.
- Restore forest habitat on select riparian old field and abandoned agricultural land (especially if these lands were prior wetlands) to increase the patch size of existing forest, connect existing forest or wetland patches and provide water quality benefits.
- Examine current storm water system for opportunities to install systems to protect the water quality of the stream. Installation of possible upland projects including bioretention areas, dry ponds, or step pond storm conveyance systems, or storm water infiltration systems to reduce runoff and pollutants entering the East River.

CITY OF DE PERE

The City of De Pere is positioned to be a leader in urban river and riparian lands improvement and management by utilizing the lands it owns along the East River. As is the case for the other municipalities along the lower East River, the improvement of the East River for human enjoyment and aesthetic appeal along with the creation of conditions suitable for a diversity of desirable species will require an attention to small-scale individual land and water improvement projects. But more importantly, it will require an attention to watershed scale, multi-jurisdictional efforts to control those landscape issues (i.e., upstream land-use practices, flow management, and floodplain connectivity) that ultimately drive the health of the land and waters of the East River. Addressing watershed scale issues are best dealt with through a collaborative process involving the multiple municipalities, various units of government, and private stakeholders of the watershed. The City of De Pere can and should be involved as a leader or participant with that broader more comprehensive, higher impact, and likely more sustainable approach to the revitalization of the East River.

The City of De Pere owns land of considerable significance for fish and wildlife within the East River corridor. The most notable area lies between the East River Trail and the river east of Black Earth Drive. These lands, part of the City of De Pere East River Parkway, lie within the Environmentally Sensitive Areas (ESA) and Shoreline Zones of Brown County, as shown in the photo to the right.

The set of recommended projects for the City of De Pere falls into the category of those many small-scale riparian and human use improvement projects. Recommendations focus on lands that are part of the City of De Pere East River Parkway.

SITE 14: EAST RIVER PARKWAY AREA

This area is generally low and comprises lowland hardwood forests, emergent wetlands, an open water pond, wet to dry meadows of grasses, and forbs in the power line corridor. The emergent wetlands and open water area are associated with an oxbow of the river and are connected to the river by two modified natural channels at either end of the oxbow. Oxbows are ancient river formations, abandoned segments of the main channel of the river. Today, these and other oxbows in the floodplain of the lower East River wetlands are intermittently connected to the main flow of the river and offer wildlife habitat and water quality benefits, along with geologic research and historical interest. The floodplain bordering the confluence of the East River and Bower Creek hold numerous oxbows and abandoned river channels giving evidence to the active erosive power of the river and the lateral movement of these small rivers across



their floodplains. These oxbows provide important functions of storing storm and flood waters, as well as capturing nutrients and sediment from the water. Lastly, these natural lands along the East River provide places for public recreation and enjoyment.

The photo to the right shows the surrounding land use of this area of the lower East River in 1938 to be predominantly agricultural, with few trees or natural vegetation. However, wetlands either fringing the river or in the isolated oxbows persisted through this period of extensive agricultural as areas that were harvested for marsh hay during periods of low water. With the abandonment of agriculture in the area the land near the river reverted to woodlots of small trees with scattered, older and larger trees.



These wooded areas are now edged by a mix of young trees, shrubs, old field herbs and grassy old fields. The common native shrubs found bordering these small woodlots include gray and red twig dogwood, hawthorn, nannyberry, sumac, choke cherry, prickly ash, ninebark, wild grape, and several non-native species including bush honeysuckle, apple trees and buckthorn (*Rhamnus cathartica* and *R. frangula*). The emergent marshes and sedge meadows which existed in the shallow, intermittent waters of the oxbows have become dominated by non-native *Phragmites* and the sedge meadows in several, but not all, settings have been invaded by reed canary grass.



While reduced in size and natural diversity, these riparian woodlots and wetlands still hold many important and interesting native plants and animals. The prevalence of this situation is reflected in the high number of bird species (e.g., song sparrow, goldfinch, yellow warbler, common yellowthroat, gray catbird, northern cardinal, indigo bunting) that can be found along the river. And despite the water quality impairments of the East River, recent fish surveys by the WDNR on the East River found an impressive 20 species of fish inhabiting the river at the Dickinson Street crossing, including yellow perch, bluegill, a few largemouth bass, northern pike and many warmwater minnow and other small bodied species. Records kept by staff of the Brown County

Land and Water Conservation Department indicate adult northern pike commonly run up the East River and its tributaries from Green Bay up to and past De Pere seeking wetlands for spawning each spring.

SITE 14.1: The first recommendation is to conduct an ecological assessment of the lands in the City of De Pere East River Parkway east of Black Earth Drive. This natural area is one of largest and highest quality natural areas in the lower East River corridor. Though highly modified from a pre-settlement condition, this area has reverted to a mix of native habitats that now supports a diverse number of native species, particularly birds and amphibians. Given the adjacency of the urban areas of De Pere and Ledgeview this landscape offers many opportunities for the public to enjoy a natural setting near their homes. It also presents challenges in protecting those natural conditions that support the plants and animals present. To help the city understand the full suite

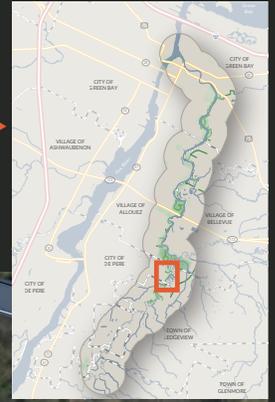
of values and challenges presented by this site, it is recommended that the city undertake an ecological inventory of the site. Once such an inventory is conducted, the city will be able to identify management options and challenges presented by the natural conditions of the site and rank them according to the needs of the city.

SITE 14.2: The second recommendation is to develop an interpretive walking path ending at an observation platform at the edge of the oxbow pond adjacent to the East River Trail. An interpretive trail in this area would create opportunities for walkers and bikers along the East River trail to learn about the natural history of the river and its floodplain and enjoy an open water wetland feature. This area has an abundance of bird life associated with this pond and should be an attractive point of observation. As this pond is an expansion of a natural oxbow of the river, it would offer an educational opportunity regarding an uncommon geologic feature.



CITY OF DE PERE SITE RECOMMENDATIONS

Map Location →



Site 14.1: Conduct an ecological assessment of the lands in the City of De Pere East River Parkway east of Black Earth Drive 🐟

Site 14.2: Develop an interpretive walking path ending at an observation platform at the edge of the oxbow pond adjacent to the East River Trail 🚶

Action Plan Item: 🌿 Water Quality Site 🐟 Fish and Wildlife Site 🚶 Park Improvement Site

Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
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GENERAL RECOMMENDATIONS FOR THE CITY OF DE PERE

Based on the identified resources and opportunities, the following general management recommendations will increase benefits to fish and wildlife habitat, the city, and the public. All these general recommendations may not apply to all sections of the river. These recommendations include:

- As the East River flows through multiple government bodies and past many private lands in its watershed, the restoration of water quality, and the reduction of damaging flooding and improvement of fish habitat will best be accomplished through the cooperative planning and project implementation with all the government bodies in the watershed. The cities of De Pere and Green Bay, Village of Allouez, and other downstream communities lie in the lower stretch of the East River that are impacted by the land cover and land uses that occur in the upper watershed of the river. Addressing those upper watershed land use issues that most severely impact the quality of life and quality of the water in these downstream communities is best handled through a united cooperative and collaborative approach amongst these downstream communities. It is recommended that the City of De Pere seek opportunities to work with its neighboring downstream and upstream communities to develop a cooperative effort to address the land uses issues of most concern affecting the East River.
- Work with neighborhood groups, school groups etc., on streambank cleanup projects; explore riparian woodlot tree thinning to increase sunlight penetration to the ground and underplant with herbaceous, soil stabilizing species; expand prairie / pollinator plantings around the stormwater ponds in the city; plant trees along the walking / biking trail to screen the houses and provide shade for trail visitors.
- Protect existing good to high quality riparian upland and lowland forest habitat through acquisition from willing landowners or management of lands currently owned by the city;
- Look for opportunities in the riparian and delineated flood zone areas along the East River to restore wetlands that had been converted to agriculture or artificially drained or ditched;
- Look for opportunities to restore or create wetlands for both fish and wildlife habitat, flood mitigation and water quality benefits;
- Replace poor culverts that present fish passage barriers in the tributary network, targeting those barriers that are embedded in larger blocks of natural riparian cover; are on streams with good mussel habitat; or have high-water quality;
- Restore floodplain reconnection through targeted removal of stream bank riprap;
- Improve habitat quality on lower quality lowland and upland forest habitat patches through targeted, judicious control of non-native invasive plants (particularly common buckthorn), and support of white-tailed deer harvest / control efforts where possible. Target shrub carr and sedge meadow habitats especially in oxbow settings for this management;
- Restore forest habitat on select riparian old field and abandoned agricultural land (especially if these lands were prior wetlands) to increase the patch size of existing forest, connect existing forest patches and provide water quality benefits; and
- Examine current storm water system looking for opportunities to install systems to protect the water quality of the stream. Installation of possible upland projects including bioretention areas, dry ponds, or step pond storm conveyance systems, or storm water infiltration systems to reduce runoff and pollutants entering the East River.

TOWN OF LEDGEVIEW

Today the East River takes a meandering path through the Town of Ledgeview bordered by a narrow band of hardwoods, wet thickets, hedgerows of small trees and shrubs, old field grasslands and agricultural fields. Habitats include upland dry-mesic hardwood stands, sedge meadows, shrub /grassland habitats, ephemeral ponds and transitional habitats between the ones mentioned. While reduced in size and natural diversity, these riparian woodlots and wetlands still hold many important and interesting native plants and animals.

Occasionally intermittent or small perennial streams enter the river from these adjoining lands particularly from the fields that lie east and west of County GV north of Dickinson Road. East of County GV, the East River floodplain holds a large extent of existing and potentially restorable wetlands connected to the main stem of the river by these intermittent and perennial flow paths. Fish surveys conducted in 2017 by the WDNR at Dickinson Road found 20 species of fish inhabiting the river, with good numbers of yellow perch (actually the most abundant species recorded), bluegill, a few largemouth bass, northern pike and many warmwater minnow and other small bodied species. Records kept by staff of the Brown County Land and Water Conservation Department indicate northern pike commonly run up the East River and its tributaries as far as Ledgeview seeking wetlands for spawning each spring.

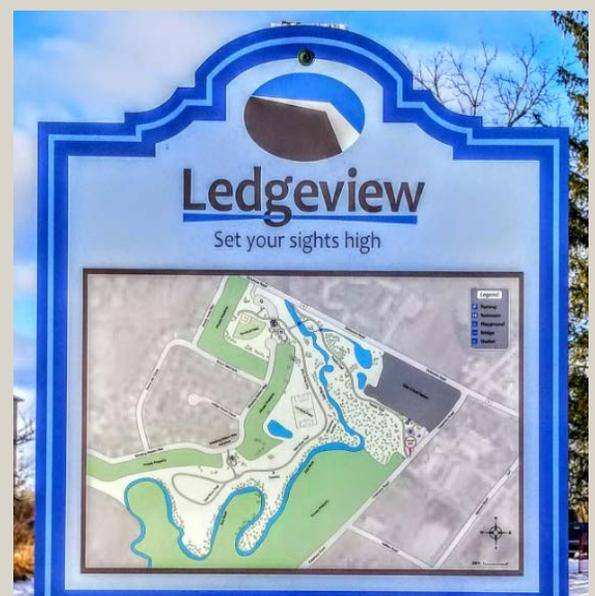
Currently, riparian lands along the East River are owned both by the town and private landowners. On those lands now owned by the town, there are several areas where the town could explore options to increase public enjoyment, improve fish and wildlife habitat and reduce stormwater and flood water problems. These opportunities are presented on the following pages as site recommendations. However, the town also has an opportunity to purchase and consolidate under public ownership, high quality or flood prone lands along the river to provide additional public access to the river, improve the river front aesthetics, reduce flood impact costs, remove opportunities for building in flood prone areas, increase fish and wildlife habitat, increase flood and storm water storage capacity, and improve the water quality of the river.

Each of the following recommendations are located within Ledgeview Park adjacent to Dickinson Road or downstream from Dickinson Road.

SITE 15: LEDGEVIEW PARK AREA

Ledgeview Park is a 66-acre publicly owned property located in the west-central portion of the town, along Dickinson Road (CTH G) and the East River. The park contains about one mile of the East River that flows through the park and forms the eastern park boundary. The town owns about .3 miles of land on each side of the river where the river flows through the park and about 6.5 miles on one side where the river forms the eastern boundary of the park.

The park offers several opportunities to install practices that will improve visitor experience, flood storage, water quality, and improve habitat for several species of interest. The projects offered below represent ideas based on several site visits in 2019 and therefore, provide a limited view of the opportunities presented. Resource concerns like streambank erosion and poor habitat quality, as well as opportunities to increase public enjoyment of the river and create new habitat for significant species, were noted.



with severely eroded streambanks, instream habitat improvement, and riparian area habitat improvement, are best done when both sides of the river can be included in any modifications.

SITE 15.2: Recommendations for this site include improvements to a natural riparian wetland located adjacent to Dickinson Road. It is recommended that a roadside buffer be created to protect the water quality of the pond located at this site. A buffer will also screen Dickinson Road from walkers and bikers on the East River Trail. The buffer should contain flood resistance, salt tolerant native and pollinator supporting shrubs and small flowering tree species such as



The pond located on this site could also be reconfigured to protect against road runoff and increase water storage. Additionally, the existing pond outlet could be rerouted away from the road to buffer against runoff and slow the pond outlet flow to increase nutrient uptake. Realigning the stream channel could also improve fish spawning activity and fish passage into and out of the pond.

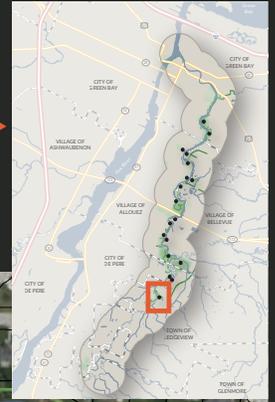
SITE 15.3: In the south eastern portion of the park, an opportunity exists to improve fish and wildlife habitat, water quality, and flood storage by removing an invasive plant stand to create a seasonal wetland. Creating a wetland scrape in this area would allow for northern pike spawning and amphibian breeding habitat, while also removing the invasive phragmites plant stand that currently occupies the space. Should a seasonal wetland be created, the surrounding area could be planted with native pollinator and bird



supporting flowers, shrubs, and small trees. Species such as hawthorns, juneberries, dogwoods, and viburnums are suitable for this site and would require little or no maintenance. The outlet stream that currently exists in this area, should be assessed, and improved, if necessary, to allow for fish passage to and from the main channel of the East River.

TOWN OF LEDGEVIEW SITE RECOMMENDATIONS

Map Location →



Action Plan Item: Water Quality Site Fish and Wildlife Site Park Improvement Site

Sources: Brown County, 2019; WisDOT, 2020; WDNR, 2019, 2020; The Nature Conservancy, 2020; Bay-Lake RPC, 2020.
 Disclaimer: This map is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information, and data used for reference purposes only. Bay-Lake RPC is not responsible for any inaccuracies herein contained.



GENERAL RECOMMENDATIONS FOR THE TOWN OF LEDGEVIEW

Based on the identified resources and opportunities, the following general management recommendations will increase benefits to fish and wildlife habitat, the town, and the public. All these general recommendations may not apply to all sections of the river. These recommendations include:

- As the East River flows through multiple government bodies and past many private lands, the restoration of water quality, reduction of damaging flooding and improvement of fish habitat will best be accomplished through the cooperative planning and project implementation with all the government bodies in the watershed. The Town of Ledgeview and other downstream communities lie in the lower stretch of the East River and are impacted by the land cover and uses that occur in the upper watershed of the river. Addressing land use issues that most severely impact the quality of life and of the water in these downstream communities is best handled through a united cooperative and collaborative approach. It is recommended that the Town of Ledgeview seek opportunities to work with its neighboring downstream and upstream communities to develop a cooperative effort to address the land uses issues of most concern affecting the East River.
- Work with neighborhood groups, school groups etc., on streambank cleanup projects; explore riparian woodlot tree thinning to increase sunlight penetration to the ground and underplant with herbaceous, soil stabilizing species; expand prairie/pollinator plantings around the stormwater ponds in the city; plant trees along the walking/biking trail to screen the houses and provide shade for trail visitors.
- Protect existing good to high quality riparian upland and lowland forest habitat through acquisition from willing landowners or management of lands currently owned by the town;
- Look for opportunities in the riparian and delineated flood zone areas along the East River to restore wetlands that had been converted to agriculture or artificially drained or ditched;
- Look for opportunities to restore or create wetlands for both fish and wildlife habitat, flood mitigation and water quality benefits;
- Replace poor culverts that present fish passage barriers in the tributary network, targeting those barriers that are embedded in larger blocks of natural riparian cover; are on streams with good mussel habitat; or have high-water quality;
- Improve fish and wildlife habitat and river front aesthetics through targeted removal of concrete block and rubble stream bank riprap and replacement with habitat enhancing stream bank stabilization structures;
- Improve habitat quality on lowland and upland forest habitat patches through targeted, judicious control of invasive plants (particularly common buckthorn), and support of white-tailed deer harvest/control efforts where possible. Target shrub carr and sedge meadow habitats especially in oxbow settings for this management;
- Restore forest habitat on select riparian old field and abandoned agricultural land (especially if these lands were prior wetlands) to increase the patch size of existing forest, connect existing forest patches and provide water quality benefits; and
- Examine current storm water system looking for opportunities to install systems to protect the water quality of the stream. Installation of possible upland projects including bioretention areas, dry ponds, or step pond storm conveyance systems, or storm water infiltration systems to reduce runoff and pollutants entering the East River.

Chapter 4: Action Plan

This chapter presents an Action Plan to meet the overall goals presented in Chapter One. The Action Plan is intended to be used as a guide for local municipalities looking to protect, enhance, or improve the water quality, flood storage, fish and wildlife habitat, and public access within the East River Corridor.

The Action Plan, found on the following pages, includes a description of the action, project category, sites of interest, benefits, potential project partners and funding sources. These actions represent priority projects that meet one or more project goals and are located within the recommended sites (Chapter 3). Related planning documents and public and partner input were considered when determining which recommendations to include in the Action Plan. Actions include wetland restoration, riparian buffer creation or enhancement, flood and storm water improvements, park improvements, invasive species management, etc.

Goals:

-  Protect and Improve Water Quality and Flood Storage
-  Protect and Improve Fish and Wildlife Habitat
-  Protect and Enhance Public Land and Park Access



WATER QUALITY AND FLOOD STORAGE PROJECTS



The table below includes multiple projects that present opportunities that will help to protect, enhance, or improve the water quality of the East River project area. Actions that can be implemented at the local level include wetland restoration, riparian buffer creation or enhancement, and flood and storm water improvements, etc. Private property acquisition that aims to protect or enhance water quality was determined and distributed to applicable municipal staff as ideas to utilize moving forward. Specific acquisition actions are not included in the Action Plan.

Table 11. Protect and Improve Water Quality and Flood Storage

Action	Description	Sites of Interest	Secondary Benefits
Creation of storage pond for trapping stormwater	The creation of stormwater storage ponds provides flow control for storm-related runoff and can reduce erosion, recharge groundwater, improve water quality, and provide wildlife habitat.	1.1 1.2 2	Reduces erosion, increases groundwater recharge, and provides habitat
Vegetative riparian buffer creation or enhancement	The creation or improvement of riparian or wetland buffers will help to protect the natural area from various potential impacts including pollutant run-off and sedimentation.	13.4 15.2	Reduces erosion, sedimentation, and pollution; and provides habitat
Enhancement of shoreline stabilization techniques	Implementing shoreline stabilization techniques similar to rip-rap will help to improve overall water quality by controlling erosion and flooding while improving aesthetics.	1.1 2 4.2 7.2	Reduces erosion, sedimentation, pollution, and flooding; and improves habitat and aesthetics
Explore potentially restorable wetlands	Potentially restorable wetlands can offer many environmental and socioeconomic benefits to their respective communities, should action be taken. Actual restored wetlands will improve water quality and flood storage by acting as a sponge during major flood events soaking up excess water and filtering runoff.	3 5 13.1 15.2	Increases flood capacity and ground water recharge; reduces erosion, sedimentation, and pollution; and provides important fish and wildlife habitat





FISH AND WILDLIFE HABITAT IMPROVEMENT PROJECTS

The table below includes multiple projects that present opportunities for protecting and improving fish and wildlife habitat within the East River Corridor. Actions include barrier removal, habitat enhancement methods, and wetland preservation, etc. Private property acquisition that aims to protect or improve fish and wildlife habitat was determined and distributed to local municipalities to utilize moving forward. Acquisition actions are not included in the Action Plan.

Table 12. Protect and Improve Fish and Wildlife Habitat

Action	Description	Sites of Interest	Secondary Benefits
Conduct an inventory of species diversity and ecological conditions assessment	Conducting an inventory would offer additional information about the presence of important wildlife features, significant natural plant assemblages or rare species and invasive species, and would help to identify issues regarding erosion, local flooding patterns, and possible impairments to future infrastructure.	4.2 5 14.1 15.1	Could lead to many environmental and socioeconomic benefits depending on inventory/assessment goals and desired outcomes
Creation or enhancement of ephemeral wetlands	The creation of small seasonal wetlands and/or wetland scrapes will provide spawning or breeding habitat for northern pike and other amphibians while also providing important secondary benefits.	6.1 8.1 9 13.1 15.3	Reduces erosion, sedimentation, and pollution; and provides important breeding/spawning habitat
Restoration of fish passageways	Removing barriers within the stream and adjacent wetlands can create habitat and improve fish passage by allowing the movement between various habitats.	10.3 15.2	Restores natural stream process; and improves wetland systems, water quality, and aesthetics
Invasive species management	Controlling invasive species will allow for native and desirable species growth, help to return original ecological processes, improve wildlife habitat, increase productivity, and improve degraded riparian systems and water quality.	1.1 4.1 11.2 12.1 12.3 13.2	Allows for native species growth and improves aesthetics of degraded riparian and forest systems
Establishment of floodplain forest	Improving or establishing floodplain forests can provide habitat corridors for wildlife including endangered and endemic species, and improve water quality by controlling erosion and runoff, trapping sediments and pollutants.	6.2 8.2 11.1	Improves water quality and aesthetics; reduces erosion, runoff, sedimentation; and offers flood control



PARK ACCESS IMPROVEMENT PROJECTS



The table below includes multiple projects that present opportunities for protecting and improving access to park and public lands within the East River Corridor. Actions include working with landowners and surrounding communities, constructing trails, and planning native trees, etc. Private property acquisition that aims to protect and expand public land or park space was determined and distributed to local municipalities to utilize moving forward. Acquisition actions are not included in the Action Plan.

Table 13. Protect and Enhance Public Land and Park Access

Action	Description	Sites of Interest	Secondary Benefits
Work with landowners and neighboring communities to protect land	By developing relationships with landowners adjacent to the river, as well as neighboring communities, there could be more opportunities that become available for acquisition, education, and management.	5 14.2	Protect water quality and flood storage and improve fish and wildlife habitat
Enhancement of existing parks	Enhancing existing parks will provide socio-economical benefits and help to increase usage, access, and user appreciation.	6.2 10.1	Improve access, aesthetics, usage, connection,



PROJECT FUNDING

As part of the Action Plan in this chapter, various funding sources that can be utilized to implement projects and actions to meet the overall goals of this plan have been identified. A brief description of current state and federal funding programs available and their acronyms are listed below.

[Emergency Watershed Protection Program \(EWP\)](#) - EWP is intended to take emergency measures to safeguard lives and property after a natural occurrence has caused a sudden impairment of the watershed. Through EWP, the Natural Resource Conservation Service (NRCS) may purchase easements on any floodplain lands that have a history of repeated flooding.

[Municipal Flood Control Grant Program](#) - This grant is available to all cities, villages, towns, tribes and metropolitan sewerage districts. Assistance is provided with items such as the acquisition of property, vacant land, structure removal, flood-proofing, administrative support and others. This program will fund the following riparian restoration activities that may be beneficial within the East River Corridor: removal of a dam or other artificial obstruction, restoration of fish and native plant habitat, and erosion control and streambank erosion.

[Targeted Runoff Management Grant Program \(TRM\)](#) - This program offers competitive grants for local governments for controlling nonpoint source pollution. Grants reimburse costs for agriculture or urban runoff management practices in critical areas with surface or groundwater quality concerns. The cost-share rate for TRM projects is up to 70% of eligible costs.

[Great Lakes Restoration Initiative \(GLRI\)](#) - This program is the largest funding program investing in the Great Lakes. Various agencies use their own mechanisms to announce grant opportunities that use GLRI funds. Currently, the Lower Fox River watershed is one of three priority watersheds in the Great Lakes Restoration Initiative Action Plan. Under the initiative, nonfederal governmental entities can apply for funding for projects related to restoring the Great Lakes. All projects must support one of the GLRI focus areas:

1. Toxic Substances and Areas of Concern
2. Invasive Species
3. Nonpoint Source Pollution Impacts on Nearshore Health
4. Habitat and Species
5. Foundations for Future Restoration Actions

[Land and Water Conservation Fund \(LWCF\)](#) - This is a federal program administered by the DNR in all states that encourages the creation and interpretation of high-quality outdoor recreational opportunities. Funds received by the DNR for this program are split between DNR projects and grants to local governments for acquisition and/or development of public outdoor recreation areas and facilities. Grants cover 50% of eligible project costs.

[Surface Water Grant Program](#) - The surface water grant program provides cost-sharing grants for surface water protection and restoration. Funding is available for education, ecological assessments, planning, implementation, and aquatic invasive species prevention and control. With many different projects eligible for grant funding, you can support surface water management at any stage: from organization capacity development through project implementation. Funds can be used for a wide variety of projects related to surface water, under one of two general categories:

1. Education & Planning projects help communities understand surface water conditions, determine management goals, and develop strategic management plans; and
2. Management projects protect and improve water quality and aquatic habitat and prevent and

control aquatic invasive species (AIS). Some projects require an approved recommendation in a management plan to be eligible for funding.

[Knowles-Nelson Stewardship Program](#) – The Stewardship Fund provides financial assistance to local governments and nonprofits to preserve valuable natural areas and wildlife habitat, protect water quality and fisheries and expand opportunities for outdoor recreation. The Stewardship fund gives the WDNR spending authority to purchase land and easement additions to state properties. Stewardship grants fund local park infrastructure, boat ramp facilities, recreational trails and land purchases for parks and nature preserves statewide.

[Wisconsin Coastal Management Program \(WMP\)](#) - The Coastal Management Grant Program supports projects focusing on wetland protection, habitat restoration, nonpoint pollution control, land use planning, Great Lakes education, public access, historic preservation, and land acquisition.

OTHER RELATED FUNDING SOURCES

[Agricultural Conservation Easement Program \(ACEP\)](#) - Under this program, NRCS provides financial assistance to help conserve agricultural lands and restore wetlands. Under the Agricultural Land Easements component, NRCS helps state and local governments, Indian tribes, and non-governmental organizations protect working agricultural lands and limit non-agricultural uses of the land. Under the Wetlands Reserve Easements component, NRCS helps to restore, protect, and enhance wetlands that have been altered for agriculture.

[Conservation Technical Assistance \(CTA\)](#) - Through Conservation Technical Assistance, NRCS assists landowners and land users, communities, units of state and local government, Tribes, and other Federal agencies in planning and implementing conservation systems.

[Conservation Innovation Grants \(CIG\)](#) – This program provides grants that drive public and private sector innovation in resource conservation. CIG projects inspire creative problem-solving that boosts production on farms, ranches, and private forests - ultimately, they improve water quality, soil health, and wildlife habitat. All non-Federal entities and individuals are eligible to apply.



POTENTIAL PARTNERSHIPS

Potential partnerships include conservation organizations, state agencies, surrounding communities, and more. For additional information on state, regional, and national partners, please visit the [Coastal Program Partners](#) section located under the WCMP page on the DOA website.

Wisconsin Department of Natural Resources (WDNR) - The WDNR is dedicated to working with the citizens and businesses of Wisconsin while preserving and enhancing the natural resources of Wisconsin. In partnership with individuals and organizations, DNR staff manage fish, wildlife, forests, parks, air and water resources while promoting a healthy, sustainable environment and a full range of outdoor opportunities.

NOAA Sea Grant - The Sea Grant network consists of a federal/university partnership between the National Oceanic and Atmospheric Administration (NOAA) and 34 university-based programs in every coastal and Great Lakes state, Puerto Rico, and Guam. The network draws on the expertise of more than 3,000 scientists, engineers, public outreach experts, educators and students to help citizens better understand, conserve and utilize America's coastal resources.

The Nature Conservancy (TNC) - The Nature Conservancy is a non-profit conservation organization with offices and staff located throughout the world. The Conservancy has an office located in northeast Wisconsin and works to protect and conserve lands and waters in the region for the benefit of fish and wildlife, and people. Local staff are invested in several projects in the East River watershed and may assist with planning, facilitation, implementation and identifying sources of funding for high impact projects in this area.

The National Association of Conservation Districts (NACD) - The NACD is the national organization for 3,000 local conservation districts across the country. Conservation districts are local units of government responsible for the soil and water conservation work within their boundaries. The districts' role is to increase voluntary conservation practices among farmers, ranchers and other land users.

The USDA Natural Resources Conservation Service (NRCS) - The NRCS is the federal agency that works hand-in-hand with the American people to conserve natural resources on private lands. Formerly the Soil Conservation Service, NRCS brings 60 years of scientific and technical expertise to the Partnership.

Green Bay Conservation Partners - The Green Bay Conservation Partners was created in 2014 as a self-sustaining regional conservation partnership to facilitate coordinated conservation in the northeast Wisconsin region of the Green Bay watershed. The partnership consists of individuals working on natural resource issues for government agencies, tribal nations, universities, nonprofit groups and others.

Brown County Land and Water Conservation Department - The Brown County Land and Water Conservation Department is involved in a number of activities directed at water quality improvement, soil erosion control, wildlife damage and public awareness of those actions. The department addresses water quality and state-mandated Agricultural Non-Point Performance Standards and Prohibitions through administration of a variety of programs including: the Northern Pike Habitat Restoration Project; Brown County Land and Water Resource Management Plan; Brown County Animal Waste Management Ordinance; Brown County Agriculture Shoreland Management Ordinance and the Wisconsin Working Lands Initiative Program.

Appendix A: Survey Results

The East River Restoration Survey was an online survey published by Bay-Lake Regional Planning Commission asking for public feedback on the current condition of the river, and also concerns or opportunities residents/visitors may have wished to share. The survey was available from September through October of 2019 and collected 137 submissions. The information collected through the survey was a vital component when creating the revitalization plan for the Lower East River Corridor in Brown County.

East River Restoration Survey Part 2

Welcome to part 2 of the East River Restoration Survey. In this interactive mapping component, please show us where some of the key points along the river that may be your favorite access points to the river or may need some attending to.

1 At what location(s) do you typically access the East River?

Click on the **blue icon** to the right and place a point on the map to let us know where you typically access the East River. After you place a point on the map, provide any comments that you so wish or add a picture by click on "Choose File" and hit save. Feel free to add as many points as you wish or continue onto the next question.

Important Note
You can add as many points as you would like, but please note that after you save a point this point will disappear from the map. Don't panic, your point and comments have still been saved.

2 Are there locations along the East River that deter you from utilizing...

3 Where along the East River would you like to see improvements...

4 Have you noticed any invasive species near or on the East River?

Let Us Know!

Click below to place an access point:

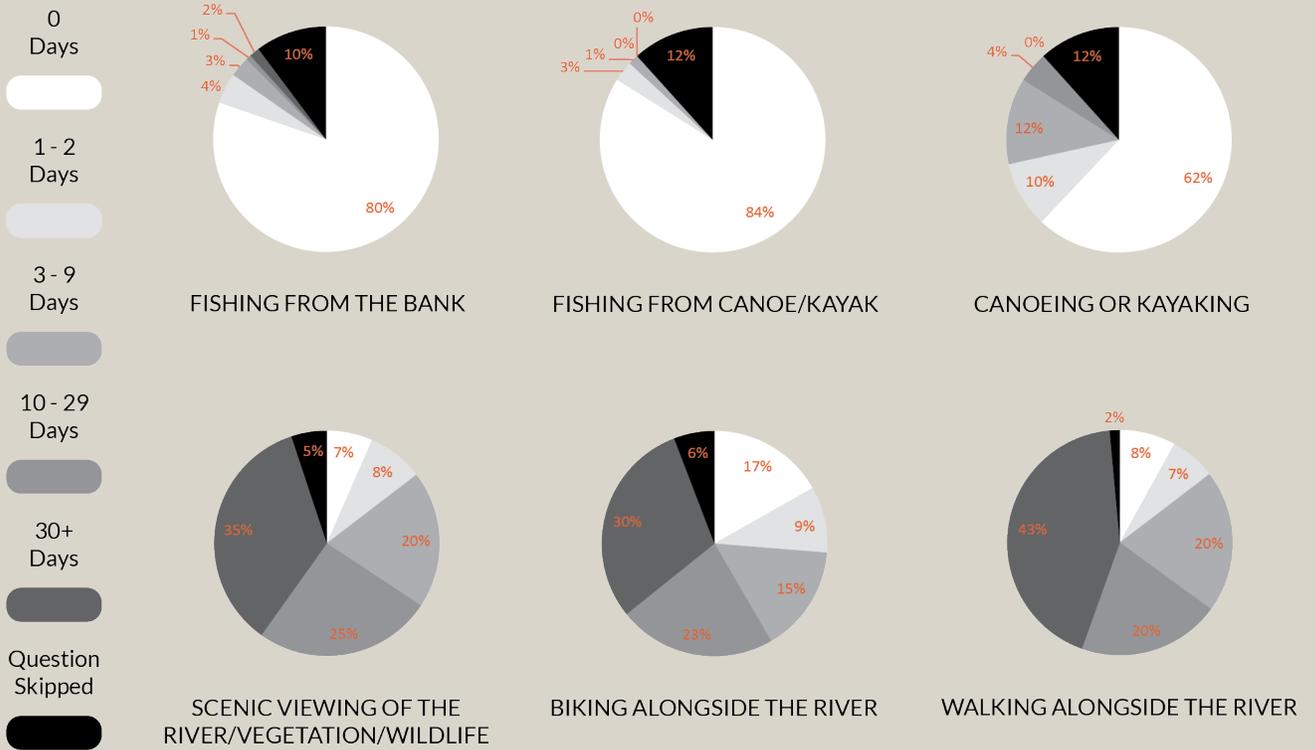
Click Here to Place an Access Point

Find address or place

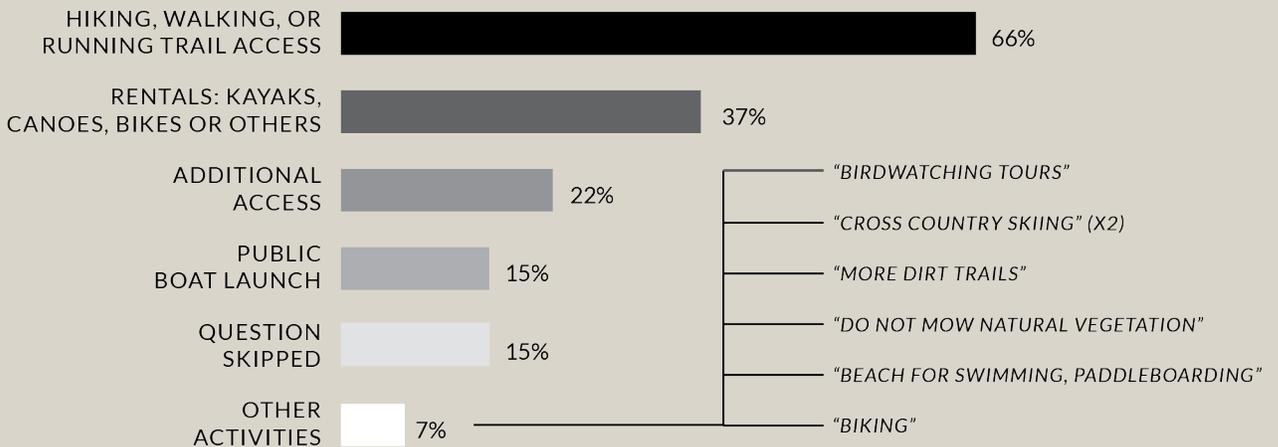
Green Bay Green Bay
East River Parkway
Wider Park
Green Bay Country Club
Brown County LIO, USDA FSA, GeoEye, Earthstar Ge... esri

SURVEY PART I

1. How many days have you participated in the following activity on the East River in the last 3 years?

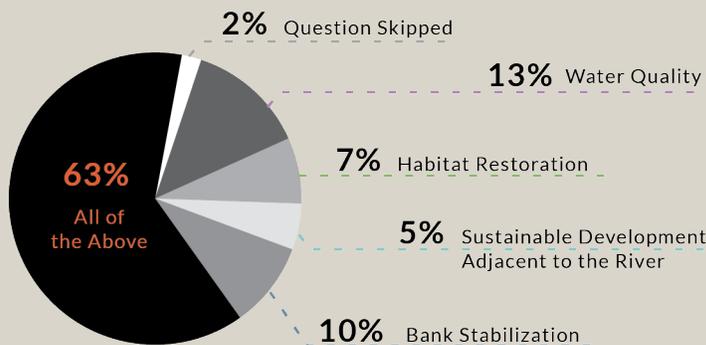


2. Are there any outdoor activities you would like to do as river based recreation activities?*

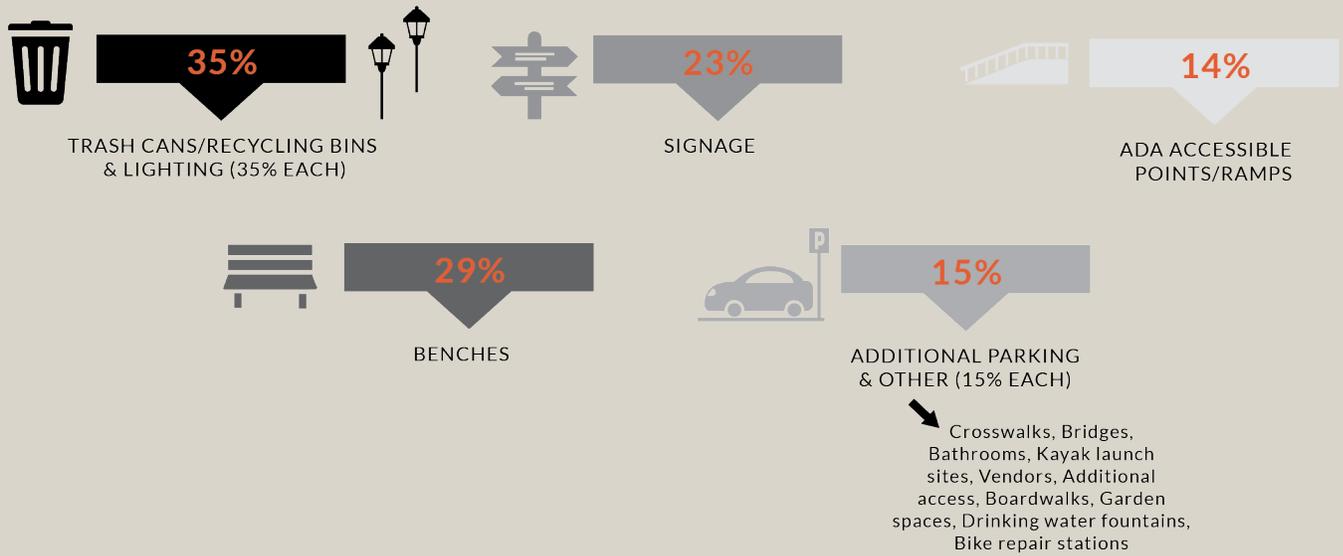


*Viewers were asked to submit all that apply

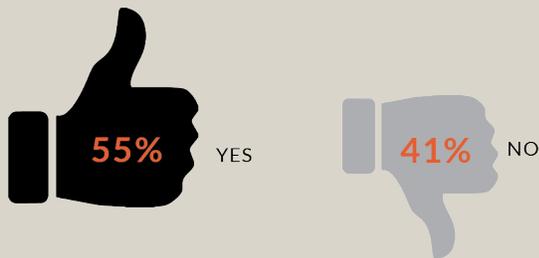
3. What feature is most important to you concerning the East River?



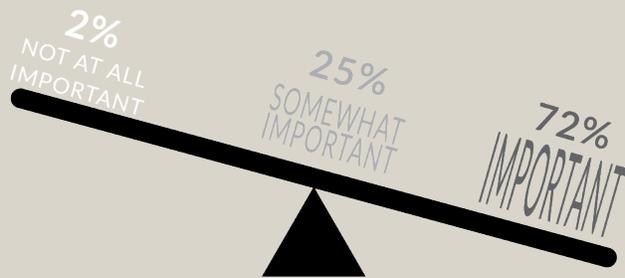
4. What infrastructure is not available that you would like to use, see, and/or have available to make your visit better?



5. During the past 12 months, did you take any single day trips where the primary purpose was to recreate in or near a river?



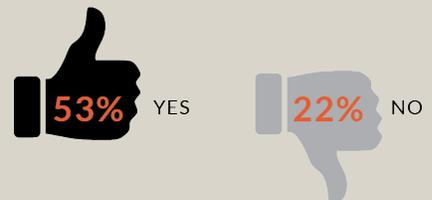
6. In general, when deciding to visit the East River, how important is the water quality?



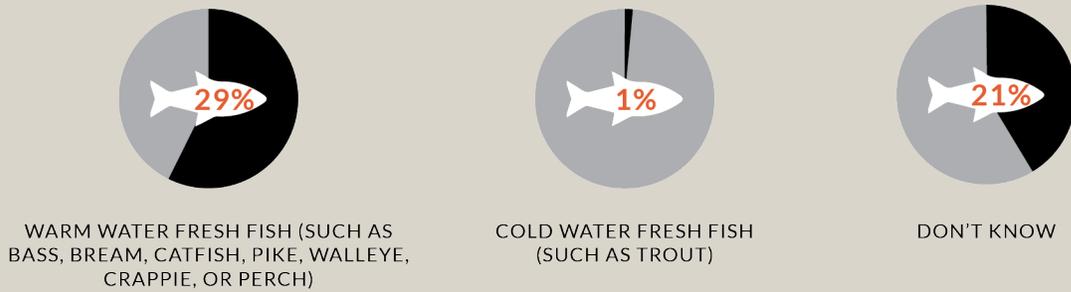
7. Would you say the size and depth of the river is:



If you answered "somewhat important," would you support redging?

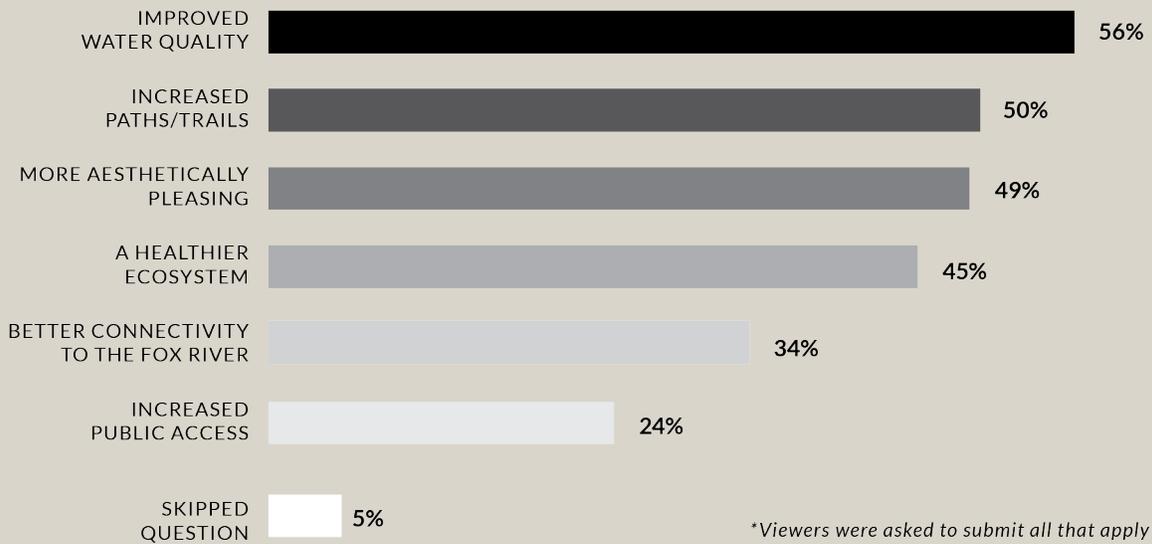


8. If you fish, what type of fish do you aim to catch?



*50% of respondents skipped question.

9. What would increase your visits to the East River?*



*Viewers were asked to submit all that apply

10. What is your favorite feature about the East River?

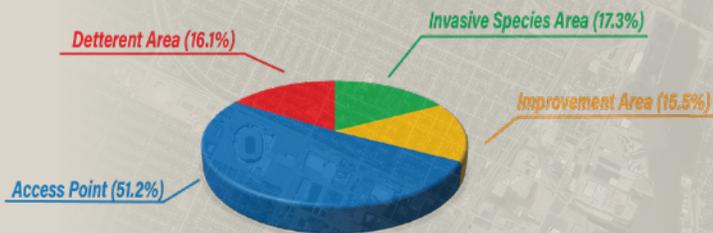
Top 6 response categories:



SURVEY PART II

Interactive Mapping Component

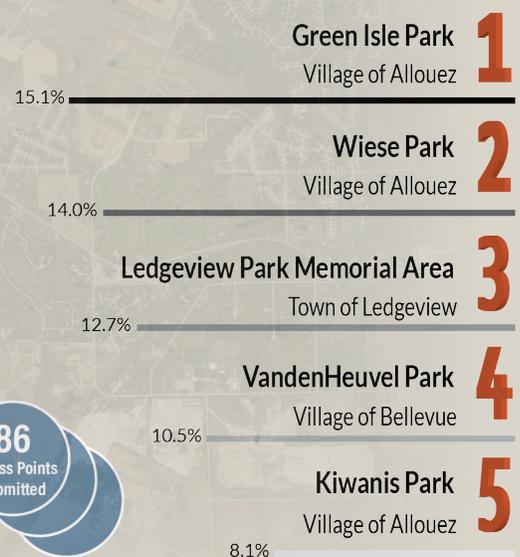
Submitters were given a chance to place points on an interactive map to show where there were areas of deterrents, invasive species, favorite access points, and areas that need improvements. Overall, there were 168 total points added to the interactive map. A summary of these submissions are shown below.



Top 3 Deterrents:

1. Flooding
2. Housing/Development too close to river
3. No Trail Connectivity

Top 5 Reported Access Areas



Appendix B: Publicly Owned Lands and Trails

Table 14: Parks in Project Area

Parks in Project Area*					
Park Name	Type	Address	Municipality	Acreage	Percentage
Unnamed	Greenway	2500 Green Ave	Allouez	4.59	0.55%
Unnamed (Schreiber)	Natural Area	Downtown Green Bay	Green Bay	1.09	0.13%
Unnnamed	Natural Area	Elkay Ln	Bellevue	4.31	0.51%
Altmeyer Park	Neighborhood/ School Park	3001 Ryan Rd	De Pere	30.49	3.63%
Astor Park	Neighborhood Park	1100 Porlier St	Green Bay	1.33	0.16%
Baird Creek Parkway	Natural Area	Main St to N Henry St	Green Bay	1.08	0.13%
Brisk Park	Mini Park	820 Day St	Green Bay	0.4	0.05%
Broadview Soccer Complex	Athletic Fields	2800 Libal St	Allouez	17.32	2.06%
Courthouse Square	Special Use	100 S Jefferson St	Green Bay	0.98	0.12%
East High Athletic Fields	Athletic Fields	1415 E Walnut St	Green Bay	15.47	1.84%
East Lawn Park	Community Park	1515 Boyd St	Allouez	8.25	0.98%
East River Emilie Park	Neighborhood Park	1550 Emilie St	Green Bay	22.72	2.71%
East River Optimist Park	Community Park	1450 Lawe St	Green Bay	8.82	1.05%
East River Parkway	Greenway	Trail access at Westminster Dr	Bellevue	79.07	9.42%
East Side Nature Park	Natural Area	2200 LeBrun Street	De Pere	51.85	6.18%
Eastman Park	Neighborhood Park	1240 Eastman St	Green Bay	2.75	0.33%
Farlin Park	Neighborhood Park	1510 Harold St	Green Bay	0.76	0.09%
Fox River Greenway	Greenway	100 Admiral Flatley Ct	Green Bay	4.56	0.54%
Green Isle Park	Greenway	2500 Green Ave	Allouez	60.46	7.20%
Jackson Square park	Neighborhood Park	300 S Monroe Ave	Green Bay	0.14	0.02%
Joannes Park	Community Park	215 S Baird St	Green Bay	30.2	3.60%

Kiwanis Park	Community Park	3517 East River Dr	Allouez	26.33	3.14%
Ledgeview Memorial Area	Natural Area	2064 Dickinson Rd	Ledgeview	55.1	6.57%
Leicht Memorial Park	Community Park	138 Dousman St	Green Bay	8.2	0.98%
Lions Trailside Estates Park	Neighborhood Park	863 Killarny Trail	De Pere	4.24	0.51%
Meyer Park	Natural Area	425 Goodell St	Green Bay	9.73	1.16%
Mossakowski Family Dog Park/ VandenHeuvel Park	Neighborhood Park	South of HWY 172	Bellevue	29.76	3.55%
Navarino Neighborhood Park	Neighborhood Park	800 Stuart St	Green Bay	2.73	0.33%
Nicolet Park	Neighborhood/ School Park	600 N Irwin Ave	Green Bay	3.19	0.38%
Optimist Park	Community Park	Libal and Kalb	Allouez	10.67	1.27%
Osprey Point (Izaak Walton League Conservancy)	Natural Area	3320 Monroe Rd	Bellevue	129.1	15.38%
Riverwalk Trail	Natural Area	No Address	Green Bay	0.27	0.03%
Riverview Park	Neighborhood Park	902 Broadview	Allouez	28.86	3.44%
Rotary Park	Mini Park	1843 Saddlebrook Ln	De Pere	0.34	0.04%
St. Philip Park	Neighborhood Park	505 Irene St	Green Bay	4.06	0.48%
Sullivan Park	Neighborhood/ School Park	1521 Deckner Ave	Green Bay	13.38	1.59%
Van Beaver Park	Neighborhood Park	800 John St	Green Bay	43.11	5.14%
VandenHeuvel Park	Greenway	2282 Bellevue St	Bellevue	41.02	4.89%
Webster Park	Community Park	2031 Jourdain Ln	Allouez	5.41	0.64%
Whitney Park	Neighborhood Park	800 Main St	Green Bay	2.52	0.30%
Wiese Park	Natural Area	900 Block LeBrun Rd	Allouez	74.52	8.88%
Total				839.18	100.00%

Table 15: Parks in Focus Area

Parks in Focus Area*					
Park Name	Type	Address	Municipality	Acreage	Percentage
Unnamed	Natural Area	Elkay Ln	Bellevue	4.21	0.98%
East High Athletic Fields	Athletic Fields	1415 E Walnut St	Green Bay	11.14	2.60%
East Lawn Park	Community Park	1515 Boyd St	Allouez	7.9	1.84%
East River Emilie Park	Neighborhood Park	1550 Emilie St	Green Bay	17.83	4.16%
East River Optimist Park	Community Park	1450 Lawe St	Green Bay	6.86	1.60%
East River Parkway	Greenway	Trail access at Westminster Dr	Bellevue	60.35	14.09%
East Side Nature Park	Natural Area	2200 LeBrun Street	De Pere	33.32	7.78%
Fox River Greenway	Greenway	100 Admiral Flatley Ct	Green Bay	1.37	0.32%
Green Isle Park	Greenway	2500 Green Ave	Allouez	33.38	7.79%
Joannes Park	Community Park	215 S Baird St	Green Bay	5.89	1.37%
Kiwanis Park	Community Park	3517 East River Dr	Allouez	13.82	3.23%
Ledgeview Memorial Area	Natural Area	2064 Dickinson Rd	Ledgeview	49.03	11.44%
Meyer Park	Natural Area	425 Goodell St	Green Bay	8.6	2.01%
Mossakowski Family Dog Park/ VandenHeuvel Park	Neighborhood Park	South of HWY 172	Bellevue	16.51	3.85%
Osprey Point (Izaak Walton League Conservancy)	Natural Area	3320 Monroe Rd	Bellevue	50.34	11.75%
Riverview Park	Neighborhood Park	902 Broadview	Allouez	17.37	4.05%
Sullivan Park	Neighborhood/ School Park	1521 Deckner Ave	Green Bay	8.96	2.09%
Van Beaver Park	Neighborhood Park	800 John St	Green Bay	27.75	6.48%
VandenHeuvel Park	Greenway	2282 Bellevue St	Bellevue	25.27	5.90%
Wiese Park	Natural Area	900 Block LeBrun Rd	Allouez	28.53	6.66%
Total				428.43	100.00%

*Refers to in or partially in parks of designated areas. Acreage shown is reflective only on park area within stated areas, percentages shown reflect to park acreage total.

Source: Brown County Parks GIS Layer, 2020

Table 16: Trails in Project Area

Trails in Project Area*		
Trail Name	Mileage	Percentage
Multi-Use Trail (No Name)	0.16	0.94%
Trail (No Name)	0.5	2.93%
Multi-Use Trail (No Name, alongside Monroe Rd in Ledgeview)	0.98	5.74%
Baird Creek Trail	0.63	3.69%
Bay Beach Wildlife Sanctuary Trail	0.44	2.58%
Cora VanderPerren Trail	0.37	2.17%
East River Trail	11.55	67.62%
Fox River Trail	0.91	5.33%
Green Isle Park Trail	0.88	5.15%
Wiese Family Park Trail	0.66	3.86%
Total	17.08	100.00%

Table 17: Trails in Focus Area

Trails in Focus Area*		
Trail Name	Mileage	Percentage
Multi-Use Trail (No Name, alongside Monroe Rd in Ledgeview)	0.07	0.64%
Cora VanderPerren Trail	0.37	3.39%
East River Trail	9.08	83.07%
Fox River Trail	0.39	3.57%
Green Isle Park Trail	0.37	3.39%
Wiese Family Park Trail	0.65	5.95%
Total	10.93	100.00%

*Refers to in or partially in trails of designated areas. Mileage shown is reflective only on trail portion within stated areas, percentages shown reflect to trail mileage total.

Source: Brown County Trails GIS Layer, 2020

Appendix C: Guide for Landowners

Landowners living directly adjacent to any water resource can have an impact on water quality. Depending on property usage, pollutants such as sediment and phosphorus are carried to the river, causing impacts that are harmful to water quality, human health, and fish and wildlife. Where there is erosion, pollutant concentrations are even higher.

This landowners guide provides practical guidance for controlling pollutants and runoff, reducing erosion, planting native species and capturing and cleansing runoff from your property to ultimately help protect and improve water quality, flood storage, and fish and wildlife habitat.

MINIMIZE POLLUTION AND RUNOFF TO PROTECT WATER QUALITY AND ENHANCE FLOOD STORAGE

Use Sustainable Lawn Management Techniques By Using Zero Phosphorous Fertilizer

Avoid fertilizers that contain phosphorus. It accelerates algae growth in the East River and ultimately makes its way into lower Green Bay exacerbating the nutrient pollution in the bay. Most lawns and gardens already contain adequate amounts of phosphorus.

Properly Dispose of Household Hazardous Waste

Do not pour oil into the ditch or wash paint brushes that at end of your driveway. Gasoline, oil, solvents, old paints, thinners, fertilizers, pesticides, cleaners and many other products need to be disposed of properly.

Reduce Hard Surfaces like Rooftops and Driveways

When considering additions, consider runoff from extra roof space, decks, sidewalks and parking areas. Pervious pavers are an option for areas that do not have heavy traffic. Hard surfaces and buildings prevent water from soaking into the ground, increasing runoff and erosion. Direct downspouts onto your lawn or landscaping, not into hard surfaces.

Minimize Erosion Through Shoreline Stabilization Techniques

Erosion of sediment to the river is especially problematic. Erosion rates from construction sites can be up to 1000 times greater than from a naturally vegetated site. Protecting wooded areas and natural landscapes, planting native species with deep root systems, and the use riprap to slow runoff are all ways to minimize erosion.

Install Rain Catchment Systems to Reduce Stormwater Runoff

Catchment systems including rain barrels and rain gardens, are effective tools to reduce stormwater runoff. Rain barrels collect water from your rooftop to water your yard during dry periods. Rain Gardens are an attractive method to increase infiltration and absorption of surface water. For more information on rain gardens, visit Homeowners guide to rain gardens.

CREATE A RIPARIAN BUFFER OF NATIVE SPECIES TO REDUCE RUNOFF, FILTER POLLUTANTS, AND PROVIDE WILDLIFE HABITAT

Plant Native Trees, Plants, and Shrubs

Planting native tree, plants and scrub species and protect wooded areas. Native trees, plants and shrubs helps to reduce erosion by covering the soil, cushioning the impact of raindrops, and slowing runoff water flow. Deep rooted, native vegetation is especially beneficial for reducing erosion and increasing infiltration. Native trees, shrubs and wildflowers can also serve as pollen and nectar sources for pollinators, and provide a food source for native caterpillars which in turn provide food for many birds.

Protect Wooded Areas

Protect wooded areas on your lot by allowing for the establishment of a thick understudy of small shrubs and plants called a duff layer. This duff layer protects soil from rain impact and absorbs water. Root systems keep the duff in place, not in the river.

Eliminate Invasive Plan Species

The first step in invasive plant species management is proper identification. There are a lot of different invasive plant species ranging from grasses, forbs, vines, shrubs, and trees and many of them look like native counterparts. Some common invasive species in the East River watershed include:

<i>Phragmites australis</i> (phragmites)	<i>Rhamnus cathartica</i> (common buckthorn)	<i>Bromus inermis</i> (smooth brome)
<i>Phalaris arundinacea</i> (reed canary grass)	<i>Clynoglossum officinale</i> (hound's tongue)	<i>Cirsium arvense</i> (canadian thistle)
<i>Typha angustifolia</i> (narrow-leaved cattail)	<i>Hesperis matronalis</i> (dame's rocket)	<i>Allaria petiolate</i> (garlic mustard)
<i>Rhamnus frangula</i> (alder buckthorn)	<i>Lonicera tatarica</i> (honeysuckle)	<i>Daucus carot</i> (wild carrot)
		<i>Coronilla varia</i> (crownvetch)
		<i>Melilotus albus</i> (white sweetclover)

Once you have identified invasive plant species on your property, you then need to select the management strategy that works best for the site and resources you have. Invasive plant species can be managed biologically, mechanically, or chemically. Biological control is the intentional manipulation of natural enemies by humans for the purpose of controlling pests. Mechanical control includes mowing, hoeing, cultivation, and hand pulling. Chemical control is the use of herbicides. You can also use a combination of these three methods (USDA, 2020). Once the invasive species have been brought under control or eradicated, establish a healthy habitat with native plants.



Invasive species in the East River Corridor (left to right): Common Buckthorn, Queen Anns Lace (top), Garlic Mustard (bottom), Phragmites, and Reed Canary Grass

For additional information on native plants and invasive species, please see [A Field Guide to Terrestrial Invasive Plants in Wisconsin](#) or visit the WDNR website.

FUNDING SOURCES FOR PRIVATE LAND IMPROVEMENTS

See Chapter 4 for additional information on funding sources that may be applicable to private landowner improvement projects.

[Surface Water Management Grants](#) – Healthy Lakes & Rivers is a subprogram of the Surface Water Management grant program that focuses on shoreland landowners that want to install practices on their property to improve habitat and water quality. Healthy Lakes & Rivers grants support five simple and inexpensive best practices that may be installed in the littoral, transition/buffer, and upland zones of shoreland properties. Landowners can ask their lake association or county staff to sponsor an application.

[Farmable Wetlands Program \(FWP\)](#) – This program designed to restore previously farmed wetlands and wetland buffer to improve both vegetation and water flow. The Farm Service Agency runs the program through the Conservation Reserve Program with assistance from other government agencies and local conservation groups. Farmers and ranchers in any state can take part in the program.

[National Water Quality Initiative \(NWQI\)](#) – The Natural Resources Conservation Service will work with agricultural producers to implement voluntary conservation practices to improve water quality in high-priority watersheds while maintaining agricultural productivity.

[Conservation Stewardship Program \(CSP\)](#) – This program offers funding for participants that take additional steps to improve resource condition. Program provides two types of funding through 5-year contracts; annual payments for installing new practices and maintaining existing practices, as well as supplemental payments for adopting a resource conserving crop rotation.

[Conservation Reserve Program \(CRP\)](#) – CRP, administered by the Farm Service Agency, is the county's largest private-land conservation program. Farmers enrolled in the program receive a yearly rental payment for environmentally sensitive land that they agree to remove from production. Contracts are 10-15 years in length. Eligible practices include buffers for wildlife habitat, wetlands buffer, riparian buffer, wetland restoration, filter strips, grass waterways, shelter belts, living snow fences, contour grass strips, and shallow water areas for wildlife.

[Conservation Reserve Enhancement Program \(CREP\)](#) – CREP is a resource to help agricultural landowners meet their conservation goals, particularly those who till or graze land along rivers and streams. CREP pays landowners to install filter strips along waterways or to return continually flooded fields to wetlands while leaving the remainder of the adjacent land in agricultural production. A 15 year contract or perpetual contract conservation easement can be entered into.

[Environmental Quality Incentives Program \(EQIP\)](#) – Provides financial and technical assistance to farm and forest landowners for conservation practices that protect soil and water quality. Grassed waterways, stream fencing, critical area planting, terraces, manure management systems including storage structures and barnyard runoff protection, and many other conservation practices are eligible for EQIP.



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- Forestry and tree planting, maintenance: Chris Plzak (Christopher.Plzak@wisconsin.gov) Wisconsin Department of Natural Resources;
- Natural lands management and restoration, wildlife habitat improvement: Josh Martinez (Joshua.Martinez@wisconsin.gov) Wisconsin Department of Natural Resources;
- Potential project (including land acquisition) funding sources: Trina Soyk (trina_Soyk@fws.gov) U.S. Fish and Wildlife Service information on Natural Resource Damage Assessment funds. Nicole Van Helden (nvanhelden@tnc.org) general information of possible project funding sources; Pam Rood (pamelaa.rood@wisconsin.gov) Knowles-Nelson Stewardship Program Grants for local units of government (<https://dnr.wi.gov/topic/Stewardship/Grants/ApplyLUG.html>) & federal Land and Water Conservation Fund grant programs information.

