

# 1

## Introduction

### 1.1 Introduction – History and Regional Context

The Buffalo River in western New York has played a vital role in the region's economy for more than a century. However, industrialization and the pressures of growing river communities have taken a toll on the river ecosystem. Historical uses of the Buffalo River and its tributaries caused the loss of fish and wildlife habitat, degraded the river bottom and its banks, and reduced fish and wildlife populations. The channel and banks were altered to allow for shipping and riparian wetlands were filled to place factories, mills, and other industrial and commercial infrastructure. Wastewater and polluted storm water runoff from industrial processes and lands put heavy metals and other contaminants into the river, polluting its water and sediments. Air pollution and subsequent deposition of contaminants associated with heavy industry, especially steel production, blanketed the landscape in the lower watershed (see Photos 1.1-1 through 1.1-3).



**Photo 1.1-1** Early settlers began deforestation, which impacted the fishery and water quality. Tributaries lost their cover and water temperatures increased.



**Photo 1.1-2** Forested land was cleared for farming. Runoff created problems.



**Photo 1.1-3** Cities – brought industrial waste, human sewage, and other problems to the lakes.

As shipping began to by-pass the city of Buffalo with the opening of the St. Lawrence Seaway in the 1950s, other forces led to the decline of steelmaking and other industries. While industry along the river declined sharply decades ago, the legacy of ecological damage remains to a significant degree. The changes wrought by the wholesale reworking of the river, its banks, and surrounding environment, however, has resulted in the loss of fish and wildlife habitat as well as degraded water quality.

**The Buffalo River as a Great Lakes Area of Concern and Associated Beneficial Use Impairments**

The United States and Canada International Joint Commission (IJC) designated the Buffalo River as a Great Lakes Area of Concern (AOC) in 1987 along with 42 other areas around the Great Lakes, including five in New York State with similarly degraded rivers and lakeshores (see Photo 1.1-4). Although discharges from the oil refineries, steel mills, and chemical plants that occupy its shores have declined sharply over the last several decades, the impacts of pollution and degraded habitats remain. The primary issues affecting the Buffalo River today are impaired water quality, contaminated bottom sediments, inactive hazardous waste sites, point and nonpoint source pollution, combined sewer overflows, and fish and wildlife habitat loss and degradation.



**Photo 1.1-4 Areas of Concern**

There are 14 potential beneficial use impairments (BUIs) applied by the IJC to an AOC (IJC 1991). These BUIs can be classified as: impaired, impairment inconclusive, needs further assessment, not impaired, in recovery, or being addressed

by another responsible party. *A Compendium of Delisting Targets and Beneficial Use Impairments in the United States Great Lakes Areas of Concern* (EPA 2010) identifies nine BUIs impaired for the Buffalo River AOC. The delisting targets for each of the BUIs for the Buffalo River AOC were developed locally by the Buffalo River RAC via a thorough assessment process and are consensus based. Revisions can be made by the RAC based on the results of future monitoring and assessment or unforeseen future developments in the AOC.

The process of delisting (also called “re-designating”) an AOC begins with delisting each individual BUI. The United States Environmental Protection Agency (EPA) (2001) provides for individual BUIs in an AOC to be delisted under the following circumstances:

- When the locally developed delisting criteria have been met;
- When the impairment is due to natural rather than man-made causes;
- When impairment is not limited geographically to the AOC but, rather, is typical of regional conditions;
- When the source of the impairment is outside the boundaries of the AOC; or
- When the beneficial use cannot be fully restored, even when all practical remedial actions have been implemented, because of other factors affecting the AOC.

The New York Department of Environmental Conservation (NYSDEC) (2010) has published similar guidance on delisting BUIs in New York State AOCs. After all of the BUIs within an AOC have been delisted, the AOC as a whole may be delisted. NYSDEC, the EPA, and the IJC concurrence are required to delist individual BUIs and the AOC as a whole.

Once all of the individual BUIs have been delisted, the entire AOC can be re-designated as “delisted” or “in-recovery” (NYSDEC 2010a). An area in recovery should be re-evaluated periodically to determine if the area has achieved the “delisted” goal. NYSDEC, EPA, and IJC concurrence is required to maintain delisted status. NYSDEC (2010a) and EPA (2001) describe the steps in the delisting process.

Of the nine BUIs listed for the AOC, there are three that are habitat-related and the focus of this habitat restoration planning effort, including:

- Degradation of benthos;
- Loss of fish and wildlife habitat; and
- Degradation of fish and wildlife populations (see Photos 1.1-5 and 1.1-6).



**Photo 1.1-5 and 1.1-6 Species in healthy aquatic and riparian habitats**

Although the criteria that must be met in order to delist these BUIs are specific and technical, they generally consist of:

- Aquatic organisms being relatively free of contaminants and deformities;
- Riparian vegetative communities being large enough and composed of native species that provide the habitat elements that native wildlife species require;
- Healthy riparian vegetative communities being connected to other healthy riparian communities;
- Surface waters meeting state water quality standards;
- Restoring and protecting natural flows and stream morphology to areas upstream of the AOC; and
- Wildlife diversity and abundance are comparable to healthy environments in the region.

While no BUIs have been delisted in the Buffalo River AOC since the AOC was designated in 1987, significant efforts and progress have been made since the completion of the Buffalo River Restoration Action Plan (RAP) by NYSDEC in 1989. Several improvements have been realized in the AOC, including the following:

- Fewer discharges of industrial waste;
- Declining levels of PCBs and pesticides in the water column;
- Abatement of combined sewer overflows (CSOs) in Kaisertown;
- Removal of contaminated sediment around the Buffalo Color Peninsula;
- 34 of 40 inactive hazardous waste sites sealed or remediated;
- Nearly 12 acres of riverine habitat restored;
- Establishment of grassland habitat on Buffalo Color peninsula;
- Increase in fish and wildlife species diversity (see Photo 1.1-7);

- Native wildlife species re-colonizing abandoned industrial sites;
- Fewer incidences of deformities in benthic organisms; and
- Fewer incidences of fish tumors observed.



**Photo 1.1-7 Red Bellied woodpecker**

Since the completion of the Buffalo River AOC RAP, several studies and projects have been completed that characterize environmental and ecological conditions within portions of the Buffalo River watershed. Several notable examples include:

- *Buffalo River Status Update Report* – Buffalo Niagara Riverkeeper, 2008.
- *Buffalo and Niagara River Habitat Assessment and Conservation Framework* – Buffalo Niagara Riverkeeper, 2008.
- *Buffalo River Section 312 Environmental Dredging Existing Conditions Report* – U.S. Army Corps of Engineers, 2008.
- *Fish and Wildlife Habitat Inventory and Assessment of the Lower Buffalo River Watershed* – New York State Department of Environmental Conservation (NYSDEC), 1993.
- *Municipal Open Space and Greenway Protection Report* – Town of West Seneca, 1999.
- *Assessment of Potential Aquatic Habitat Restoration Sites in the Buffalo River Area of Concern* – Irvine et al., 2005.

Despite progress made through RAP implementation, much remains to be done. As a result, the Great Lakes National Program Office (GLNPO) of the EPA has funded development of this master plan for restoring habitat in the Buffalo River AOC and its tributaries to facilitate targeted habitat-related projects.

### **Current Plans for the Remediation and Habitat Restoration Projects**

The *Interim Buffalo River Area of Concern (AOC) Strategic Plan for Beneficial Use Impairment (BUI) Delisting*, published in March 2011, summarizes ongoing plans and projects and provides specific recommendations for future projects designed to delist the BUIs in the Buffalo River AOC (<http://bnriverkeeper.org/wp-content/uploads/2009/07/Interim-Buffalo-River-Strategic-Plan-for-BUI-Delisting31.pdf>). The Interim Strategy addresses steps to delisting all BUIs in the AOC. The ERMP identifies actions that can be taken to address the habitat-related BUIs. The ERMP has been developed in the context of, and is consistent with, the Interim Strategy and the projects and plans it identifies.

Persistent environmental contamination and pervasive habitat alterations within the lower Buffalo River watershed have disconnected people from the river and its tributary streams. Common concerns include issues of human health, resource management, ecological integrity and sustainability, traditional uses of the waters and surrounding areas, and outdoor public recreational opportunities.

Among the identified habitat-related projects and plans, one of particular relevance to the ERMP is the Draft Final Buffalo River Feasibility Study (FS) (<http://www.dec.ny.gov/chemical/54166.html>), which was released in November 2010 by the Buffalo River Great Lakes Legacy Act Project Coordination Team. The FS describes projects designed to address environmental challenges, including contaminated river sediments and insufficient fish and wildlife habitat in the Buffalo River AOC. Plans include two major environmental dredging projects, as well as habitat restoration projects. Locations where dredging projects are expected to occur are shown in Figure 1-1.

The first project, to be performed by the United States Army Corps of Engineers (USACE) in the summer and fall of 2011, involves [dredging contaminated sediments in the federal navigation channel using funds from the Great Lakes Restoration Initiative \(GLRI\)](#).

The second project, to be implemented with oversight of the EPA, is being planned and funded through the Great Lakes Legacy Act (GLLA). The GLLA project will address contaminated river sediments outside of the navigation channel. Habitat restoration on five areas of the river and the head of the ship canal may be components of this project. While the exact boundaries of, and design for, the GLLA habitat restoration projects are under development, the general locations are presented in Figure 1-1. These sediment remediation activities will occur mostly along the shoreline of the river in targeted areas of a 6.2-mile stretch of the lower Buffalo River and a 1.4-mile stretch of the City Ship Canal (i.e., the

Buffalo River AOC). The GLLA project will follow the USACE dredging of the federal navigation channel after completion of the remedial design.

### **The GLLA Project, Other Projects and Regional Planning Initiatives, and the ERMP**

Although the area of investigation for this master plan extends well beyond the Buffalo River, the ERMP has been developed to complement the habitat restoration work currently in the design process. This ERMP proposes 26 additional projects at other locations in addition to the six habitat restoration sites to be restored through the GLLA project,

Numerous regional planning initiatives and projects are currently underway, have recently been completed, or are planned for the near future. Examples of these initiatives include (but are not limited to):

- Investigating the possibility for beneficial uses of clean dredge material for habitat restoration using the USACE Section 204 authority (see details below);
- The Ecology Engineering Evaluation Report was completed and is part of the FS. The design of the six habitat restoration sites identified in that report still needs to be completed;
- Planning for the RiverBend Commerce Park by the Buffalo Urban Development Corporation;
- Development of the Buffalo Green Belt Renewable Energy and Technology Corridor;
- GLRI funding of Buffalo Niagara Riverkeeper proposal for the RiverBend habitat restoration project;
- The completion of the South Buffalo Brownfield Opportunity Area (BOA) Nomination Document; and
- On-going habitat restoration activities and development of a habitat restoration plan for the West Seneca Oxbow site.

Section 204 of the Water Resources Development Act of 1992 provides authority for the USACE to plan, design, and build projects to protect, restore, and create aquatic and ecologically related habitats in connection with dredging of authorized federal navigation projects. The USACE is currently conducting an FS to enhance and create habitat in the AOC, Lake Erie, and the Niagara River using materials dredged from the Buffalo River AOC. The restoration projects proposed by the ERMP are consistent with the objectives of the work being studied by the USACE.

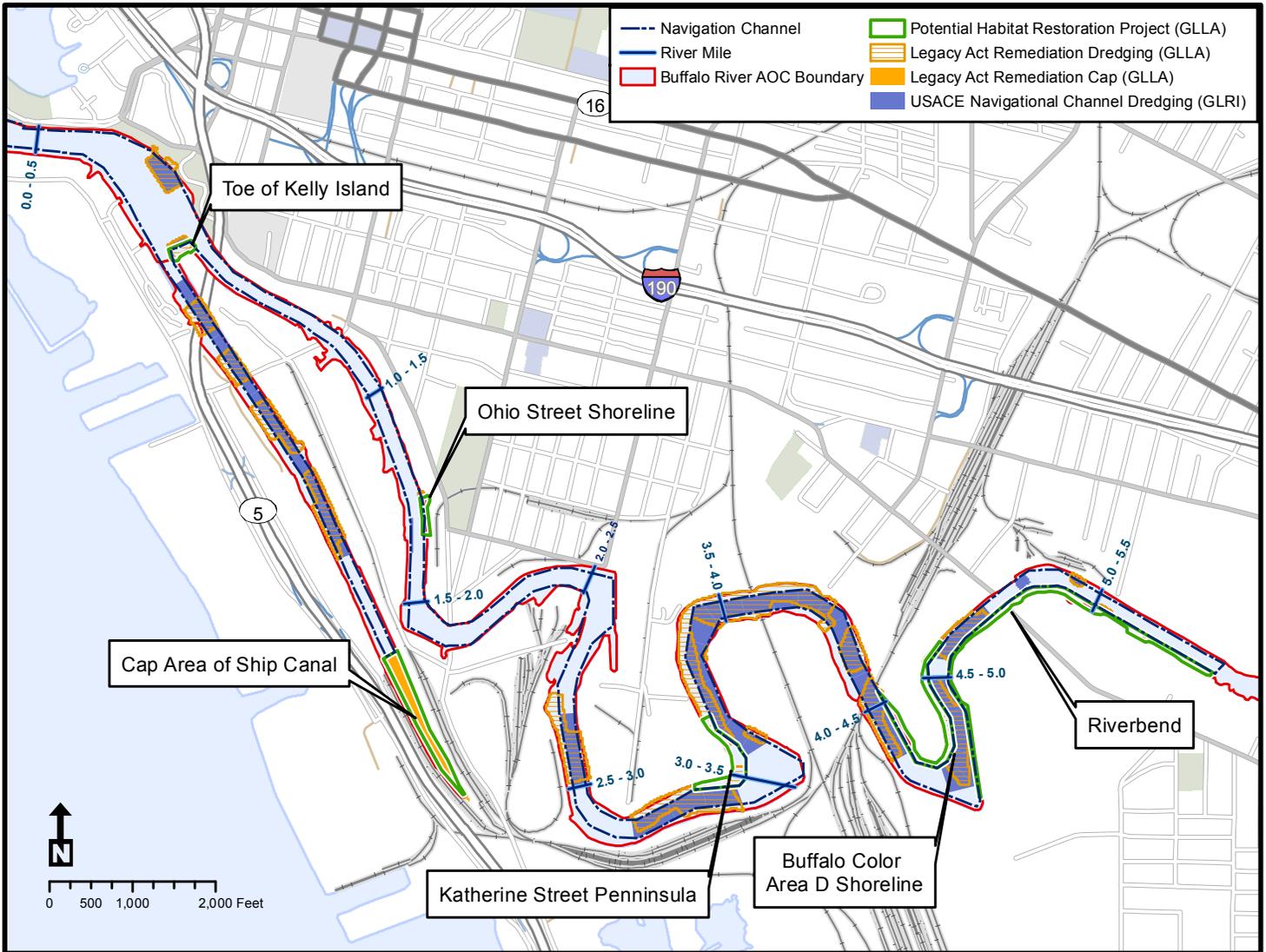


Figure 1-1 Buffalo River Restoration Projects Funded by the Great Lakes Restoration Initiative and the Great Lakes Legacy Act

Through collaboration and coordination with regional stakeholders, the ERMP process took these initiatives into account. Taken together, they form the context for further habitat restoration planning that supports the delisting of impairments within the lower Buffalo River watershed.

## 1.2 Description and Purpose of the Plan

The Buffalo River ERMP has been primarily developed from the information gained from regional stakeholders regarding their recommendations on the potential of sites for habitat restoration within the study area. These sites were screened for suitability based on the current understanding of what is known regarding the environmental status of the watershed, and the detailed knowledge of existing conditions.

The Buffalo River Ecological Restoration Master Plan provides a specific framework for addressing habitat-related impairments in the lower Buffalo River watershed. Citizens' groups, private enterprises, municipalities, landowners, and agencies can all utilize the master plan to select and implement restoration projects.

### Purpose

The purpose of the ERMP is to provide a framework for future efforts to improve the health of the watershed by providing a “ready list” of habitat restoration projects that specify restoration features and, ultimately, contribute to the delisting of the identified BUIs. The projects have been selected for their ecological value and their value to the community.

At the first Stakeholder Consultation Meeting in June 2010, stakeholders defined the ERMP Mission Statement:

*To identify, prioritize, and facilitate opportunities to restore, protect and enhance habitat within the Buffalo River Habitat Corridor and its tributaries for a healthy and sustainable ecosystem that will benefit habitat, wildlife, corridor communities, and future generations.*

### Goals and Objectives

The overall goal of the ERMP is to remediate and eliminate specific impairments that currently occur within the lower Buffalo River watershed by listing and describing a number of sites where meaningful and effective habitat restoration can be implemented. The specific goals are to:

- Protect water quality;
- Protect habitat quality in the Buffalo River and its tributaries; and
- Assist efforts to delist the three habitat-related BUIs listed above.

The objective of the ERMP is to provide a master plan to regional stakeholders that:

1. has real utility for moving the lower Buffalo River watershed forward to an unimpaired status by providing a list, or “menu,” of habitat restoration options

that project sponsors can use for compiling successful funding applications/requests; and

2. supports the creation of a regional framework by which to substantiate, measure, and monitor the implementation and success of habitat restoration projects.

### Collaboration

The ERMP has been developed with early and substantial involvement of individuals, groups, businesses, local governments and agencies that have voiced abiding interests in restoring ecological functions and values to the Buffalo River, its tributaries, and lands adjacent to the river and creeks. These interested parties wish to return some measure of cultural and traditional uses within the watershed while maintaining a forward-looking perspective and promoting sustainable economic growth in the region (see Photo 1.1-8).



**Photo 1.1-8 Local, state, and federal partners effecting change in a western New York AOC**

## Plan Overview

This master plan integrates available pertinent information on habitat conditions in the Buffalo River and its tributaries. It also takes into account current plans for public and private actions that could affect habitat restoration planning. The master plan considers the totality of this information and presents conceptual project plans for future habitat restoration projects. Stakeholders provided uniquely valuable information and perspectives on the potential concerns and opportunities for ecological restoration in the project area.

The ERMP process for identifying, mapping, screening, conducting field assessments and selecting potential habitat restoration sites is summarized in Section 3.

The section central to this master plan is Section 4, which provides (in Section 4.2) the detailed descriptions of 26 project sites, along with conceptual habitat restoration measures and estimated costs. Section 4.1 presents background information regarding how restoration concepts were developed, summarizing: the field data collection effort, the specific habitat zones evaluated, and the organization for each of the site descriptions. Section 4.3 provides a menu of project concepts including specific restoration measures that can be consulted and utilized when applying for funding for restoration project implementation.

## 1.3 Project Description

### The Project Area

The Buffalo River is located in western New York and flows from the east into Lake Erie, near the head of the Niagara River. Although the Buffalo River is listed as an AOC, it is appropriate to consider the effects of the larger watershed on the AOC. As such, the ERMP project area extends well beyond the AOC. The project area has been defined as the Buffalo River upstream from Lake Erie to the first year-round impassible barriers to fish movement on each of the three main tributaries: Cayuga Creek, Buffalo Creek, and Cazenovia Creek (about 37.2 river miles and approximately 43,800 acres; see Figure 1-2). These tributaries contribute to the historic and current condition of the Buffalo River. The project area includes floodplains, wetlands, and other significant tracts of open space adjacent to the river.

Because the land nearest the river and creeks has the most direct influence on the habitat of those streams, a focus area was developed that extends 500 feet to each side from the centerline of the channels of the Buffalo River and each of its three main tributaries to inland parcels. The resulting focus area includes a 1,000-foot-wide corridor that covers approximately 4,702 acres, or about 11% of the project area. The evaluation of existing conditions and the potential for identifying suitable habitat restoration sites occurred within the focus area.

The Buffalo River has been a vital part of the City of Buffalo and the western New York region. Although its industrial role has changed greatly, the river is still a vital part of the evolving identity of the city. Restoring ecological health

and vitality to this waterway would help restore the city and region and allow a fuller expression of the potential of this Great Lakes community.

### **The Plan**

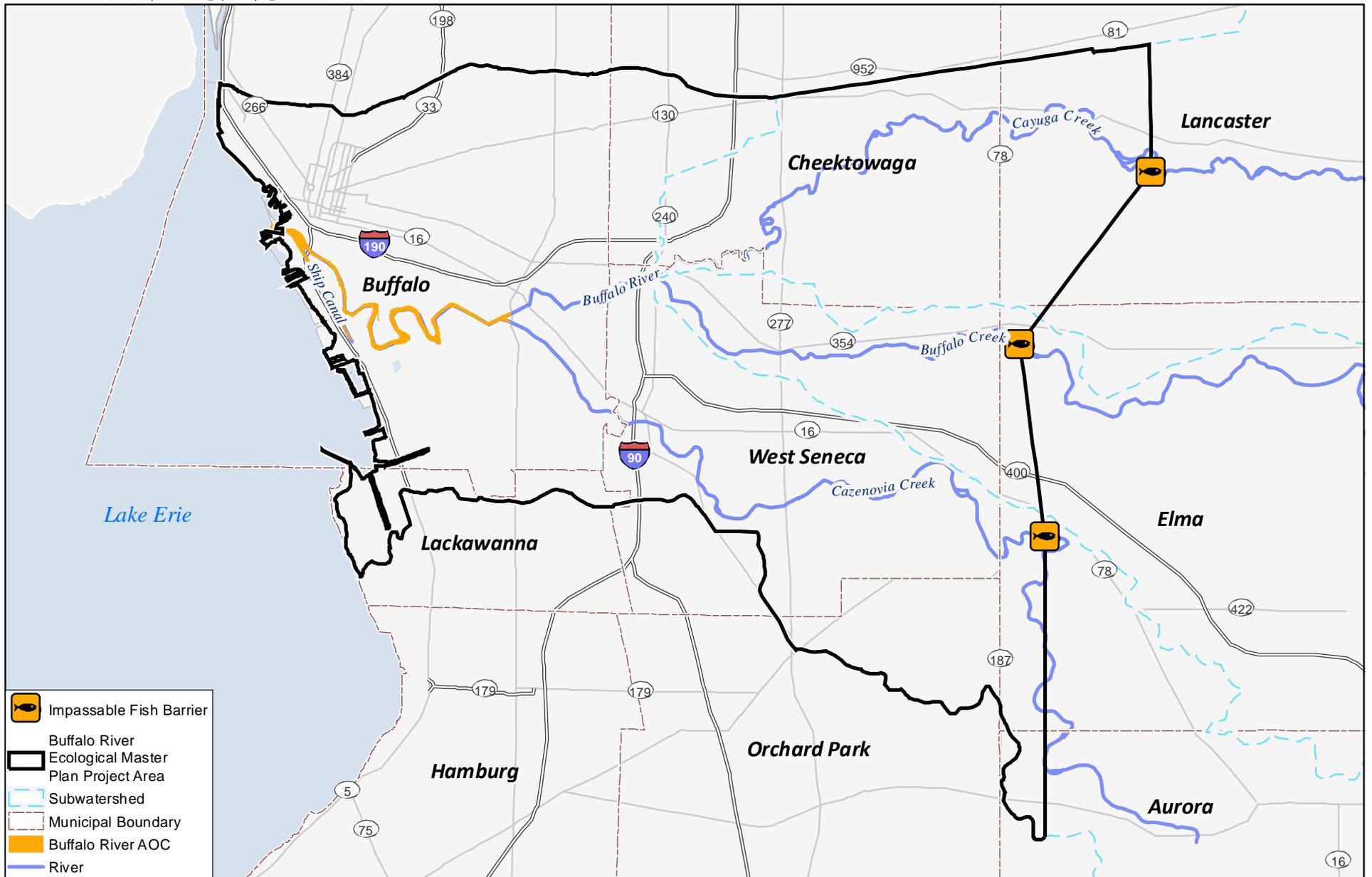
This plan describes 26 site-specific restoration projects. By identifying many locations in the watershed in need of improvement, it also can help guide decisions made within and near the focus area. The plan presents stakeholders with the information they need to facilitate detailed planning, acquire funds, implement habitat restoration, and, ultimately, contribute towards the delisting of habitat-related BUIs. The plan also identifies some areas of relatively high ecological value, which need protection using tools such as environmentally sustainable land development. Future land use planning in the lower Buffalo River watershed can integrate the information provided in this plan to support balance for environmental and community health with long-term economic vitality.

## **1.4 Benefits of Ecological Restoration**

### **Ecological Benefits**

The ecological benefits of restoring natural form and function within impaired water resources and riparian systems are complex and numerous. In general terms, however, measureable improvements of ecological processes and recovery of ecological resources can be achieved through restoration design. Restoration design should strive to create habitat elements that provide biological and physical complexity appropriate to the place being considered for restoration, and create/restore/enhance functionally similar conditions that would exist at healthy, relatively undisturbed ecosystems.

Highly modified or impaired stream systems such as those of the project area require energy dissipation features designed to resist damaging stream flows and redirect flows away from problem areas. Proper structural design of hydraulic features supports the regeneration of native plant communities that stabilize stream banks and floodplains as well as provide improved riparian habitats and wildlife travel corridors. Restoration features in the projects proposed in this ERMP are designed to initiate ecological recovery and re-establish ecological resilience to stream and riparian habitat.



0 1.25 2.5 5 Miles

Figure 1-2 Buffalo River Ecological Restoration Master Plan Project Area

The projects also would restore stream channels and banks within a highly modified system to hydraulic forms that are stable and provide a variety of habitat elements typical of healthy stream ecosystems. The ecological benefits associated with the selected projects are related to improving aquatic and terrestrial habitat, and specifically include:

The projects proposed in this ERMP have been developed to improve ecological functions in biotic communities by restoring native vegetative communities and by stabilizing the physical environment in which they grow.

- Stabilizing the soil and supporting complex biological communities and processes;
- Adding diverse aquatic and riparian habitats;
- Promoting natural food web structure and processes;
- Improving water and soil quality in support of the biotic community;
- Connecting dispersed and fragmented habitat areas and providing pathways for wildlife to move through the landscape; and
- Promoting stable chemical processes and nutrient cycles to maintain equilibrium and supply required elements to biota.

### **Economic Benefits**

The Buffalo River has had a historic role in the development of the economy of the Buffalo region. Improving the environmental quality of this resource would have a positive effect on the region by increasing economic activity, both directly and indirectly. The restored, natural form and function of biotic resources provides a measureable level of resilience to environmental stressors which can be characterized as bio-integrity.

Economic benefits of natural resource recovery are linked directly to ecological health and bio-integrity of aquatic, riparian, and terrestrial habitats.

In addition to possessing ecological values, healthy aquatic and riparian habitats can provide a variety of socio-economic values to communities such as:

- Public access and recreation (parkland, boating, swimming);
- Passive and active wildlife observation (fishing, bird watching);
- Environmental education; and
- Water quality (potable water supply).

Although public access, recreation, and environmental education are not included as specific project elements as proposed in this ERMP, many of the projects present opportunities for these values to be incorporated into detailed project plans (see Photo 1.1-9).

Implementation of the Buffalo River Ecological Master Plan and restoration of the ecological function of the Buffalo River would have the following benefits:

- **Direct expenditure of funds in the regional economy:** Restoration activities would infuse an estimated \$28.9 million into the regional economy, representing a positive short-term economic benefit. Materials and services would be purchased locally to complete ecological restoration projects included in this plan, with the result of increasing regional economic output. The increase in restoration expenditures would have a multiplicative impact on jobs, wages, and regional industrial output.
- **Erosion control and reduced sedimentation of the river:** Implementation of the ERMP would generate a positive economic benefit by reducing or avoiding future dredging costs. The USACE should be contacted to determine who would perform analysis of the economic impacts.



Photo 1.1-9 Restored water resources promotes public use

- **Increased recreational use by residents:** Restoration activities would include environmental improvements that would contribute to sport fishing, bird watching, boating, and other active and passive recreational activities. While

the improvements proposed in this ERMP may not by themselves generate a significant increase in recreational spending, the projects would help improve the overall attractiveness of the area. As the Buffalo River is made more attractive, local residents would be more likely to use the creeks and river for recreation. Similarly, heightened awareness of local natural resources tends to increase community use which has an additive effect for improving the perceptions and practice of stewardship.

- **Increased property values along the Buffalo River corridor:** Improvements in aesthetics, recreational resources, water quality, and flooding and erosion control would have a positive impact on property values.
- **Aesthetic/quality of life improvements:** The improved environmental quality of the river would enhance the quality of life for local residents, knowing that the river habitat is cleaner and supports a greater variety and number of fish and wildlife species. This effect would positively enhance community image.

### **Compatibility of Ecological Restoration with Economic Development**

A basic premise of the ERMP is that it is possible to combine economic growth with environmental health and sustainability. Through interaction with the business and industrial development community and the City of Buffalo, the project team has been made well aware of the need for continued economic development in the project area, especially in the lower Buffalo River and AOC. Industries and local government are planning projects that would re-use former industrial properties. Some properties that are currently unused or under-utilized for economic purposes are slated for a variety of purposes such as expanded rail yards, biofuels processing and materials handling, and other industrial and commercial uses. Where stakeholders have identified such plans, restoration project plans have avoided proposing measures incompatible with future economic uses. An example is the proposed redevelopment of part of the Concrete Central Peninsula for railroad infrastructure, which is discussed in Section 4.2.5.2. Other redevelopment plans in the AOC are also being considered.

Project sponsors should reach out to landowners and other industrial and business stakeholders in order to best accommodate both ecological restoration and economic development.

### **Compatibility of Ecological Restoration with Stormwater and Floodplain Management**

Pollution from stormwater and discharges from combined sewer overflows (CSOs) and sanitary sewer overflows (SSOs) contribute to the Buffalo River BUIs. Stormwater outfall locations are identified by number on the figures for each project in Sections 4.2.1 through 4.2.26. Potential project sponsors should contact the Buffalo Sewer Authority and/or NYSDEC to obtain location information for CSOs and SSOs. Stormwater outfalls discharge runoff from streets and

impervious urban spaces and do not discharge sanitary sewer waste. Combined storm sewers and sanitary sewers receive both street runoff and domestic wastewater. CSOs discharge that combination of stormwater and domestic waste when the sewer capacity is exceeded during heavy storms. The resulting volume of rainwater and sanitary wastewater exceeds the system's capacity and sewage is forced to overflow into area streams and rivers through CSO outfalls. SSOs discharge partially treated or untreated wastewater into surface waters when excess infiltration during wet weather causes sewer flows to exceed the capacity of the treatment system. State and local governments are actively engaged in efforts to reduce pollution from these sources in the Buffalo River watershed.

The proposed projects may offer opportunities to reduce the pollution that enters the Buffalo River and its tributaries. Project sponsors should investigate the potential for incorporating stormwater management components into their proposals. The Western New York (WNY) Stormwater Coalition would be an important group to involve in developing funding proposals and planning future projects. The WNY Stormwater Coalition is currently engaged in a three-year project of mapping and evaluating the stormwater infrastructure for most of the ERMP study area. More information about the WNY Stormwater Coalition, including a map of all outfalls in the ERMP area, is available at:

<http://www2.erie.gov/environment/index.php?q=western-new-york-stormwater-coalition>.

The ERMP survey area represents aquatic habitat (In-Channel and Nearshore, Shoreline) and terrestrial/riparian habitat (Stream Bank and Upland to Inland). Just beyond and adjacent to the areas proposed for restoration are riparian and inland areas that include a variety of natural, industrial, and urban land features. Inland areas offer opportunities to attenuate volume and trap sediments and contaminants in surface runoff. The hydrology, vegetation cover types, and land uses of those areas affect the capacity for regeneration of natural form and function on the ERMP sites. Several of the proposed project sites identified in the ERMP have the potential to help manage stormwater quality. For those sites that have or are near CSOs and SSOs, project sponsors should investigate the feasibility of accommodating discharges from CSOs and SSOs as part of their overall restoration plans. The impacts on water quality from stormwater runoff and sewer overflows can, in some cases, be mitigated by designing capture areas such as created wetlands to capture stormwater and snowmelt before it enters the river or mixes with the sanitary sewer system. Project sponsors should contact the Western New York Stormwater Coalition to discuss these concerns early in the project proposal stage: <http://www2.erie.gov/environment/index.php?q=western-new-york-stormwater-coalition>

All new development and redevelopment within the watershed should incorporate green infrastructure concepts and techniques. Green infrastructure can include measures such as:

- Preservation of undisturbed areas;

- Preservation of buffers;
- Reduction of runoff from impervious surfaces by redirecting to rain gardens or storage tanks for later reuse;
- Reduction of clearing and grading;
- Open space design; and
- Rainwater reuse systems.

Additional information can be found in NYSDEC's 2010 Stormwater Management Design Manual (<http://www.dec.ny.gov/chemical/29072.html>).

The management of floodplains to reduce flood damages should also be considered with habitat restoration projects. Undeveloped natural habitat areas within floodplains can allow flood flows to spread out, thereby reducing flood crest levels, slowing flows, and reducing their destructive force. Managing floodplains for natural habitat instead of development also provides opportunities to improve water quality by allowing sediments and other pollutants to settle out. Additional information on how floodplain management and habitat restoration goals can be combined can be obtained from the Center for Watershed Protection at <http://www.cwp.org/>. The USACE - Buffalo District should also be consulted.

# 2

## Existing Conditions

### 2.1 Surface Water and Water Quality

The project area is located primarily within the Buffalo River watershed, a tributary to Lake Erie near the Niagara River. A small portion of the northwest corner of the project area is located in the Niagara River watershed. Both of these watersheds have been designated as Category I watersheds by the New York Unified Watershed Assessment Program. Category I watersheds are those watersheds in need of restoration which do not currently meet or face imminent threat of not meeting clean water and other natural resources goals (NYSDEC 2011).

Historically, many sources of pollution have been identified in the Buffalo River watershed, including industry, CSOs, SSOs, runoff from agriculture, and failing septic systems in the upper watershed, inactive hazardous waste sites, stormwater runoff from urban and upstream sources, and the re-suspension of historically contaminated sediments (Buffalo Niagara Riverkeeper 2005). Declining industry in the Buffalo River AOC has resulted in fewer direct discharges from industry to the Buffalo River; as such, water quality in the river continues to show improvement.

Water quality classifications are assigned to all major waterbodies and most tributaries in New York State (NYS) based on their ability to meet the standards of the NYS stream classification system. Classifications for the Buffalo River and its three tributaries within the project area are summarized below, along with a brief synopsis of existing water quality:

- The **Buffalo River**, including the entire AOC, is currently listed as Class C. Class C waters are defined as supporting fish propagation and survival, with water quality that shall be suitable for primary and secondary contact recreation (E & E 2008). The Buffalo River is listed on the NYS Priority Waterbodies List as being impaired for fish consumption use. Recreational uses are known to be stressed and aquatic life is suspected of being stressed. Contaminated sediments from CSOs are listed as the source of these use impairments (NYSDEC 2003). The Buffalo River is also listed on the NYS 303(d) List of Impaired Waters under Part 2b which defines waters that are impaired by fish consumption advisories. PCB-contaminated sediments are listed as the primary source of contamination (NYSDEC 2010).

- The majority of **Cayuga Creek** within the project area is classified as Class C; however, the upstream portion of the creek, from approximately 1.5 miles downstream of the fish barrier is classified as Class B. Class B waters are suitable for primary and secondary contact recreation and fishing. The lower Cayuga Creek system and its tributaries are listed on the NYS Priority Waterbodies List as having minor impacts to aquatic life (suspected of being stressed) and fish consumption (possibly stressed). The causes of the impairments are nutrients, silt, and sediment from stream bank erosion, and urban runoff (NYSDEC 2003). Cayuga Creek is not listed on the NYS Section 303(d) List of Impaired Waters.
- **Buffalo Creek** is classified as Class B and is listed on the NYS Priority Watersheds List as having minor impacts to aquatic life (suspected of being stressed). The cause of the impairment is listed as silt and sediment from stream bank erosion, urban runoff, and agriculture. Buffalo Creek is not listed on the NYS Section 303(d) List of Impaired Waters.
- **Cazenovia Creek** is classified as Class C from its confluence with the Buffalo River to approximately 1.3 miles upstream. From this point, the creek is classified as Class B. Cazenovia creek is not listed on the NYS Priority Waterbodies List or NYS Section 303(d) List of Impaired Waters.

### 2.2 Wetlands

Wetlands are some of the world's most diverse ecosystems, providing food and habitat for fish and wildlife, as well as providing multiple values, ranging from water quality improvement to opportunities for educational and recreational activities. The United States Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and NYSDEC freshwater wetland maps were reviewed to describe the community types and acreages of wetlands present within the Buffalo River ERMP project area. According to NWI data, there are 2,434 acres of wetlands within the Buffalo River ERMP project area. Six wetland types (freshwater emergent wetland, freshwater forested/shrub wetland, freshwater pond, other, lake, and riverine) are found within the project area; more than half of the total wetland acreage is comprised of freshwater forested or shrub wetlands. A total of 12 NYS-designated, NYSDEC freshwater wetlands exist within the Buffalo River ERMP project area with a combined area of approximately 1,897 acres. Within the 1,000-foot ERMP focus area within the larger project area, approximately 853 acres of NWI and NYSDEC wetland exist.

### 2.3 Floodplains

Floodplains are typically low-lying areas adjacent to waterbodies that experience occasional or periodic flooding. Floodplain areas are important as they dissipate excess flow, store floodwaters, and minimize potential damage farther downstream. They also provide water quality benefits by reducing erosion and scour that can be caused by high flow velocities and by retaining silt and sediment carried in the water. Floodplains in urbanized areas, like those along the Buffalo

River, are typically disturbed and altered in ways that prevent them from providing natural flood attenuation.

Federal Emergency Management Agency (FEMA) flood insurance mapping for the Buffalo River indicates that there are 4,667 acres of Flood Risk Zone<sup>1</sup> located within the Buffalo River ERMP (FEMA 2010). Concentrating on the 1,000-foot focus area for potential restoration within the Buffalo River ERMP project area, FEMA data indicate that there are 2,617 acres of Special Flood Hazard Area (SFHA)<sup>2</sup> within the 1,000-foot focus area. Of these 2,617 acres, approximately 541 acres of SFHA exists along the 1,000-foot focus area along the Buffalo River, 48 exist along the City Ship Canal, 754 acres are adjacent to Cayuga Creek, 455 acres exist along Buffalo Creek, and 819 acres of SFHA exist along Cazenovia Creek.

## **2.4 Soils**

Soils within the Buffalo River ERMP project area are comprised of five primary types/complexes: Urban Land, Niagara-Canandaigua-Cosad series, Odessa-Schoharie-Rhinebeck series, Darien-Remsen-Angola series, and Blasdell-Farnham-Alton Series. The Natural Resource Conservation Service (NRCS) defines Urban Land as nearly level and well drained to poorly drained soils and disturbed soils on lowland plains. This soil type dominates in the city of Buffalo. The Niagara-Canandaigua-Cosad series is defined as nearly level, deep, somewhat poorly drained to poorly drained, medium textured soils occurring on lowland plains. The Odessa-Schoharie-Rhinebeck series is defined as nearly level and gently sloping, deep, somewhat poorly drained to well drained, medium textured and moderately fine textured soils on lowland plains. NRCS defines the Darien-Remsen-Angola series as nearly level and gently sloping, deep and moderately deep, somewhat poorly drained soils, with medium texture and moderately fine texture, occurring on uplands underlain by alkaline shale bedrock. The Blasdell-Farnham-Alton soil series are nearly level through sloping, deep, moderately well drained to somewhat excessively drained, medium textured soils occurring in valleys and on plains (USDA 1986). Taken as a whole, these soils are moderately to highly erodible. The majority of the soils summarized above have moderate shrink-swell potential, which indicates that damage to plant roots would not be severe or widespread. The majority of the soils series listed above are classified by NRCS as having a good potential for habitat elements for grasses, herbaceous plants, and hardwood trees.

---

<sup>1</sup> Flood Risk Zones within the Buffalo River ERMP project area include Zones A and AE which are both defined as areas subjected to inundation by the one-percent-annual chance flood event.

<sup>2</sup> Special Flood Hazard Area refers to the area where the National Flood Insurance Program's floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies.

## **2.5 Land Use and Land Cover**

### **Land Use**

The 1,000-foot focus area along the Buffalo River is comprised of nine land use categories, with vacant land (196 acres) and industrial (100 acres) making up the two greatest categories of land use. Commercial (76 acres) and public services (72 acres) comprise the next greatest land use categories. Wild, forested, and conservation lands comprise only approximately 30 acres of the focus area.

The 1,000-foot focus area along Cayuga Creek is comprised of eight land use categories, with residential (326 acres) and vacant land (285 acres) making up the two greatest categories of land use. Commercial (204 acres) and community services (136 acres) comprise the next greatest land use categories. Wild, forested, and conservation lands comprise less than 1 acre (0.04 acre) of the 1,000-foot focus area along Cayuga Creek.

The 1,000-foot focus area along Buffalo Creek is comprised of nine land use categories. Of those categories, residential (295 acres) and vacant land (162 acres) make up the two greatest categories of land use. Areas with no data (50 acres) and public services (37 acres) comprise the next greatest land use categories. There are no wild, forested, or conservation lands in the focus area.

The 1,000-foot focus area along Cazenovia Creek is comprised of nine land-use categories, with residential (557 acres) and vacant land (208 acres) making up the two greatest categories of land use. Community services (139 acres) and wild, forested, and conservation lands (113 acres) comprise the next greatest land use categories.

### **Land Cover**

Eleven different land cover types have been identified in the project area, with developed land being the most abundant land cover type, comprising approximately 73% of the project area. The 1,000-foot focus area along the Buffalo River is predominantly comprised of developed land (421 acres), open water (234 acres), and developed open space (105 acres). The 1,000-foot focus area along Cayuga Creek is predominantly comprised of developed lands (398 acres), woody wetlands (243 acres), and deciduous forests (196 acres). The 1,000-foot focus area along Buffalo Creek is predominantly comprised of cultivated crops and pasture/hay (216 acres), deciduous forests (166 acres), and developed lands (161 acres). The 1,000-foot focus area along Cazenovia Creek is predominantly comprised of deciduous forests (502 acres), developed lands (362 acres), and developed open space (191 acres).

In addition to the land use and land cover categories discussed above, brown-fields, areas where redevelopment or reuse may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminate, also exist within the project area. Ten NYSDEC Voluntary Cleanup locations were identi-

fied within the greater project area, and 22 EPA-designated brownfields were identified within the project area (New York State GIS Clearing House 2011).

## **2.6 Land Use Plans**

The project area is located within the boundaries of Erie County and is also partially contained within the Towns of Cheektowaga, Lancaster, West Seneca, Elma, Aurora, and Orchard Park and within the cities of Buffalo and Lackawanna. There are multiple municipality-based planning documents, primarily in the form of comprehensive plans and master plans. At the county level, the Erie-Niagara Framework of Regional Growth report sets forth principles for the region's growth, development and conservation, inclusive of encouragement of conservation and protection of the region's most sensitive natural systems, which include rivers, creeks, streams, wetlands, and floodways (Erie and Niagara Counties 2006). The Erie County Parks System Master Plan (Erie County 2002) provides a Waterfront Development Strategy that identifies places along significant waterways in the county, including the Buffalo River, that are currently under utilized. The Master Plan also focuses on preservation and enhancement of the environmental along the Buffalo River, including improvements in both water quality and habitat restoration (Erie County 2002).

At the local level, a number of comprehensive plans and their updates exist for the eight municipalities within the project area. These plans all include goals which focus on the protection of environmental features, such as stream corridors, and preservation of natural resources and habitats. The Town of Cheektowaga is currently updating the Comprehensive Plan, which will include a focus on improvement of "significant stream corridors" (Town of Cheektowaga n.d.). The Town of Lancaster has established a regional comprehensive plan with both the villages of Lancaster and Depew that seeks to protect creeks and streams and references stream restoration (Town of Lancaster 2000). A goal in the Town of West Seneca Comprehensive Plan (2006) is to protect environmental features and open space, including major creeks and associated floodplains. The Plan also provides suggestions including the creation of a stream corridor/floodplain overlay and permanent protection for some stream corridors. The Town of West Seneca Municipal Open Space and Greenway Protection Report (Town of West Seneca 1999) outlines Special Focus Areas in the town which were chosen as exceptional opportunities for protecting municipal open space and greenbelts and include creek corridors and floodplains. The towns of Aurora and Elma are included in a Regional Comprehensive Plan (Towns of Aurora, Elma, Holland and Wales and Village of East Aurora 2003). This plan sets a regional goal to protect and preserve natural resources. The Town of Orchard Park's Comprehensive Plan Update (2007) has a goal to protect significant environmental resources, including the protection of wildlife habitats, wetlands, and stream corridors. The City of Buffalo's Comprehensive Plan strives to safeguard both the quality and quantity of Great Lakes water and the health of the whole ecosystem. Lastly, the City of Lackawanna's Comprehensive Plan has goals and policies set for the future of the city including the protection of natural resources.

## 2.7 Fish Species

A summary of fish habitat and available fish survey data for the Buffalo River and its tributaries is provided below:

- **Buffalo River.** The river's fish habitat is characterized by an over-widened, and over-deepened channel primarily caused by the maintenance of the federal navigational channel which has resulted in two distinctly different habitat types. The federal navigational channel is maintained to just downstream of the confluence of Cazenovia Creek; upstream of this section, the river has a more natural bed and bank and a pool/riffle regime where it forks to form Buffalo and Cayuga creeks. Fish surveys conducted in 2003 and 2004 included an analysis for deformities, eroded fins, lesions, and tumors (DELTs), the frequency of occurrence of which are considered to be indicators of the health and condition of the fish community. In minimally or non-impacted sites, these abnormalities occur infrequently or are absent altogether. For the AOC as a whole, DELT scores averaged 37%, which is much higher than one would expect for a moderately impacted (2% to 5%) river or a river not impacted (less than 2%; Irvine et al. 2005). In addition to an assessment of DELTs, Irvine et al. (2005) used the Index of Biotic Integrity (IBI) to rate the health of the fish community at the 10 potential restoration sites they investigated. Based on the IBI, fish community was rated as poor to very poor at the 10 sites sampled in 2003/2004 (Irvine et al. 2005). An assessment of total species collected at each site indicated that diversity and abundance of juvenile and adult species were similar across all sampling locations in 2003/2004, ranging from 15 to 20 species per site (Irvine et al. 2005).
- **Cayuga Creek.** Fish habitat in the creek is characterized by a natural stream channel up to the Como Park Lake Dam; the creek meanders and has a riffle/run regime throughout this stretch and appears to be the least manipulated of the three Buffalo River tributaries. Limited sampling data exists for Cayuga Creek; sampling data from 1993 which combines Cayuga Creek with Buffalo and Cazenovia Creeks indicates that 34 species of fish were found, ranging from brown bullhead (*Ameiurus nebulosus*), smallmouth bass (*Micropterus dolomieu*), stonecat (*Noturus flavus*), to white sucker (*Catostomus commersoni*).
- **Buffalo Creek.** Fish habitat in the creek is characterized by a predominantly natural channel with a series of small low head dams. The creek is dominated by a riffle/run regime from the mouth to Blossom Road falls. No published fish surveys exist specifically for Buffalo creek. As indicated above for Cayuga Creek, 34 species of fish were found in a 1993 sampling effort, which combined Cayuga Creek, Buffalo Creek, and Cazenovia Creek.
- **Cazenovia Creek.** Fish habitat in the creek is characterized by a predominantly natural channel above the Cazenovia Park Falls. Below the falls to the confluence with the Buffalo River, much of the creek is straightened and lined by concrete and sheet pile which provides minimal fish habitat. The channel

is more natural and meandering for the remainder all the way to the Northrup Road Falls. Upstream of the park, the creek is dominated by a riffle/run regime. From Cazenovia Park to the mouth, the creek is predominantly a glide from the mouth to Blossom Road falls. No published fish surveys exist specifically for Cazenovia Creek. As indicated above for Cayuga and Buffalo Creeks 34 species of fish were found in a 1993 sampling effort, which combined Cayuga Creek, Buffalo Creek, and Cazenovia Creek.

## **2.8 Benthos**

The most recent published report available on benthos is the NYSDEC February 2005 Niagara River-Lake Erie Basin Rotating Basin Studies (RIBS) Report for sampling which occurred during 2000 and 2001 (NYSDEC 2005). This report included sampling results within the Buffalo River (at Ohio Street), Cayuga Creek (at Union Road), Buffalo Creek (Union Road), and Cazenovia Creek (Cazenovia Parkway). The data included in this report indicate that the macroinvertebrate communities in the Buffalo River, Cayuga Creek, and Cazenovia Creek showed slightly impacted conditions. The source of impacts in the Buffalo River is considered to be from municipal/industrial inputs, non-point source nutrient enrichment and siltation for Cayuga Creek, and non-point source nutrient enrichment for Cazenovia Creek (NYSDEC 2005). The macroinvertebrate data for Buffalo Creek indicated both non-impacted and slightly impacted conditions due to siltation.

In addition to the RIBS data, Irvine et al. (2005) surveyed the benthic community near the shoreline at 10 potential habitat restoration sites and six mid-channel locations within the Buffalo River AOC. The findings of their survey indicate that the Buffalo River AOC continues to be dominated by a low diversity benthic community that is broadly tolerant of pollution and environmental degradation.

## **2.9 Wildlife**

Wildlife in the project area includes a variety of birds, mammals, and aquatic species. Bird studies within the project area conducted by NYSDEC in 1991 (NYSDEC 1993) and the Buffalo Ornithological Society (BOS) in 2005-2006 (Morris and Hamilton 2007) provide much of the data on bird species. NYSDEC data indicate that 35 bird species were detected between the junction of the Buffalo River with Cazenovia Creek and the first impassable barrier (NYSDEC 1993). The BOS Survey reported 77 species in 2005 and 73 in 2006 for a total of 83 bird species (Morris and Hamilton 2007). Both studies indicate a wide variety of habitat types present as shown by the diverse assemblages of birds, ranging from open water species to forest interior species and grassland species.

The most current data regarding mammals within the project area comes from a survey that focused on the Buffalo River AOC and upstream tributaries (Cazenovia, Buffalo, and Cayuga creeks). This report detected 12 species, the majority of which were adapted to urban areas, such as eastern chipmunk, grey squirrel, and woodchuck (NYSDEC 1993). The NYSDEC survey also indicated the presence of two amphibian (leopard frog and spring peeper) and two reptile (painted turtle

and common garter snake) species, suggesting a low diversity of these species (NYSDEC 1993). Several other amphibian and reptile species would also be expected to be found in the project area, including the green frog, bull frog, and common snapping turtle.

### **2.10 Invasive Species**

Invasive species is a term used to describe non-native plant and wildlife species that can harm the environment or human health. Invasive species are commonly associated with a degraded ecological condition because invasive species tend to exploit niches in ecosystems, while frequently lacking natural predation. This process often results in severe population growth among invasives, subsequently reducing biodiversity among native wildlife. There are numerous invasive species inhabiting the landscape of the Buffalo River AOC and larger watershed. Common aquatic invasive wildlife species include round goby (*Neogobius melanostomus*), carp (*Hypophthalmichthys* spp.), and zebra mussels (*Dreissena polymorpha*). Common aquatic invasive plant species include Eurasian watermilfoil (*Myriophyllum spicatum*), water chestnut (*Trapa natans*), and European frogbit (*Hydrocharis morsus-ranae*). Invasive terrestrial plant species include common reed (*Phragmites australis*), Japanese knotweed (*Polygonum cuspidatum*), and Tree of Heaven (*Ailanthus altissima*). Invasive species can be a problem for habitat restoration, especially in areas where such species are currently severely degrading locations along the Buffalo River both ecologically and in terms of aesthetics and recreation.

### **2.11 Threatened and Endangered Species**

Federally listed threatened and endangered (T&E) plant and animal species are protected by the Endangered Species Act of 1973, which is administered by USFWS. State-listed T&E plant and animal species are protected by the New York State Environmental Conservation Law, Article 9, and Article 11, which are administered by NYSDEC. In reviewing the reports and investigations that have been completed within the Buffalo River AOC, no statements, or observations of threatened or endangered species were found. A review of the *Federally Listed Endangered and Threatened Species and Candidate Species in New York* indicated that no federally listed endangered or threatened species or candidate species are known to occur in Erie County (USFWS Northeast 2011). NYSDEC indicated that there are 13 historic locations of state-listed plant species and two locations of state-listed insect species within the Buffalo River AOC and that these are likely historic locations only, since these species may no longer occur in the AOC (NYSDEC 2008). Correspondence from the New York State Natural Heritage Program (NHP) identified 15 rare species which are known to currently persist in the project area, including four birds, one species of crawfish, five species of fish, and five species freshwater mussels. Five of these rare species are state-listed threatened or endangered; none of these species are federally listed.

### **2.12 Cultural Resources**

The Buffalo ERMP project area covers an area that was a part of what is known historically as the Niagara Frontier, a land rich in cultural traditions and history,

which dates back to the Paleo-Indian Period (10500-8000 B.C.). Present day Native Americans, including, but not limited to, the Seneca Nation of New York, the Tonawanda Band of Seneca Indians of New York and the Tuscarora Nation of New York, have an ongoing and dynamic relationship with the Buffalo River and surrounding areas.

While the Buffalo Creek reservation was intact, what is now the project area was a center of Haudenosaunee culture and important structures and activities occurred throughout. Although most of the tribes' cultural history, as documented, makes it difficult to pinpoint places on a map, a particularly important site was the Seneca Council House, which was located north of the present day intersection of Archer and Littell avenues. That location is just across the Buffalo River from the Seneca Bluffs restoration site. In a September 2010 meeting, representatives of the Tonawanda Band of Senecas and the Tuscarora Nation shared their concerns and interests with the project team. They explained that native people view the river and its natural resources as gifts for humans to use, whereas non-native people view the restoration process as a way of preserving everything that is natural. Native Americans would say that identifying the main goals of restoration is easy: we should have fish that we can eat and water we can drink.

A review of NYS archaeological and architectural site files at the New York State Office of Parks, Recreation, and Historic Preservation (OPRHP) was not conducted due to the broad scale of the project and the extensive geography of the project area. Many hundreds of archaeological sites and architectural resources are known in the Niagara Frontier and almost entire surface of the Buffalo River Ecological Restoration Master Plan project area is flagged as archeologically sensitive by the SPHINX GIS (OPRHP) system. These sites may include Paleo Indian stray finds, Archaic period camps, historic farmsteads, and industrial archaeological sites.

### **2.13 Socioeconomics**

The project area is located within Erie County, the towns of Cheektowaga, Lancaster, West Seneca, Elma, Aurora, and Orchard Park and the cities of Buffalo and Lackawanna. This area of western New York is part of the larger Niagara-Buffalo Metropolitan Statistical Area (MSA). In 2000, the Niagara-Buffalo MSA had a total population of 1,170,111 and a population density of 746.6 people per square mile of land area. The 2010 U.S. Census data indicate that as of July 1, 2008, Erie County was estimated to have a population of 909,845 and the eight towns and cities comprising the remainder of the MSA had a combined population of 513,737 (U.S. Census 2010).

In 2000, the Niagara-Buffalo MSA had a median household income of \$38,488. The MSA supported 511,583 housing units and had a housing density of 623.4 units per square mile of land area. The median housing value for all owner-occupied housing units in 2000 was \$86,900 in the Niagara-Buffalo MSA. Erie County had a median household income of \$38,657. Erie County supported 415,868 housing units and had a housing density of 398.3 units per square mile of

land area (U.S. Census 2000). The median housing value for all owner-occupied housing units in Erie County was \$88,200, slightly above the Niagara-Buffalo MSA. In 2000, median household income for the eight towns and cities comprising the remainder of the MSA ranged from \$24,536 (City of Buffalo) to \$59,762 (Town of Orchard Park). Housing densities ranged from 124.50 units per square acre of land area (Town of Elma) to 3,584.40 units per square acre of land area (City of Buffalo), and the median housing value for all owner-occupied housing units ranged from \$138,100 (Town of Orchard Park) to \$58,800 (City of Buffalo; U.S. Census 2000). In Erie County and the city of Buffalo, the majority of employment is associated with education, health, social services, and manufacturing, followed by retail trade (E & E 2008).

# 3

## The ERMP Development Process

### 3.1 Integration of Existing Information

The project team reviewed over 70 sources that provide information on the ERMP process and data and information on the project area. The Bibliography (Section 6) provides a partial listing of the sources utilized. Mapping and information was reviewed on wetlands and waterbodies; surface water classification; water quality; water body impairments, such as combined sewer overflows, stormwater outfalls, and sanitary sewer overflows; flood control programs; floodplains; soils; land use planning; historic and cultural overview; land use; and fish and wildlife species and habitats.

The project team reviewed information from a variety of resources regarding the physical, ecological, and environmental conditions within the ERMP project area.

The project team also solicited input from stakeholders to obtain data and information pertinent to habitat restoration in the project areas. Stakeholder input included identified actions planned or taken by federal, state and local agencies, non-profit groups, and private entities to address habitat restoration needs and economic development concerns.

### 3.2 Stakeholder Consultation

The Buffalo River ERMP is essentially a tool developed with stakeholders, for stakeholders, that may be used to plan, design, and obtain resources to implement habitat restoration efforts. As such, project stakeholders have helped to shape the ERMP vision into reality. Development of this document has been funded by the GLNPO and has been a collaborative effort between regional stakeholders (including businesses, organizations, agencies, municipalities and residents), GLNPO, and E & E. The Tonawanda Band of Senecas and representatives from Tuscarora Environment Program were also consulted during the development of the ERMP.

Local representatives and residents provided invaluable input on:

- potential restoration opportunities and constraints within the lower Buffalo River watershed;
- restoration priorities; and
- restoration sites and projects.

At the start of the project, the project team developed a preliminary stakeholder list comprising groups, such as local, state, and federal agencies and interest groups. The team contacted key stakeholders to obtain additional stakeholder

names, and met representatives from the Buffalo Niagara Riverkeeper and the NYSDEC, to support the development of a regional stakeholder directory. Following these meetings, the broad list was refined to approximately 100 stakeholders who were thought to be the most likely to be actively involved and interested in contributing to the ERMP process. Specific coordination early in the project included telephone calls to stakeholders to inform them of the project kickoff meeting, followed by an invitational mailing. Additionally, a project-specific Web site with a “list serv” feature was established to support the dissemination of project news and accomplishments, and to provide a vehicle for posting documents. A list serv was developed and an invitational mailing was distributed to stakeholders via email. The stakeholder list and list serv were updated over the course of the project.

Appendix C lists project stakeholders. Table C-1 lists the stakeholders that attended each meeting held by the Project Staff.

#### **Initial Stakeholder Consultation Meeting**

A project "kickoff" meeting took place on June 24, 2010, to introduce the project and solicit input on restoration opportunities and challenges. Prior to the meeting, the project team developed a PowerPoint presentation, draft mapping, and a preliminary list of references. Large display boards were developed to describe project goals and schedule, define the project area, and share Web site information. The team also designed a large group exercise to engage meeting participants and record their ideas and concerns.

The meeting was held at the Millennium Hotel in Cheektowaga, New York, a location that is central and accessible to many project stakeholders. The meeting was attended by approximately 30 stakeholders representing a wide range of regional interests. The project Team opened the meeting with a 45-minute presentation with a question and answer period. The presentation described the project goals and draft mission statement, schedule, and study area. Additionally, the presentation included an overview of project activities completed to date (desktop review and references), and remaining work (additional desktop review, field assessments and evaluations of restoration areas). Following the presentation, the 30 participants were asked to break into smaller, facilitated discussion groups. Each group selected a note-taker and a spokesperson.

Through active participation in the initial stakeholder consultation meeting, stakeholders aided in refining the ERMP mission statement, identified opportunities and challenges related to ecological restoration within the project area, and provided locations of potential restoration sites on maps.

Stakeholders spent 15 minutes working individually to answer the following questions:

1. How would you revise the draft mission statement?

### 3 The ERMP Development Process

2. Keeping in mind the project goals, please list two examples of what you consider to be the most promising opportunities/biggest constraints for restoration of the Buffalo River and its primary tributaries.
3. Using your local knowledge, which site(s), species or habitat(s) should be considered during development of the ERMP?
4. Should we add any studies or references to our preliminary list of project references?
5. Are there any stakeholder groups/individuals not at this meeting who should be added to our outreach list?

Upon completing the questionnaire, stakeholders spent an hour discussing their responses, documenting key points, and providing feedback. Stakeholders also reviewed oversize maps of the proposed focus area and candidate restoration sites that had been previously identified, and provided additional sites for consideration.

During the initial stakeholder consultation meeting, meeting participants reviewed aerial mapping of the ERMP focus area and identified 13 additional sites for consideration as possible habitat restoration projects.

**Opportunities and Constraints.** Stakeholder feedback was grouped into the following main categories:

- Habitat Restoration/Protection/Enhancement
- Education/Awareness
- Human Use/Future Enjoyment
- Stakeholder Collaboration
- Pollution Control
- Precedent for other AOCs
- Funding
- Outside Influences/Future Threats
- Project Support/Landowner Consent

Table 3-1 shows specific opportunities and constraints discussed by stakeholders.

**Table 3-1 Stakeholder Meeting No. 1 Summary: Opportunities and Constraints, by Category**

Opportunities
<b>Habitat Restoration/Protection/ Enhancement</b>
Could increase extent of forest and herbaceous riparian buffers along entire corridor
Softening of hard armoring in the lower river
Protection may be more important than restoration
Re-establish traditional species in the corridor, such as American basswood
Preservation opportunities abound along Cayuga, Buffalo, and Cazenovia creeks. Much non-active farmland remains, mostly under private ownership

**Table 3-1 Stakeholder Meeting No. 1 Summary: Opportunities and Constraints, by Category**

Reduction in heavy industry adjacent to the river
Identify high priority segments in ERMP both private and public
Combine green development with habitat
<b>Education/Awareness</b>
Teach stewards to protect and restore this asset in order to minimize the future need for maintenance
The opportunity exists to conduct tree and bird inventories in the town of West Seneca
The opportunity exists to conduct environmental education programs for adults and children
There is an opportunity to increase community interest to use Buffalo River as an ecological asset and destination
<b>Human Use/Future Enjoyment</b>
We need to think about future generations
There is an opportunity for improved boating program(s) “on the water,” especially if tied to history of watershed and cultural uses
Potential for reuse of historic grain elevators
<b>Stakeholder Collaboration</b>
Stakeholder collaboration is needed for environmentally responsible and balanced redevelopment
There is a collective need to review and update local land use, comprehensive plans, and zoning regulations to confirm that planning and development are environmentally sensitive, culturally and historically informed
Need to recognize the native people’s historical connection to the land
There is an opportunity to incorporate cultural values and recreate a Seneca cultural presence (Council House restoration)
Expanded focus areas will require a high level of input and support from municipality officials to be effective and successful
There is good synergy through number of stakeholders working together (angling community, city groups, government agencies)
<b>Pollution Control</b>
People eat the fish that they catch; there is an opportunity and a need to control pollution
There is a reduction in heavy industry adjacent to the river, making restoration more feasible
<b>Establish Precedent for Other AOCs</b>
Biggest opportunity for significant improvements is within the AOC
Do a really good job of identifying what is really out there already
All agreed it was great to see focus expanded beyond the AOC
Need to consider watershed, not just AOC (e.g., bacteria from CSOs/other sources is an upstream issue too)
<b>Funding</b>
Funding IS available!
Align specific projects with funding sources and provide preliminary design
Good opportunity to get funding for projects outside the “AOC Spotlight”
<b>Constraints</b>
<b>Outside Influences/Future Threats</b>
Success will depend on “ownership” moving forward; and future maintenance/monitoring
Home rule can pose challenges to development, restoration, and a comprehensive vision

**Table 3-1 Stakeholder Meeting No. 1 Summary: Opportunities and Constraints, by Category**

Currently there are limited opportunities for people to physically access or connect with this resource
<b>Education/Awareness</b>
If source problems are not truly addressed, sustainability of restoration and enhancement efforts will be difficult
Individual projects should be looked at in conjunction with one another, not just in isolation
<b>Project Support/Landowner Consent</b>
Need fund for land acquisition and willing and informed stewards
Property ownership and fragmentation
Remaining creek corridors (undeveloped land) are under severe development pressures aided by our (Town of West Seneca's) weak zoning laws
Land owner engagement and approval
Need to get local officials and planners on-board
<b>Stakeholder Collaboration</b>
Stakeholders need to be more informed about how to manage riparian areas successfully
Currently there appears to be poor and uncoordinated land use vision and regulation
Revision of current zoning codes and practices is difficult as change seems to be driven by political and social considerations
May be challenging to engage municipal support for approval of projects
Difficult to coordinate planning efforts
<b>Habitat/Restoration/Protection</b>
No guidelines for habitat development
Invasive species
Unresolved storm sewer and contaminated sediment
CSOs and SSOs (West Seneca consent decrease)
More constraints in the river as opposed to upstream
Remediation that needs to occur prior to habitat projects
Much, but not all, of the creek corridors in the town of West Seneca have been developed, resulting in impaired water quality in the West Seneca Creek system
Aging infrastructure – overburdened sewer system; results in CSOs and SSOs. West Seneca Sewer District No. 13 is currently under a Consent Order for NYSDEC
CSO/septic bacteria create low dissolved oxygen; additively create impaired water quality and aquatic system
Defined goals are too limiting and need to extend beyond habitat and water quality BUIs to include improvements in public access to waterways
CSOs will continue to affect water quality until an effective Buffalo Sewer Authority – Long-Term Control Plan is actively in place
<b>Funding</b>
Need fund for land acquisition and willing and informed steward
Not habitat friendly land use and funding opportunities
Diminished Tax Base – the Town of West Seneca does not have the resources to deal with these problems
Time
Funding for implementation

**Table 3-1 Stakeholder Meeting No. 1 Summary: Opportunities and Constraints, by Category**

Securing funds. The GLRI has funding but current state budget crisis may affect local and state funding
---

The comments on opportunities included observations that there are substantial opportunities to restore ecological resources such as riparian forests and those opportunities exist along the tributaries of the Buffalo River as well as in the AOC. There is a need for continued collaboration among groups and especially by government officials. Educational opportunities were noted, both to use the River and Creeks as educational resources and also to educate citizens and officials about the need to properly manage the resource.

On the constraints side of the equation, stakeholders noted several issues that must be dealt with. The need for government officials and agencies as well as private landowners to be educated about managing the resource and to support restoration activities. Local planning and zoning were identified as having a role in protecting and improving the resource. Other constraints identified were the numerous CSOs and SSOs, pressure for development of land in the focus area, the shortage of financial resources at the local level, and the lack of access to the water by the public.

Following the meeting, the project team reviewed stakeholder feedback on opportunities and constraints, candidate restoration sites, revisions to the mission statement, and questionnaire responses. The project team revised the mission statement and solicited input from stakeholders via list serv. Using stakeholder feedback from the June meeting and email responses, the mission statement was revised to:

*To identify, prioritize, and facilitate opportunities to restore, protect and enhance habitat within the Buffalo River Habitat Corridor and its tributaries for a healthy and sustainable ecosystem that will benefit habitat, wildlife, corridor communities, and future generations.*

### **Small Group Stakeholder Meetings (Summer/Fall 2010)**

As a follow-up to the initial meeting with stakeholders, small group meetings were convened with a variety of groups to gain additional input from a broader spectrum of regional stakeholders. Information gained was used to identify additional candidate restoration sites and to further understand how various groups thought about habitat restoration planning within the focus area. Meetings were held with representatives from local municipalities, Native American Nations, local interest groups, and business owners with vested interests in the restoration and development along the Buffalo River. Specifically, meetings were held with the following groups:

- Tonawanda Band of Senecas;

- Tuscarora Environment Program;
- Town of Cheektowaga;
- Town of West Seneca;
- Town of Lancaster;
- Erie County Department of Environment and Planning;
- City of Buffalo;
- Buffalo Urban Development Corporation;
- Buffalo Green Energy Corridor; and
- Local businesses adjacent to the Buffalo River.

In many of the meetings, stakeholders asked how sites would be prioritized and how the project boundary was established. Some participants noted that an argument could be made for large-scale restoration of the whole watershed, rather than focusing on smaller sites, considering that there are larger issues that need to be addressed (e.g., CSOs, SSOs, and associated water quality issues). At each meeting, participants helped to identify local priorities, planned development and restoration needs. They recommended specific sites and helped to provide further information about developable projects.

#### **Key Points Obtained from Small Group Meetings with Stakeholders**

- Restoration projects identified in the ERMP should foster connections between the community and the river resources;
- Potential restoration sites should be ranked based on their geographic location;
- Identified restoration projects not included in the full project descriptions should still be listed or shown in the ERMP; and
- Identified restoration projects should be compatible with ongoing or planned development projects.

#### **Comments Received on Draft ERMP and Final Stakeholder Meeting (May 2011)**

The Draft ERMP was made available to stakeholders on the Project Website on April 13, 2011. At that time, stakeholders were notified by listserv email messages of the availability of the document and were invited to comment on it. Stakeholders were also invited to a meeting held on May 9, 2011, to discuss and comment on the Draft ERMP. Stakeholders were allowed several days after the meeting to provide any additional comments. Comments received on the Draft ERMP included:

- Discuss how ecological restoration projects might help municipalities address stormwater and floodplain management concerns, including the use of “green infrastructure” techniques;

- Discuss how ecological restoration projects would be linked with delisting BUIs;
- Address the limited resources available to potential project sponsors to develop proposals and manage projects;
- Discuss the need for project sponsors to plan for the long-term maintenance costs required to keep restoration projects functioning as intended;
- Discuss how habitat restoration can be compatible with retaining active agricultural land use within their boundaries.
- Discuss how potential project sponsors can obtain the support of landowners and the local governments for implementing projects.

The Final ERMP addresses these comments in appropriate sections of the document.

### 3.3 Identification of Reference Areas

When planning and implementing ecological restoration, it is common practice to identify what are termed reference areas or reference sites. Generally, a reference site contains relatively undisturbed habitat of the type desired by a particular habitat restoration project. The types of biotic communities found at the reference sites are those targeted for establishment at the restoration site. The reference site may provide physical, chemical, and/or biological data that can be compared to the restoration site to evaluate restoration success.

According to the Society for Ecological Restoration (SER), “A reference ecosystem or reference serves as a model for planning a restoration project, and later for its evaluation. In its simplest form, the reference is an actual site, its written description, or both.” Because natural systems can develop in multiple directions given the many variables that can impact development of restored areas, SER goes on to say that:

“... a simple reference inadequately expresses the constellation of potential states and the historic range of variation expressed by the restored ecosystem. Therefore, a reference is best assembled from multiple reference sites and, if necessary, other sources. This composite description gives a more realistic basis for restoration planning.

Sources of information that can be used in describing the reference include:

- ecological descriptions, species lists and maps of the project site prior to damage;

- historical and recent aerial and ground-level photographs;
- remnants of the site to be restored, indicating previous physical conditions and biota;
- ecological descriptions and species lists of similar intact ecosystems;
- herbarium and museum specimens;
- historical accounts and oral histories by persons familiar with the project site prior to damage.”

In the case of the Buffalo River, its tributaries, and similar streams in the eastern Lake Erie region, there are very few, if any, intact stream ecosystems to be found. Drastically modified channels, stream banks, riparian areas, floodplains, and vegetative communities are the norm and, therefore, often times act as the present day reference. Flood control projects and development in riparian areas have altered reaches using combinations of bank armoring and channel alteration in the form of sheet piling, riprap revetments, berms, channelization (straightening), grade control structures -- to name a few. Floodplain and off-channel wetland complexes have been modified and/or disconnected from main channels and tributaries, thereby increasing flow and velocity.

There are, however, some areas that demonstrate hydraulic and ecological function and have helped to define restoration features within the watershed. Existing conditions associated with soils, hydrology, and spatial or land use constraints often dictate restoration or enhancement options. For example, compared to active industrial sites, some vacant or agricultural parcels can be more attractive candidates because of size, native soil and potential to restore preexisting hydrology. Existing conditions will determine options and potential for success in regeneration of habitat form and function.

Rather than develop a process for identifying more or less undisturbed reference sites outside of the project area, the field assessment effort was used to identify features within the lower Buffalo River watershed that exhibited some degree of intact ecological function and habitat values that could be mimicked through the design and implementation of restoration projects. There are some areas that contain hydraulic or habitat features within the focus area that provide ecological and environmental services, even within the built and vastly modified landscape. Examples of such areas include:

- Water willow – gravel bar complexes located in Cazenovia Creek where the stream flows through Cazenovia Park, and in upper reaches near Ridge Road;
- Rock riffle complex in Cazenovia Park;

- Rock riffle complex Cayuga Creek at LA-7 Wetland site in Cheektowaga;
- Lower terrace above stream bank acting as floodplain along Buffalo Creek in West Seneca behind compost facility;
- Active backwater channel and lower terrace floodplain between the riverine island along left descending bank upstream end of Seneca Bluffs site;
- Active lower terrace upstream of natural bluff feature along LDB at Seneca Bluffs;
- Point Bar formation below natural bluff feature at Seneca Bluffs that is aggrading and supporting shrub vegetation providing roughness and sediment capture; and
- Expansive floodplain along LDB at West Seneca Developmental Center site despite bank failure.

If a reference system or reference reach is linked to restoration goals and objectives, designers have to answer the question: “What are the restoration targets or what is the desired future condition or habitat type?” Consequently, project sponsors can use these locations to support the design of in-channel/nearshore, shoreline, and inland and upland features. Additionally, native vegetation communities may be designed and regenerated successfully on sites with appropriate “reference” soils and hydrology.

### **3.4 Identification and Evaluation of Restoration Sites**

As indicated in Section 1, a number of reports and studies have been completed that identify locations or broader areas that could be considered to be suitable candidates for ecological restoration. The review of those reports resulted in a list of 60 candidate sites that ranged in location from Lake Erie to the upper extent of the project area (see Figure 3-1). Through active participation at the first stakeholder consultation meeting, stakeholders mapped 13 additional candidate sites, creating a total of 73 sites for consideration in the ERMP process (see Figure 3-2).

In order to direct efforts to the sites with the greatest need for restoration and likelihood of making substantial contributions upon being restored, the project team developed a site screening process that incorporated successive levels of data and evaluation. Those sites initially identified as candidates but subsequently not included in the ERMP for conceptual project development may still be viable for ecological restoration or other development, such as river access. For the purposes of this ERMP, they were determined to have limitations related to the overall need for habitat restoration, potential impact on BUI delisting, feasibility of implementation, or a combination of those factors. A complete list of the 73 candidate sites identified through researching published reports and stakeholder input is presented in Appendix D (see Table D-1), along with a map (see Figure D-1) showing their approximate locations.

First, all candidate sites were screened based upon whether they fell within the 1,000-foot wide focus area (as described in Section 1.3). It was determined that those sites not in the focus area exhibited less direct connection to the river and creeks and, therefore, moderately reduced influence on riverine water quality and habitat function. Next, those sites that are known to require remediation of contaminants were taken off the candidate list since remediation activities would be required prior to ecological restoration. In those cases, restoration planning, design, and implementation may become part of the remedial process.

Sites that were not selected for further consideration for restoration planning were already part of existing projects or are planned to be restored in the near future under other projects. The screening was accomplished with use of GIS data and maps, on-line mapping tools, and aerial images, supplemented with personal knowledge of several of the sites. This stage of evaluation produced a list of 48 sites.

A second level of screening was conducted to determine which of the 48 sites appeared to exhibit enough restoration potential to warrant detailed assessment in the field. Sites were evaluated based on criteria including:

- Compatibility with restoration of existing land use;
- Connection to adjacent areas of quality habitat;
- Size (less than 1 acre was less desirable);
- Floodplain area present in addition to shoreline; and
- Presence of wetland or hydric soil.

Sites that scored well against these criteria were selected for evaluation in the field. This second round of evaluation resulted in 37 sites, some of which included long reaches of creek and associated upland areas.

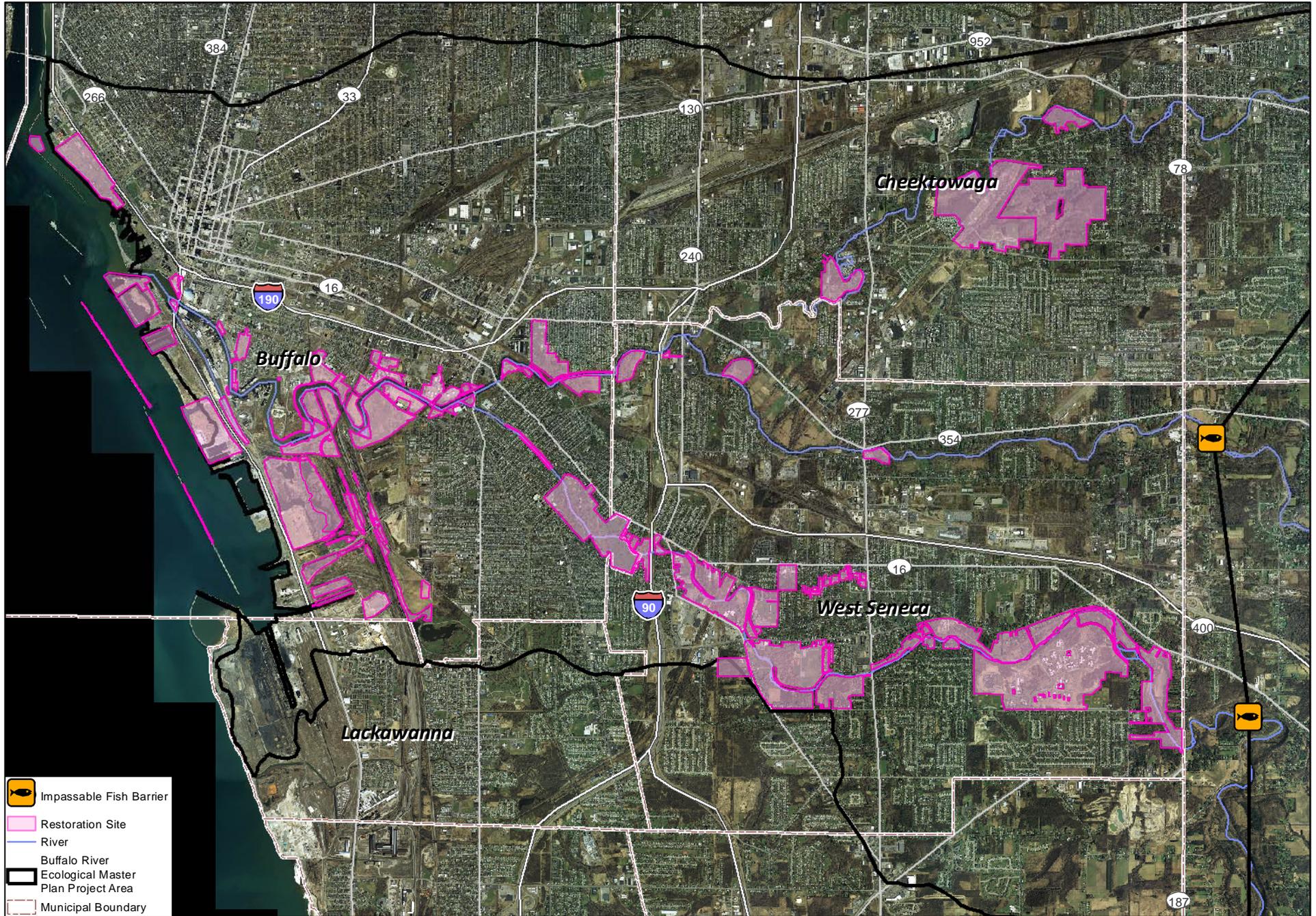
Field assessments were completed across the 37 sites in October and November 2010. Eleven sites were determined in the field to be less suitable candidates for developing conceptual habitat restoration plans within the ERMP. Generally, the reasoning supporting not developing full project descriptions for those 11 sites was related to a combination of site characteristics or conditions, such as:

- Lack of suitable area for restoration due to existing infrastructure;
- Incompatible land uses;
- Historic land uses (such as municipal landfills) combined with straightened river channel and high steep stream banks (> about 10 feet) that would additionally require complex engineering and therefore potentially much higher costs than other sites; and

- Perceived lack of ecological benefits and function uplift compared to other sites assessed in the field.

#### **Summary**

Stakeholder input was solicited and received throughout development of this draft ERMP. As a result of ongoing and regular stakeholder outreach, the project team was able to expand a list of 60 candidate restoration sites (obtained from desktop review of existing documents) to 73 potential sites for broad evaluation and assessment. Based on subsequent development of evaluation criteria, the list of sites was refined to 37 sites that were evaluated in the field. A final list of 26 development sites was developed that considers stakeholder input, the project goals and objectives, and which sites present the greatest need and best opportunities from an ecological standpoint for restoration and contributing to the delisting of habitat-related BUIs.



Data Source: ESRI 2010, Buffalo Niagara Riverkeeper 2007, USACE 2005

Figure 3-1 Ecological Restoration Master Plan - Candidate Restoration Sites Identified in Published Studies

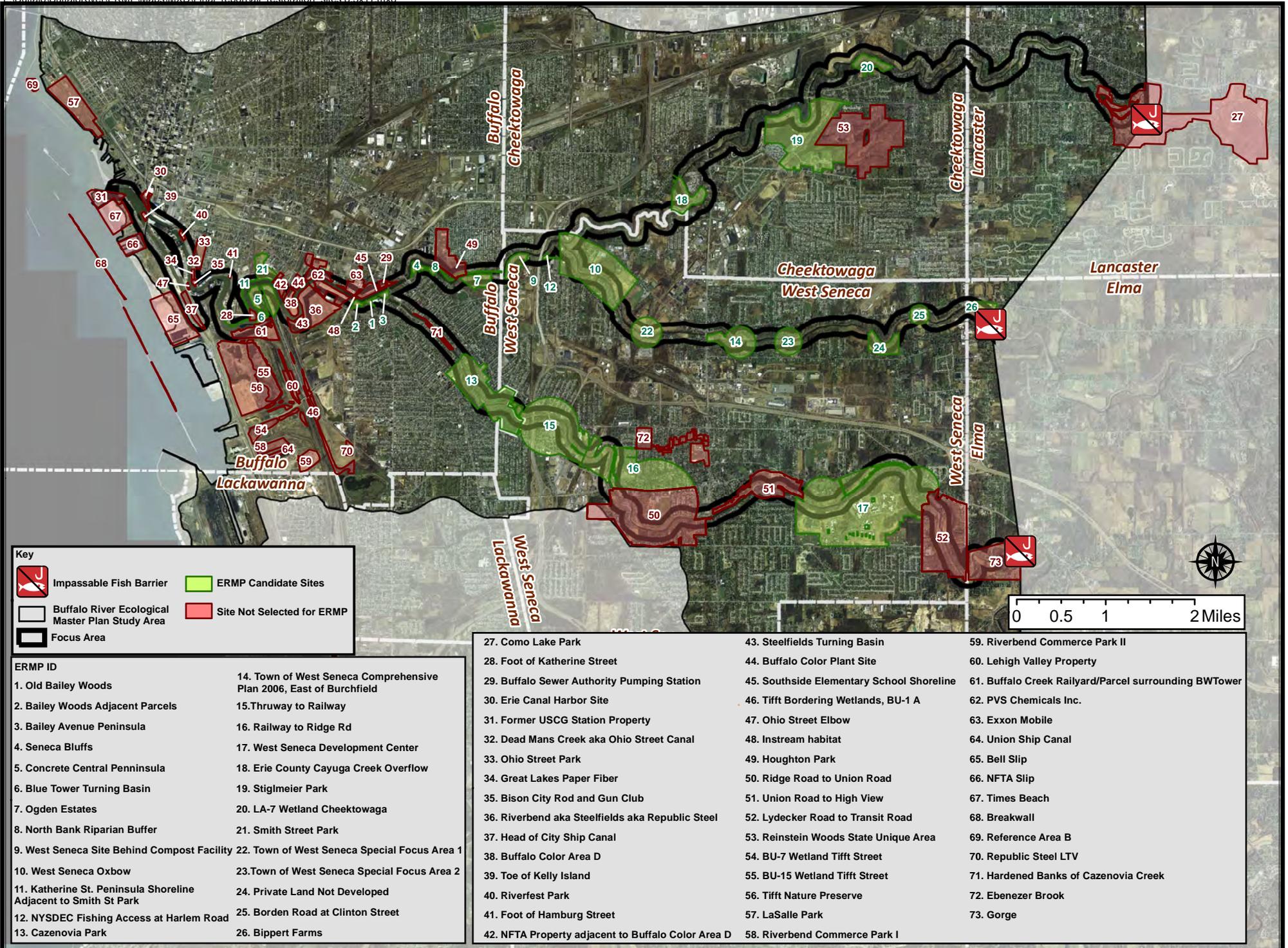
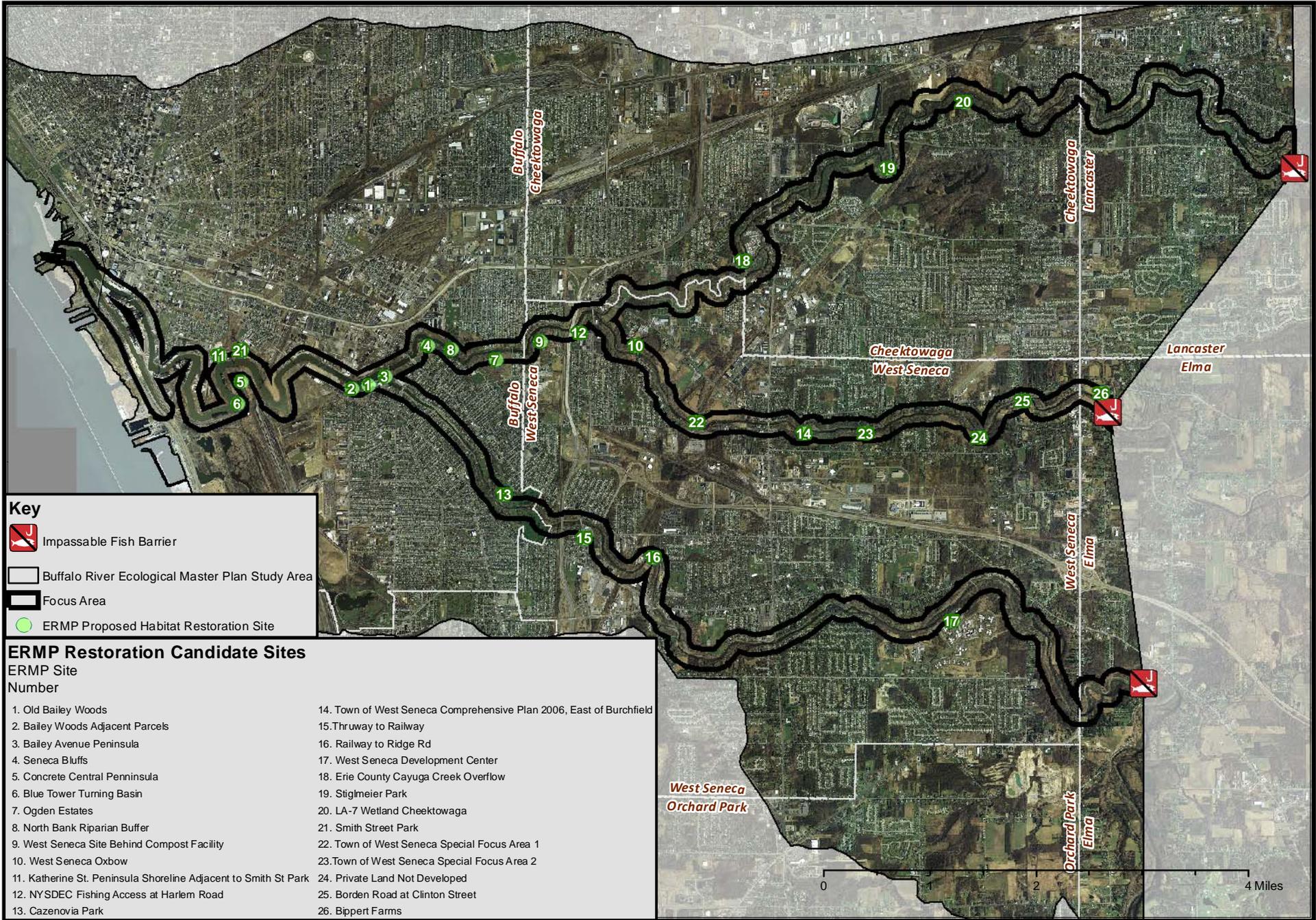


Figure 3-2 Buffalo River Ecological Restoration Master Plan - Candidate Habitat Restoration Sites



Data Source: ESRI 2010, NYS office of Cyber Security 2008

Figure 3-3 Buffalo River Ecological Restoration Master Plan - Proposed Habitat Restoration Sites

