

Niagara River Habitat Conservation Strategy



August 2014



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Niagara River Habitat Conservation Strategy

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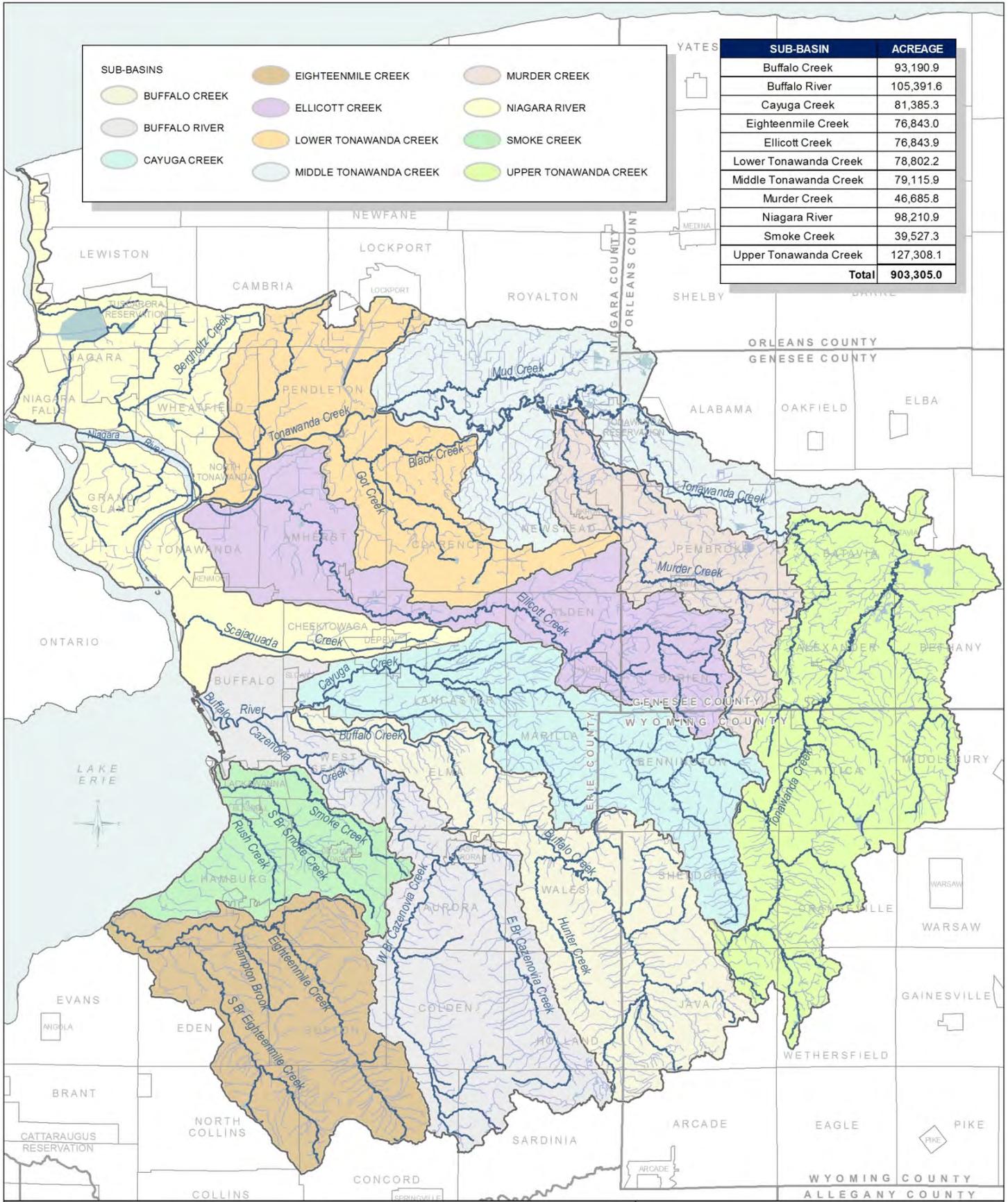
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August 2014

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Map Notes:
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 NYS DOT Civil Boundaries. All data obtained from NYS GIS Clearinghouse.

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Sub-Basins within the Niagara River Watershed

NIAGARA RIVER HABITAT CONSERVATION STRATEGY

MARCH, 2014

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Executive Summary

The purpose of the Niagara River Habitat Conservation Strategy is to create a blueprint of the most effective opportunities for conserving biodiversity and ecological function in the Niagara River watershed and to engage the many stakeholders that need to be involved in resetting the region's environmental health trajectory away from "poor" and towards "good." While the entire watershed was considered in this effort, an emphasis emerged on priority opportunities within the headwater and/or upstream portions of sub-basins. In part, this focus relates to existing patterns of development and the adverse impacts these patterns have had on the quality and health of the watershed's biodiversity features. In most cases, the greatest opportunities to change the ecological trajectory towards "good" lay where large tracts of intact landscapes remain undisturbed or where streams can be adequately buffered to provide greater resiliency. Additionally, headwater and upstream conditions within the Niagara watershed demonstrate a direct relationship with the overall health and condition of downstream segments, particularly within the two Areas of Concern (AOCs). Therefore, efforts to preserve and restore the region's headwaters are prominently featured in the Strategy.

Additional focus on AOC and downstream specific opportunities is being included within the complementary Niagara River Greenway Habitat Conservation Strategy, expected to be complete in mid-2015.

Chapter 1 provides background on the environmental degradation of the Buffalo River and Niagara River as Great Lakes Areas of Concern (AOCs), and the need for a watershed approach to ecological restoration. It describes the methodologies we used including The Nature Conservancy's Active River Area (ARA) and Conservation Action Planning (CAP) models, and the process whereby our Technical Advisory Committee (TAC) and public outreach sessions helped refine objectives and collaborative strategies.

Chapter 2 assesses aquatic, wetland, woodland, grassland/shrublands, and natural area biodiversity features in the Niagara River watershed ARA in terms of amount, condition, landscape context and native species information. It explains the set of indicators used to rank the viability or health of these features and also the process for identifying the most critical threats to future viability. Synthesizing this assessment with some of the major ongoing habitat restoration goals and programs in the watershed, it identifies a watershed-wide set of conservation objectives building on our regional needs and strengths.

Note: Buffalo Niagara Riverkeeper is addressing biodiversity features specific to the Niagara River, including deep and shallow water habitats, islands and the Niagara Gorge under a parallel CAP process for the Niagara River Greenway, scheduled to be completed in mid-2015.

Chapter 3 employs the CAP indicators and process at a finer scale, looking at the watershed in terms of its three major ecoregions—Cattaraugus Hill uplands, Ontario lowlands, and Lake Erie plain—and its 11 sub-drainage basins. Biodiversity features, threats and opportunities are tied to these physiographic units, as are the conservation strategies recommended in **Chapter 4**.

Chapter 4 summarizes the suite of "best-bet" conservation opportunities across the watershed identified as outcomes of the Strategy work. The opportunities are grouped into five categories grounded in various components of the CAP process and spanning planning scales, from regional to site-based. Opportunities are also identified that leverage ongoing regional restoration work and directly address Niagara River Remedial Action Plan (RAP) priorities.

Chapter 5 is the “toolkit” of local laws and policies that currently support, or are available to communities to support conservation of wildlife habitats, natural features, native species and ecological services within their jurisdictions. It also includes a summary of grant programs that will support specific conservation initiatives for local governments, agencies, public-private partnerships and other collaborations in our region.

A separate Technical Report documents the models, data sources, and standard operating procedures for GIS-generated tables and maps used in this report.

Summary of Recommendations by Conservation Strategy (from Ch.4)

Building on the conservation maxim “protect first,” the following strategies first address habitats of existing or potentially high ecological value mainly on public lands, where relatively small shifts in focus and resource allocation could make major differences in habitat viability and functionality. Summarized below by biodiversity feature, the collective strategies and recommended actions create a playbook ranging from stronger protection to customized restoration that can be implemented to move the lever on watershed habitat quality from a “poor” rating towards an overall healthier trajectory. A snapshot of strategies is provided below with additional strategies and recommended actions detailed in Chapter 4.

Aquatic

Strategy: Identify critical needs and opportunities for buffering to protect streams from runoff

Como Lake Park (CAYU 01), Hunter’s Creek County Park (BUFC 06&07), Sprague Brook County Park (BUFR 03) and the “Shale Creek” undeveloped portion of Chestnut Ridge County Park (18MC 06) all contain significant riparian and aquatic habitats that are at risk from erosion, sedimentation, invasive species and lack of ecology-based management plans. All four sites will benefit from improvements touched upon in the Erie County Parks Master Plan but detailed in the Strategy field assessments, addressing buffering, trail re-routing, mowing and other actions to improve habitat and stream function. A related GIS analysis identifies predicted impervious cover hotspots or areas in greatest need of conservation in terms of runoff and water quality degradation.

Strategy: Assess and address known barriers to native and naturalized trout spawning

Working with fisheries biologists, 12 high priority impassable culverts are identified in the upper watershed for removal or mitigation. Associated recommendations include using the data for known trout spawning locations to upgrade NYS stream classifications to ensure future protection of native trout populations, and engaging municipal highway departments in conservation-based best management practices related to road, culvert and stream maintenance.

Strategy: Identify opportunities to mitigate the effects of channelization and altered flows

The Erie Canal corridor (LTON01& 02) and Nature View Park (ELLI 01) present opportunities to work with multiple partners to address habitat degradation associated with channelization of Tonawanda Creek, including management of invasive plants to restore habitat values, and educational outreach to residents focusing on the stormwater retention values of large floodplain wetland complexes like Nature View.

Wetlands

Strategy: Identify high quality aquatic habitats and riparian wetlands for conservation

Eighteenmile Creek undeveloped park (18MC 05) and Protection Bog (BUFC 03&04) are two unique and botanically diverse Erie County properties. Eighteenmile Creek is a NYS “significant fish and wildlife area,” with 90% native woodland along its gorge confluence and talus slopes, but with up to 50% invasive plants in the floodplain. Protection Bog supports many uncommon plant species. Conservation recommendations involve working with the county and other potential partners to preserve the biodiversity and functional qualities of these sites.

Strategy: Identify and protect sites with high ecological value and use as reference sites for habitat restoration

Buffalo Audubon’s Beaver Meadow Nature Preserve (BUFC01 & 02), Tillman Swamp Wildlife Management Area (LTON 03), Elma Town Park (BUFC 08) and Brush Mountain Park (SMOK 01) are proposed as good reference sites and core areas for extending wetland, floodplain or woodland habitat stewardship in the watershed.

Woodlands

Strategy: Conserve headwater forests for water quality, habitat and climate change resilience

Action: Clarify, fund and implement ecology-based headwater forest management plans on public lands

This action applies to the Erie County Forest Master Plan for forest lots 13, 9, 10, 11 and 6 which support high biodiversity, good water quality and other ecological services. County forest management plans should be enhanced to address invasive species, stream buffering and wildlife needs based on updated surveys of plant and animal species at these sites.

Action: Identify opportunities to protect and expand core forest areas resilient to climate change

This action applies to large or strategic tracts of privately-owned functional forested land such as the 1,300-acre, largely roadless Fowlerville Forest; and available parcels that would link already protected forests into larger core tracts, such as 18MC 07. Acquisition of strategic forested parcels should be a priority in the NYS Open Space Plan and for local land conservancies. Action plans discuss funding, acquisition, and easement opportunities.

Action: Identify and protect at-risk forested areas from fragmentation due to development pressures

GIS analysis identifies unprotected core, headwater and riparian forested areas at greatest risk to future development based on proximity to developed lands. The resulting maps should assist municipalities in identifying key areas for protection and in setting watershed management goals. In the intensively developed Niagara River sub-basin, Grand Island is a high priority for conserving large forested tracts.

Grasslands/Shrublands

Strategy: Increase grassland habitat values for breeding birds

Darien Lakes State Park (Ellicott Creek), Birdsong parklands (Smoke’s Creek) and Knox Farm (Cazenovia Creek) are potentially significant bird habitats, where management plans should be clarified, funded and implemented according to species usage, including known species-at-risk at Darien and Knox Parks, and potential grassland breeding birds at Birdsong Park. GIS analysis identifies 14 other specific opportunities for grassland/wetland matrix conservation, including high priority areas along the Niagara River.

Natural Areas

Strategy: Identify opportunities to protect and connect significant natural areas

Beeman Town Park (Lower Tonawanda) and Counterfeiter’s Ledge (Murder Creek) are parts of larger significant natural systems—the Tonawanda-Beeman forested floodplain and the Onondaga Escarpment respectively—in rapidly developing areas. Habitat values would be enhanced by protecting and connecting adjacent natural areas identified in the action plans. An Onondaga Escarpment inventory is needed to identify other remnants with high biodiversity, functional and cultural values in need of protection. A GIS analysis identified 9 specific opportunities to abate the threat of forest, wetland and/or grassland fragmentation by protecting existing patches of these covers on agricultural lands.

Strategy: Identify opportunities for landscape ecology stewardship

As with Erie County forests and parks, the Carlton Hill multiple use area in Wyoming County presents a significant opportunity to clarify, fund and implement ecology-based conservation plans. Although largely designated as a “Bird Conservation Area,” GIS analysis shows grassland habitat to be partially designated for mining and quarrying land uses. The Department of Environmental Conservation (DEC) identifies lack of resources for active management of grasslands for listed birds as a major threat.

Strategy: Restore highest ecological values possible in quarry reclamation projects

Although habitat is the stated long-term use for the majority of sand and gravel quarry reclamation projects in the watershed, the quality of these restored habitats is often poor. Municipalities should first ensure high quality habitats are protected by local land use laws and second, ensure reclamation plans are designed into quarry development from the beginning to make maximum use of grading, buffering, soils, native plants and water resources.

Areas Of Concern

Strategy: Provide support for de-listing habitat-related impairments in the Niagara River Area of Concern (AOC)

Action: Analyze and build on existing data to address degradation of benthos (BUI #6)

In support of the delisting criteria that “benthic macroinvertebrate community structure should be non-impacted or slightly impacted” and that there should be “no statistically significant bioaccumulation of priority contaminants in fish” in selected sediment depositional zones, the DEC should build on three programs that have provided 30+ years of data on benthic community health and contaminant levels in fish and mussels: the Stream Biomonitoring Program (Bode et al), the DEC young-of-year fish studies and the Ontario Ministry of Environment’s caged mussel studies. The latter two studies identify locations where priority contaminants still bioaccumulate at relatively high levels in fish and mussels, indicating a potential need for future remediation efforts.

Action: Use the CAP analysis to further identify “best bet” habitat conservation priorities to satisfy the “loss of fish and wildlife habitat” Beneficial Use Impairment (BUI) #14

Delisting criteria for this BUI focus on 35 “priority Niagara River AOC habitats” that were identified in the 1994 Stage 1 RAP document and revised in the Stage 2 Addendum based on more current field assessments. By reviewing the many identified priority habitats through the CAP viability indicators of size, condition, landscape context and species assemblages, some habitats will emerge as higher priority. The ranking scale can further identify “very good” habitats for protection and reference, and “fair to good” habitats where intervention could help set the trajectory towards long-term viability.

Niagara River Habitat Conservation Strategy

Riverkeeper is currently working on a Niagara River Greenway Habitat Conservation Strategy that will support this action recommendation.

Action: Complete baseline assessments for all waterways within the AOC to benefit restoration planning and AOC delisting

While listed under AOC priorities, comprehensive, watershed-wide baseline data gathering is needed in both upstream and downstream segments of local waterways to ensure the region's practical ability to restore the downstream AOCs. To implement this action, a common protocol needs to be utilized that expands visual stream assessments and benthic community sampling. The development of reference conditions for in-stream and riparian restoration should also be a priority to help further define restoration trajectories within the AOCs.

Chapter 1: Project Background & Methodology

1.1 Problem Statement

Currently, no regional strategy exists for conserving fish and wildlife habitat or ecosystem services in the Western New York region of the Great Lakes Basin, whose principle drainage area is the Niagara River Watershed. In 1987 the International Joint Commission (IJC) designated both the last six miles of the lower Buffalo River and the entire Niagara River connecting channel as two of forty-two Great Lakes “Areas of Concern” (AOCs). Like the other “toxic hotspots” on the lakes these two rivers have suffered chemical, physical, and biological degradation resulting from decades of poorly planned industrial and municipal development, water pollution, channelization and other changes to natural flows. Land and water habitats were found to be impaired by contaminated sediments, loss of wetlands/coastal shallows, and loss of other in-stream and terrestrial native vegetation of sufficient amount and quality to support healthy reproducing native fish and wildlife populations.

At a watershed level, New York State’s Comprehensive Wildlife Conservation Strategy (CWCS) (DEC, 2010) rates the landscape condition of the Erie-Niagara region as “poor.” It identifies 104 bird, mollusk, fish, herptefaunal, insect, and mammal “species of greatest conservation need”—species that are rare, threatened or endangered in New York State’s Lake Erie Basin or at risk of becoming so. It also identifies 38 animal species “now believed to be extirpated from the basin.” The CWCS cites habitat loss, toxic contaminants, degradation of water quality, altered hydrology, and human disturbance (roads, habitat fragmentation, invasive species, collisions) among the top ten threats affecting these species in the watershed.

Over the past 20 years, partnerships among agencies including the US Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (DEC), US Fish and Wildlife Service (FWS), the Army Corps of Engineers (USACE), Buffalo Niagara Riverkeeper (Riverkeeper), and several industries have enabled major remedial actions in the AOCs such as landfill capping, sediment dredging and shoreline restoration. These investments have led to measurable improvements in water quality and fish and wildlife health. Cumulatively, they are creating opportunities to transform the image of our region from that of a “rust belt city” to one rooted in its blue economy, creating revitalization through the restoration of the health and integrity of our fresh water system.

To protect these investments and restore ecological function to the system over the longer term, it is necessary to utilize principles of ecosystem based planning and management, simultaneously conserving upstream and downstream riparian and stream habitats in the Niagara River Watershed, and educating and involving local and regional stakeholders along the way. These stakeholders include municipal officials, citizen groups and public and private landowners whose daily decisions have major impacts on the health and resilience of our streams and natural communities. When guided by the strategic framework of the Niagara River Habitat Conservation Strategy, stakeholders can confidently adopt measures which preserve whole systems of living infrastructure to support healthy communities and healthy economies long-term.

Within this model of prosperity, the health and vitality of the region’s economy and community are directly proportional to the health of its natural resource base.

1.2 Purpose

In 2010, the Great Lakes Restoration Initiative awarded Riverkeeper a grant to develop a Niagara River Habitat Conservation Strategy (Strategy) to address these needs. The purpose of the Strategy is, in part, to support the habitat-related goals of the Buffalo River and Niagara River Remedial Action Plans, the NYS Comprehensive Wildlife Conservation Strategy, the Great Lakes Regional Collaboration and related initiatives. A summary of these goals can be found in the technical report. They include:

- Improve water quality to slight or non-impaired status for aquatic life and habitat
- Protect and restore aquatic habitat to support native fish and benthic communities and selected at-risk species such as Lake sturgeon and Brook trout
- Improve terrestrial habitat to support native plant and animal communities, including rare, threatened, and endangered species as well as species at risk
- Restore habitat connectivity where possible with natural area corridors
- Restore natural hydrology, including stream/floodplain connectivity and removal or remediation of barriers to flow where possible

Mission Statement:

“Building upon completed and ongoing regional habitat conservation work, restore and conserve native ecological communities and biological integrity by promoting healthy, self-sustaining aquatic ecosystem functions within the Niagara River watershed.”

The larger purpose is to integrate these already existing habitat conservation goals with a systematic assessment of biodiversity features, ecological function, threats and opportunities in the Niagara River Watershed to yield a practical strategy that can be implemented at many levels by the various stakeholders that need to be involved. Stated another way, this blueprint for ecological restoration within the Buffalo Niagara region is designed to focus collaborative efforts on the suite of best-bet opportunities for habitat conservation in the near-term—the next five to ten years.

A bi-national Technical Advisory Committee (TAC) of local and regional fish, wildlife, habitat, hydrology and ecology experts was convened to guide decision-making throughout the development of the Strategy. Over the course of its first two meetings, the TAC agreed upon a mission statement: “Building upon completed and ongoing regional habitat conservation work, restore and conserve native ecological communities and biological integrity by promoting healthy, self-sustaining aquatic ecosystem functions within the Niagara River watershed.”

1.3 Scope and Methodology

The definition of the Niagara River Watershed is based upon the United States Geological Survey's (USGS) 10-digit Hydrologic Unit Code (HUC), encompassing approximately 900,000 acres, 3,193 miles of streams and rivers, and eleven sub-basins in four counties in Western New York. Because the focus is on water, the Technical Advisory Committee chose to use The Nature Conservancy's Active River Area (Smith, 2008) modeling tool to further refine the project planning area. The Active River Area (ARA) model refined the project scope to include those areas on the ground linked to the physical and ecological processes of river and stream function. Components of the ARA include material contribution areas, meander belts, floodplains, terraces, and riparian wetlands (see Technical Report for more detail).

“The Active River Area model refined the project scope to include those areas on the ground that are linked to the physical and ecological processes of river and stream function.”

Focusing analyses on the ARA within the watershed helped to enhance the mission of the project related to “aquatic ecosystem function.” The ARA scope reduced the study area by about 60%—to 413,540 acres—allowing greater focus on the areas of greatest biodiversity in the watershed and on hydrologic function. We further divided the watershed into its eleven sub-basins, as mapped by the USGS 10-digit HUC. Most of the GIS mapping and analysis work was done at this level. Chapter 3 provides a summary of findings for each sub-basin.

The Strategy also used The Nature Conservancy's Conservation Action Planning (CAP) model (TNC, 2007) to define and assess biodiversity features within the project area. The CAP model provided a logical process for evaluating the health status of biodiversity features in terms of landscape context including size, condition, connectivity, and plant and animal species indicators. The specific indicators used to evaluate health or viability are described in Chapter 2. Use of the CAP model also facilitates the integration of this work with other CAPs that have been completed or are underway in surrounding watersheds with overlapping species and habitats. These include Lake Ontario, Lake Erie, and the Niagara River Corridor in the Province of Ontario.

As part of the project effort, Riverkeeper and its consultants developed and followed three Quality Assurance Project Plans (QAPPs). Plans for secondary data usage, Geographic Information Analysis (GIS) and Site Level Habitat Assessment were developed and approved by the EPA, assuring that all components of the project were conducted in accordance with the highest standards of quality.

To find the data needed to accomplish these tasks, Riverkeeper reviewed and catalogued over 200 documents pertaining to historic and current habitat, species and ecological conditions in the Niagara River Watershed. This archive is collected in a sharable database. GIS shapefiles and datasets were also collected, and many new datasets were created or derived from spatial analysis to custom build a set of maps and tables for assessing the health of biodiversity features. Standard operating procedures for GIS-generated data can be found in the Technical Report. Both databases can be obtained by contacting the Riverkeeper offices.

As a result of the CAP analysis, the project team selected 37 representative sites for groundtruthing by a team of ecologists and biologists. Field sites were further selected on the basis of accessibility and also potential value to Strategy implementation including likely good candidates for protection, restoration, policy or regulatory adjustments, best management practices, and reference sites. The resulting suite of sites represents some of the best bets for habitat conservation in the watershed.

1.4 Project Team

The project team met throughout the course of the project at critical decision points. Guided by a core team of Riverkeeper staff, they included biologists and ecologists from the US Fish and Wildlife Service, the Haudenosaunee Environmental Task Force, and the NYS Department of Environmental Conservation; geography, soils and fluvial geomorphology experts from Buffalo State College, SUNY Buffalo and the Natural Resource Conservation Service; CAP veterans from The Nature Conservancy and the Niagara Peninsula Conservation Authority in Ontario; and others with specific knowledge of natural areas and species in the region. Applied Ecological Services, Inc. conducted the field work needed to ground-truth ecological values and threats at particular sites. Lisa Wiza, GISP, conducted GIS analysis throughout the project.

Regional stakeholders were an important part of the effort, including county Soil and Water Conservation Districts and water quality coordinating committees, conservation groups like Trout Unlimited and the Niagara Frontier Botanical Society, municipal officials, public land owners such as managers of county parks and forests, and private landowners. Ten regional presentations and over 50 smaller meetings with key stakeholder groups helped fine tune the analyses of viability, threats and opportunities.

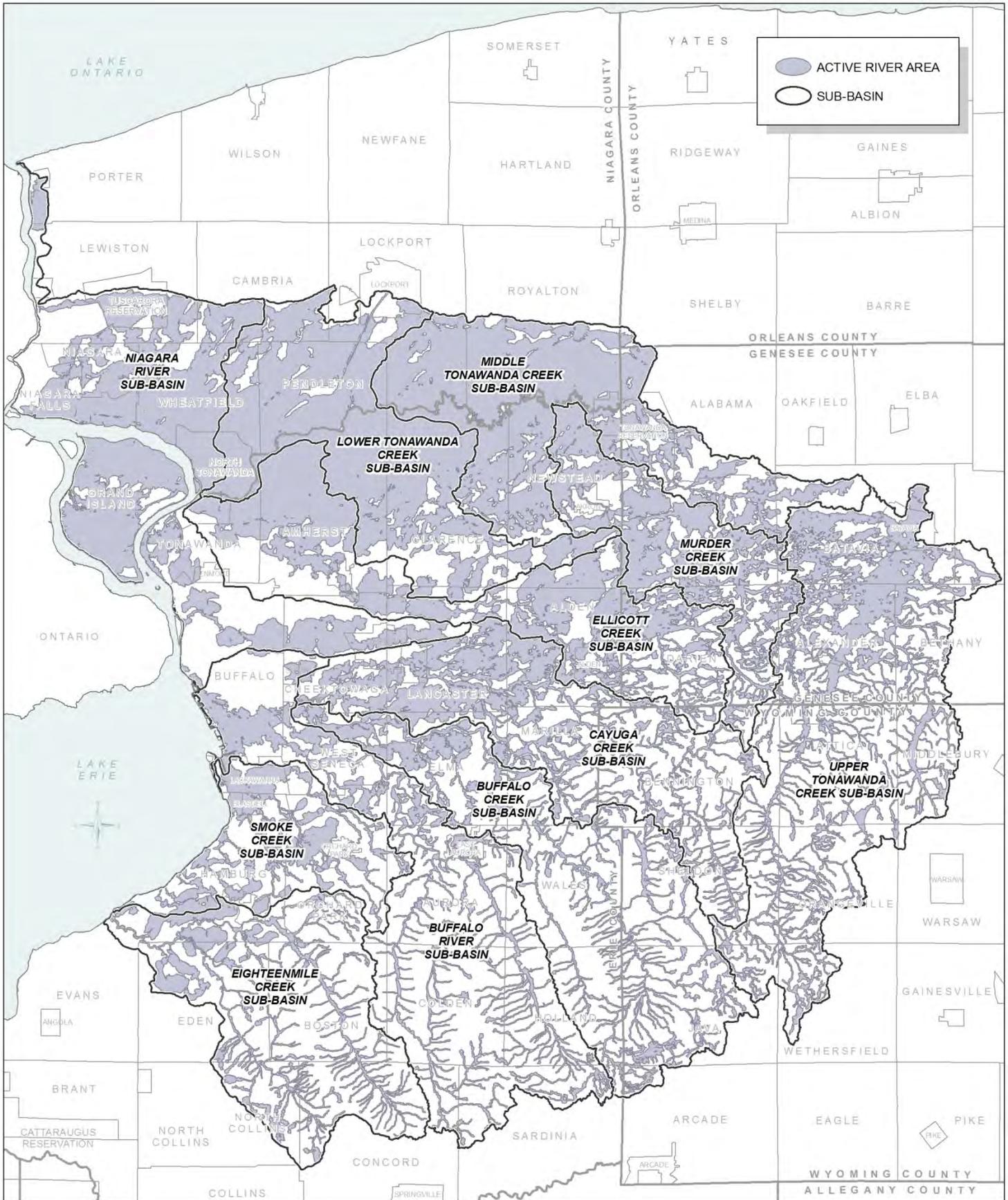
1.5 How to Use this Strategy

The following are some of the ways the Strategy can be applied to meet shared conservation goals:

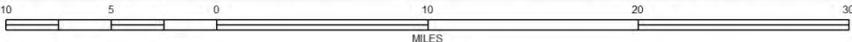
- Review the proposed strategies and actions (Chapter 4) to identify areas of synergy with your conservation goals. The Strategy can be used to inform and refine those goals, support funding applications for conservation projects in an ecosystem or watershed context, educate constituencies, and strengthen and enhance local partnerships.
- Incorporate actions from the Strategy into local and regional plans and land use regulations. (See Policy recommendations in Chapter 4 and “Toolkit,” Chapter 5.)
- Review threats assessment (Chapter 2) to help identify critical conservation needs.
- Review sub-basin profiles (Chapter 3) to help further prioritize actions needed in your focus area (town, village, river corridor, park, backyard, etc.).
- Custom build a “habitat calculator” for your town using the resources provided in this document and in the Technical Report and accompanying geodatabase.
- Review biodiversity feature viability assessments (Chapter 2) to identify further research needs.
- Review Toolkit (Chapter 5) for an overview of local regulatory options and funding sources for habitat conservation.
- Review literature and mapping databases for research and spatial analyses relating to your areas of interest.

Map 1.1 Active River Area Niagara River Watershed

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ACTIVE RIVER AREA
 SUB-BASIN



Map Notes:

Active River Area (ARA) created using the Three-Stream Class (3SC) Toolbox Documentation, by Analie Barnett, The Nature Conservancy- Eastern Division. June 2010.

**Active River Area
NIAGARA RIVER WATERSHED**

Chapter 2: Niagara River Watershed

The project team selected five basic biodiversity features that generally correspond with those used in Conservation Action Plans for surrounding watersheds including the Lake Erie, Lake Ontario, and Niagara River Corridor (Ontario) CAPs.

Terrestrial features are based on compiled 2005 NOAA land use/land cover categories. Although 2011 NOAA land cover data is now available, changes in the amount of wetland, woodland or grass/shrubland features from 2005 mainly reflect changes in interpretation. For example, 27,781 acres of deciduous forest is reclassified in 2011 as palustrine forested wetland. Net changes from natural land covers to developed or agricultural land covers are: for total wetlands a decrease of 1,195 acres (2%), for total forests a decrease of 3,877 acres (3%); and for grasslands and shrublands a decrease of 2,476 acres (25%) which makes the latter the watershed’s most at-risk feature. See Technical Report for details.

What is Biodiversity?

Biological diversity, or biodiversity, refers to the variety of life, as expressed through genes, species and ecosystems that is shaped by ecological and evolutionary processes. The full spectrum of biodiversity is essential to maintaining the ecological functions that sustain us. When we conserve biodiversity we also conserve these benefits, such as clean water and air, hunting and fishing opportunities, productive soils, crop pollination, resilience to weather extremes, and flood and pest control.

(Taylor, 2010)

Features specific to the Niagara River, including deep and shallow aquatic habitats, islands and the Niagara Gorge are assessed under a parallel CAP process for the Niagara River Greenway.

2.1 Biodiversity Features

Open Water Aquatic Habitat

Definition: Open water habitat up to and including first order streams, lakes, ponds, and agricultural ditches and drains within the Active River Area. The focus is mainly on the tributaries.

Wetlands

Definition: Emergent, shrub/scrub, and forested wetlands including coastal, floodplain, and headwater wetlands; and springs and seeps within the ARA.

Woodlands

Definition: Deciduous, evergreen and mixed forest within the ARA.

Grasslands/Shrublands

Definition: Meadows, early successional farmlands and selected industrial lands (e.g., capped landfills remediated to support habitat) within the ARA.

Natural Areas

Definition: Land covers supporting terrestrial habitat connectivity and/or stream function within and continuous with the ARA (referred to as the “study area”). The continuous extension allows inclusion of whole parcels of natural areas that may extend beyond the ARA. This measure facilitates comparison between the amount of natural land in the study area and the amount that is protected as parkland, forest lot, wildlife management area, State wetland, or under some form of conservation easement.

Niagara River Watershed Active River Area NOAA Land Use/Land Cover Data, 2005.

Pasture/Hay	20.7%
Cultivated crops	13.7%
Bare land	0.5%
Developed, High Intensity	2.0%
Developed Medium Intensity	3.5%
Developed, Low Intensity	11.4%
Developed, Open Space	3.8%
Open Water	0.9%
Deciduous Forest	23.7%
Evergreen Forest	1.5%
Mixed Forest	0.3%
Palustrine Emergent Wetland	1.2%
Palustrine Forested Wetland	10.8%
Palustrine Scrub/Shrub Wetland	0.7%
Grassland/Herbaceous	0.9%
Scrub/Shrub	1.6%

2.2 Viability Analysis

Each feature's current health status or viability was evaluated by defining a set of indicators representing the feature's size, condition, landscape context, and species assemblages. Where possible, indicators were assigned thresholds defining acceptable ranges of variation. These indicators provided a basis for ranking or assessing the status of each feature. For many indicators, comprehensive watershed data was insufficient to complete quantitative assessments. In these instances, qualitative data was sometimes used to provide additional information about the health of particular features. For example, field-collected population data for specific species was often available; however, literature-referenced descriptions of general presence or absence of species within a location were available and therefore included as a broad-brush method to further define areas of interest within a sub-basin or within an ecoregion.

At its April 11, 2012 meeting the Technical Advisory Committee decided that conservation strategies should address those features and sites at the threshold between "Fair" and "Good" as the best candidates for restoration, and features/sites assessed as "Good" to "Very Good" as best candidates for protection. Identification of reference sites for future restoration efforts was also included as a goal.

Assessing Viability of Biodiversity Features

Key Terms:

- **Size:** Abundance of a biodiversity feature or of a species population size.
- **Condition:** Measures of biological composition, structure and biotic integrity. For example, presence of representative or historic native communities or at-risk species.
- **Landscape context:** The environmental and ecological processes that maintain a biodiversity feature and keep it functional. For example, connectivity between natural areas keeps them functional as wildlife corridors.

Ranking Scale:

- **VERY GOOD** - Ecologically desirable status; requires little intervention for maintenance.
- **GOOD** - Indicator within acceptable range of variation; some intervention required for maintenance.
- **FAIR** - Outside acceptable range of variation; requires human intervention.
- **POOR** - Restoration increasingly difficult; may result in extirpation of target.

2.3 Selected Indicators

In completing the viability analysis, the project team made every effort to obtain the best available data and used information from the project's secondary data database, local and regional experts, and GIS mapping and analysis to inform assessments. Across the watershed, the team found large gaps in data and a critical need for more extensive site-level information collection. Accordingly, the indicators selected for use in the Strategy are developed to the extent that existing data reasonably supports. In cases of absent data, indicators were either discarded as unusable or included only as a secondary screening factor when evaluating overall biodiversity health.

Final indicators for size, condition and landscape context as summarized below are described by biodiversity feature and data source. Section 2.4 includes a description of indicators relevant for the watershed as a whole while individual sub-basins are discussed in Chapter 3.

Aquatic

- **Biological Assessment Profiles (BAP)** and rankings are provided by the DEC Rotating Intensive Basin Studies (DEC, 2000 - 2011), which score sampling sites according to the amount, diversity and composition of benthic macroinvertebrate communities. The Nature Conservancy and NY's Natural Heritage Program also provide predicted BAP scores for whole stream segments based on models of existing BAP scores and over 100 other indicators of stream health (White, 2011).
- **Stream miles** are used as an indicator of size and are based on USGS National Hydrography Dataset. (<http://nhd.usgs.gov>)
- **The amount of impervious surface** is derived from NOAA developed land categories and provides an indirect way to assess the threat of runoff to stream health. Stream bank conditions may be further ranked in sub-basins where *Stream Visual Assessment Protocols* (SVAP) have been employed.
- **Known barriers** to migratory fish movement are based on DEC records in the upper watershed for trout, and on current studies under the Niagara River Greenway Habitat Conservation Strategy of barriers potentially impacting Niagara River species that use the tributaries for some part of their life cycle.

Wetlands

- **Level of protection** compares DEC-regulated wetlands to National Wetlands Inventory (NWI) mapped wetlands.
- **Class I wetlands** provide information on quality, size, aquifer connections, etc.

Woodlands

- **Functional Riparian Forest Tracts** are defined as wooded habitats >50 acres and >100 meters in width, spanning a waterway. These tracts provide habitat sufficient to support forest interior dwelling bird species, as well as stream buffering and water quality benefits (Jones, 2001).
- **Core Forests** are unbroken blocks of forest >500 acres in size and >100 meters from a road. Defined in Ontario's Niagara River Corridor CAP (Jalava, 2010), these tracts are considered large enough to withstand the pressures of climate change, invasive species and other disturbances.

Grass/Shrublands

- **Grassland tracts greater than 10 acres** are considered most ecologically functional based on observations of at-risk breeding grassland birds in this region (Norment, 1999).

Natural areas

- **Percent natural cover** in a watershed is a measure of overall landscape quality based on the availability of natural areas to provide beneficial ecosystem services as well as habitat. Watersheds with at least 60% natural cover are priorities for conservation (EC, 2004).
- **Percent semi-protected natural area** is a measure of a region's long-term ability to ensure continuity in critical ARA natural areas. "Semi-protected" includes Federal, State, County or locally-designated park, forest, wetland, wildlife management area, refuge or conservation area; and private land conserved by easement (see Technical Report SOP). These areas may offer major opportunities to increase the viability of biodiversity features. See Map 2.1.
- **Natural areas >150 acres** are considered most ecologically functional based on the range requirements of certain species and the value of ecosystem services that increases proportional to increases in natural cover tract size (White, 2011).

"Listed" Plant and Animal Species

- Includes NYS Natural Heritage Program (NHP), DEC or other field-documented findings of any of the 104 species listed in the New York State Comprehensive Wildlife Conservation Strategy for the Erie Basin (DEC, 2010). These include Federal and NYS endangered, threatened, rare or "of concern" species. Also noted are recent records of any of the 38 CWCS animal species believed to be extirpated from the basin. The presence of rare or historic plant species or communities is based mainly on NHP data but includes local published sources also, and will assist with the ranking of priority sites. Information on population trends is mainly available for bird species, which is an indicator for all habitat types. See Technical Report for all listed species in the watershed by sub-basin and biodiversity feature.

2.4 Viability Rankings by Biodiversity Feature

Niagara River Watershed Baseline Data

Total size:	903,305 acres
Total waterways:	3,193 miles
Active River Area:	413,541 acres
ARA Wetlands:	52,979 acres or 12.8%
ARA Woodlands:	115,503 acres or 28.2%
ARA Grass/Shrublands:	10,253 acres or 2.5%
ARA and continuous Natural Areas:	349,664 acres or 60% of study area (580,167 acres)
ARA and continuous tracts >150 acres:	291,622 acres or 83%

The following summary offers an overall assessment of health or viability of each biodiversity feature within the Niagara River Watershed. See Table 2.1.

Open Water Aquatic Habitat: POOR - GOOD

- Benthic community health: (2010 RIBS sampling av. plus NHP-TNC Predicted BAP scores) Map 2.2
- Percent of impervious land cover: Map 2.3
- Bed and bank assessments (by sub-basin only)
- Barriers to migratory fish movement (by sub-basin only, see Section 4.4)
- Presence of listed plant and animal species
- Nested features: Populations of lake sturgeon, native trout, listed mussel species are stable to increasing

Wetlands: FAIR

- Percent of DEC-regulated compared to total DEC and NWI mapped wetlands: Map 2.4
- Presence of Class 1 wetlands
- Population of listed marsh birds are stable to increasing

Woodlands: FAIR - GOOD

- Acreage (percent) of woodlands in the ARA: Map 2.5
- Number of core forests in unbroken blocks, >500 acres, and >100m from roads
- Amount of functional riparian forest habitat >50 acres and >100m width from stream edge
- Population of listed forest birds are stable to increasing

Grass/Shrublands: POOR

- Percent of acreages in tracts >10 acres: Map 2.6
- Population of listed grassland birds are stable to increasing

Natural Areas in and continuous with the ARA: FAIR

- Percent of ARA and continuous study area
- Number of tracts >150 acres: Map 2.7
- Amount/percent of semi-protected natural area
- Presence of listed bird species requiring large mixed natural areas are stable to increasing

“Minimum recommended area for core forests in southern Ontario would be between 100 and 200 hectares (250 and 500 acres). Given projection for larger, more frequent storms due to climate change, a conservation strategy would recommend forest of at least 200 hectare (500 acres) in size.”
(Jalava,2010)

Table 2.1

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 5%	5.0-7.5 90%	7.5-10 5%	
	Condition	% impervious surface	>20%	10-20%	5-10% 9%	<5%	
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69	70-79	>80	By sub-basin only
	Landscape Context	Known barriers to migratory fish species					By sub-basin only
	Listed mussel species	Populations are stable to increasing	X				Of 27 species 17 are believed to be regionally extirpated
	Native trout	Populations are stable to increasing		X			Stable
	Lake sturgeon	Populations are stable to increasing			X		Increasing
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37% 33%	38-50%	>50%	33%
	Condition	Number of Class 1 wetlands					59
	Listed bird species	Populations are stable to increasing	X				Of 8 listed species 5 are decreasing
Woodlands	Condition	Riparian forest tracts: >50 acres & >100m wide, spanning a waterway					354 tracts
	Condition	Core forest: unbroken blocks >500 acres and >100m from a road					110 tracts
	Listed bird species	Populations are stable to increasing		X			Of 13 listed species 3 are decreasing
Grass/ Shrubland	Condition	% of acres in tracts >10 acres	11%				11%
	Listed bird species	Populations are stable to increasing	X				Of 12 listed species 7 are decreasing
Natural Areas	Size	% of study area (ARA and continuous) with natural cover		<60%	>60% 60%		349,664a or 60%
	Condition	% of above that is semi-protected	<25%	<50% 27%	>50%	>75%	27%
		# of tracts >150 acres					324
	Listed bird species	Populations are stable to increasing	X				Of 15 listed species 10 are decreasing

2.5 Threats

Identification of critical threats is an important step in the CAP process that helps to address the factors that most affect the future viability of biodiversity features. The CAP process generally ranks threats in terms of scope, severity, and irreversibility. Those threats that receive the highest ranks are referred to as critical threats and are factored into conservation strategy priorities.

The preliminary list of threats was developed from local, regional and Great Lakes studies and from State assessments like the Natural Heritage Program and the Comprehensive Wildlife Conservation Strategy. This list was then fine-tuned through public workshops and meetings with local experts, resulting in the top threats for each biodiversity feature within each sub-basin.

The project team added another tier to the ranking process to define top threats for each sub-basin responsive to potential conservation actions. This process ranked threats by four factors: whether or not mitigation addressing the threat is available, whether the threat could be mitigated in the short term (5-10 years), whether mitigation is economically feasible, and whether the threat was ranked high at public meetings. Thus, for example, the threat to aquatic habitat of major channelization like the Erie Canal might rank high in terms of scope, severity and irreversibility, but lower in terms of available mitigation. However, when channelization is approached in terms of its specific components, such as hardened shorelines, it may point to practical strategies for a major restoration need.

Conserving the Active River Area is in itself a basic strategy for mitigating the impacts of climate change. The more natural the ARA, the more resilient both human and wildlife habitats are in the face of damages associated with severe weather. The more protected and connected the riparian corridor, the more viable it is for wildlife migration.

Top-ranked threats to **aquatic habitat** across all sub-basins are runoff, erosion and lack of riparian buffers. Runoff from farms, roads and development contribute to eroding stream banks, and increase siltation and pollutant loads—especially where natural vegetated buffers are not present to stabilize banks and filter the runoff.

For **wetlands**, invasive species are a major threat, with roadside management considered a major component, including soil disturbance, spreading of seeds and propagules, and ditching.

For **all terrestrial features**, especially woodlands and wetlands, top-ranked threats are lack of long-term protection and fragmentation from roads, utility corridors and railroad Right of Ways (ROWs).

In the major **upland sub-basins** where most large publicly-owned forests and parks are found, lack of ecological management plans is a top-ranked threat.

For **grasslands/shrublands**, loss of acreage and mowing regimes on farm fields and on public lands are ranked highest for their impacts on grassland breeding birds.

Climate change is a threat whose potential scope and severity is already observable in the watershed in terms of changes in natural cycles like fish spawning and migration, increased damages to property and ecosystems related to more severe storms and temperature changes, and increasing numbers of invasive plant and animal species as their ranges shift northward. Many of the indicators chosen for habitat viability—such as the minimum size for core forests or riparian forest tracts—are directly related to climate change scenarios for the region.

2.6 Conservation Objectives

The viability and critical threats analyses led to an initial identification of conservation objectives for the eleven sub-basins within the Niagara River Watershed. They target many levels of stakeholders, as detailed in the strategies and action plans outlined in Chapter 4.

Objectives

Aquatic habitat:

- Increase stream buffers, especially where connectivity to active floodplains, riparian wetlands or other habitats is enhanced, or where problems with runoff and/or erosion are known to exist.
- Reduce impervious surface—especially in sub-basins where impervious surface is >25%.
- Protect and replicate high quality stream segments.
- Reduce stream barriers in areas of known or probable interference with aquatic life.

Wetlands:

- Protect critical wetlands (e.g., bogs, fens, mineral spring wetlands, wetlands hydraulically connected to aquifers, floodplain wetlands, wetlands supporting listed species, etc.).
- Increase the amount of state-regulated wetlands to >50% of total mapped wetlands.
- Conserve, reclaim wetlands/grasslands in quarry siting and reclamation plans.

Woodlands:

- Increase the amount of protected, functional, riparian forest, especially in headwater streams.
- Conserve & increase number and quality of core forest tracts (>500 acres >100m from roads).

Grasslands:

- Increase acreages and habitat values for grassland breeding birds.

Natural Areas:

- Increase protected coverage to >50% of existing natural areas in and continuous with ARA.

Species /communities:

- Conserve and restore habitats supporting New York State-listed fish and wildlife species.

Stewardship:

- Build partnerships with and between municipalities to connect and increase ecological values of coastal zones, stream corridors and other shared habitat features through BMPs and ecology-based planning and zoning regulations.
- Increase conservation of habitat and ecological services at the landscape level to increase habitat viability and resilience to climate change stressors.

2.7 Ecoregions

Four “ecoregions” provide the spatial framework to further assess biodiversity features and ecological function in the watershed. These are based on geology, physiography, vegetation, climate, soils, land use, wildlife and hydrology. The EPA’s ecoregion closely correspond to the NYS DEC’s “ecological zones” but are based on a finer level of scale and detail. They are:

- Cattaraugus Hills at 324,708 acres or 36% of the watershed
- Ontario Lowlands at 387,026 acres or 42.9% of the watershed
- Erie/Ontario Lake Plain at 190,556 acres or 21.1% of the watershed
- Glaciated Low Allegheny Plateau at 773 acres or 0.1% of the watershed

In many ways the top three ecoregions correspond to the five components of the Active River Area. Portions of sub-basins that fall within each ecoregion will likely share the threats and opportunities associated with a corresponding river function.

Cattaraugus Hills Ecoregion

The EPA characterizes the topography of the Cattaraugus Hills Ecoregion as “dissected plateau, rolling hills and plateau toeslopes.” The five sub-basins that are mainly part of this ecoregion —Eighteenmile Creek, Buffalo River, Buffalo Creek, Cayuga Creek and Upper Tonawanda Creek—are important source areas in the system, contributing groundwater and the organic and inorganic materials which serve as the basic building blocks for the stream’s food web.

These upland areas have a long-term influence on aquatic habitat locally and downstream, providing nutrients, channel stability, shade and cooling to the system. They were historically almost 100% forested, and still today include the larger tracts of riparian and core forest in the watershed, largely due to the difficulty of timbering on steep slopes. They include cold, spring-fed streams conducive to native and naturalized trout species.

Protection and enhancement of these remaining upland forests is critical to the continued viability of the cold-water streams they nurture, and ultimately to the ecology and function of the entire river system. Barriers like dams or stranded road culverts are often primary threats in these headwater streams since they block the migratory range needed by trout populations to survive.

Ontario Lowlands

The Ontario Lowlands cover a large portion of the lower watershed, basically the extent of glacial Lake Iroquois that once existed between the glacial basins of Lakes Erie and Ontario. This low-lying area was once dominated by forests, however much has been cleared due to the agricultural capability of the land. Sub-basins largely within the Ontario Lowlands have low gradient streams, and large (at least historically) wetland-floodplain complexes. The Ontario Lowlands Ecoregion includes 100% of the Lower Tonawanda and Middle Tonawanda sub-basins, 95% of the Murder Creek sub-basin and 72% of the Ellicott Creek sub-basin.

Hydraulic connection with underlying groundwater like the Onondaga Aquifer is both an opportunity and a threat for the wetlands and wetland species that occur in this ecoregion. Sinks and swallets associated with the limestone Onondaga Escarpment and Aquifer are a potential opportunity for protecting and enhancing biodiversity, water quality and stream function across the northern portion of

the watershed. However, development with the potential to block, contaminate or otherwise alter aquifer recharge areas, poses a threat to wetlands and groundwater viability.

Since stone, sand and gravel quarries are a major use in this ecoregion, their design, operation and closure will be an important strategy for conserving habitat and function.

Erie/Ontario Lake Plain

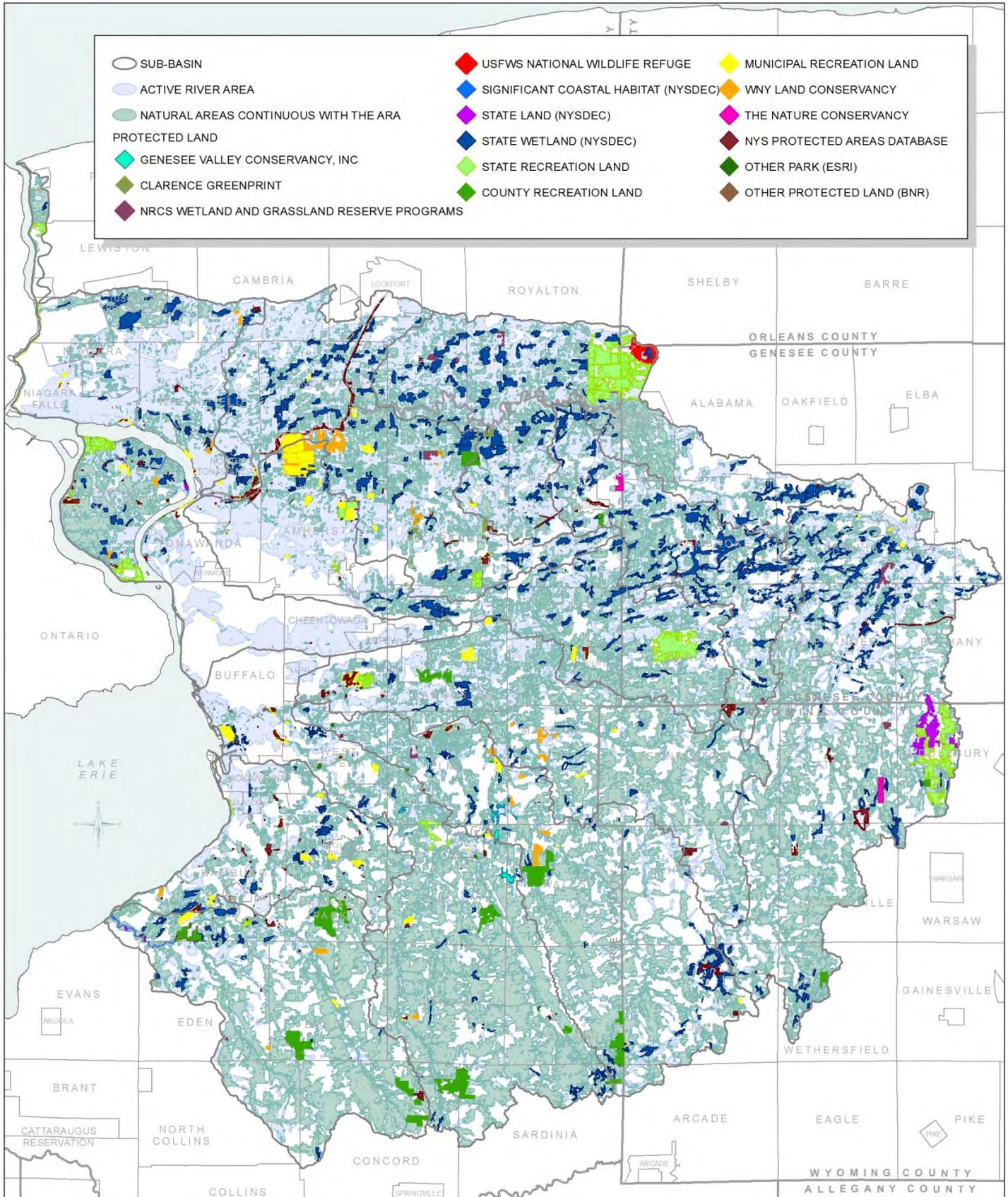
The middle portion of the watershed is characterized by the Lake Erie Plain Ecoregion, consisting of the flat lake plain bounded inland by Pleistocene beach ridges, and an Active River Area dominated by floodplains, meander belts and floodplain terraces. This ecoregion includes 86% of the Smoke's Creek sub-basin and 51% of the Niagara River sub-basin. It also includes the lower portions of the Eighteenmile Creek, Buffalo River, Cayuga Creek and Ellicott Creek sub-basins.

Ecological function and biodiversity in these areas is related to the amount of active floodplain (undeveloped and connected to a stream) that allows the stream's energy and nutrients to disperse over the land at flood stage. Meander belts and terraces, although higher and less frequently inundated, are important for storing waters during very large flood events, for recharge, and for harboring aquatic plants, insects and other animals in saturated soils.

Critical threats are tied to the loss of these functions, and, in the lower watershed, are exacerbated by other changes to the natural hydrology including flow reversals and water level fluctuations associated with the Erie Canal and the Ontario and New York power plant uses of the river. These changes to natural hydrology may interfere with the life cycles of many species, including lake sturgeon, walleye, northern pike, many shorebirds and less mobile aquatic species like fresh water mussels. Conservation measures may include stronger local laws preventing development in floodplains, development setbacks along riparian corridors, native vegetation buffer requirements, and soft engineering to protect and restore living shorelines and shallow water spawning, nesting and nursery habitats.

Map 2.1 Natural Areas and Semi-Protected Lands Continuous with the Active River Area Niagara River Watershed

05.REV01.2014-0311



Semi-Protected Lands from various data sources listed in SOP dated 9/5/2013. Active River Area derived by Buffalo Niagara Riverkeeper, 3/2012. Based on USGS 10m DEM data and 1:24000 waterways. Natural Areas based on Grassland, Wetland, and Woodland Land Cover classes, NOAA 2005.

Natural Areas and Semi-Protected Lands Continuous with the Active River Area NIAGARA RIVER WATERSHED

BUFFALO NIAGARA RIVERKEEPER

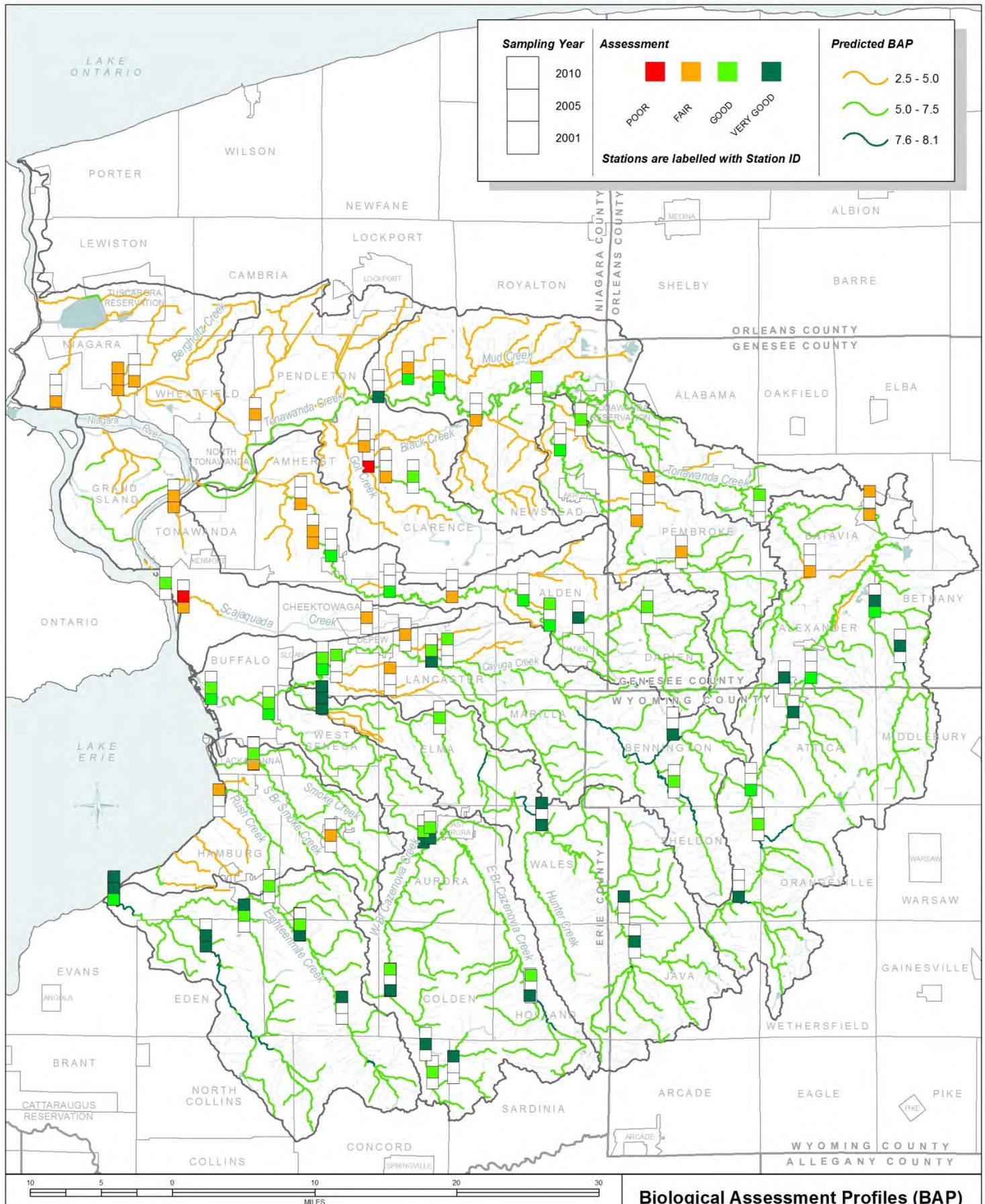
MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE NYS DEPARTMENT OF STATE IN SUPPORT OF THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

NIAGARA RIVER HABITAT CONSERVATION STRATEGY

MARCH, 2014

Map 2.2 Biological Assessment Profiles Observed and Predicted Niagara River Watershed

06.REV01.2014-0311



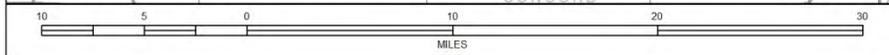
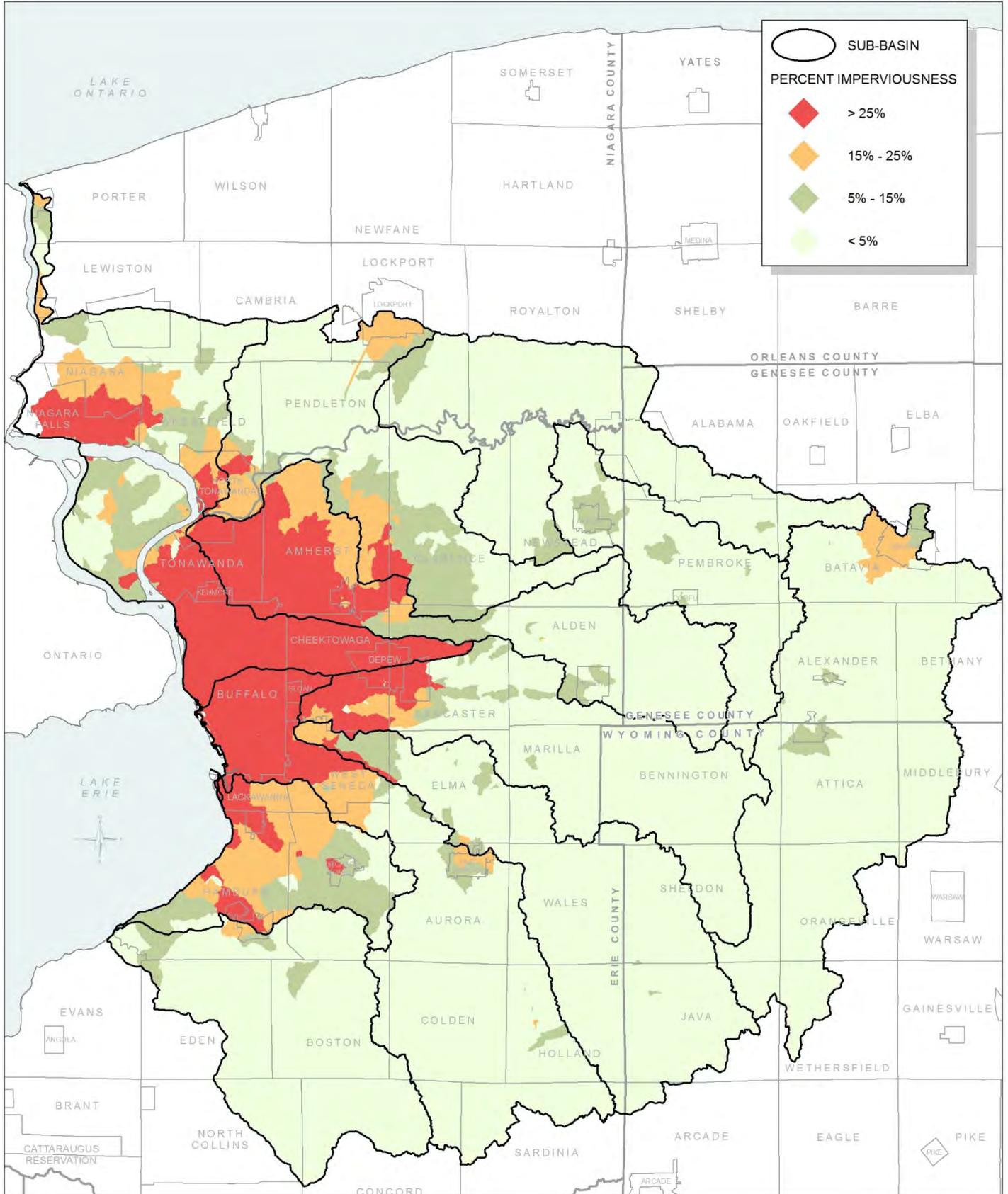
Map Notes:
 Station scores from Biological Assessment Profiles (BAP) and Rotating Integrated Basin Studies (RIBS) Water Quality Assessment through the NYS Waters Monitoring Program. Predicted scores were derived by NYS Freshwater Conservation Blueprint Project, Phases I and II: Freshwater Systems, Species, and Viability Metrics (NYSDEC, Dec 2011).

MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE NYS DEPARTMENT OF STATE IN SUPPORT OF THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

**Biological Assessment Profiles (BAP)
 Observed and Predicted**
 SAMPLING YEARS: 2010, 2005, & 2001
NIAGARA RIVER WATERSHED

Map 2.3 Percent Impervious Land Cover by Sub-Basin Niagara River Watershed

11.REV01.2014-0311

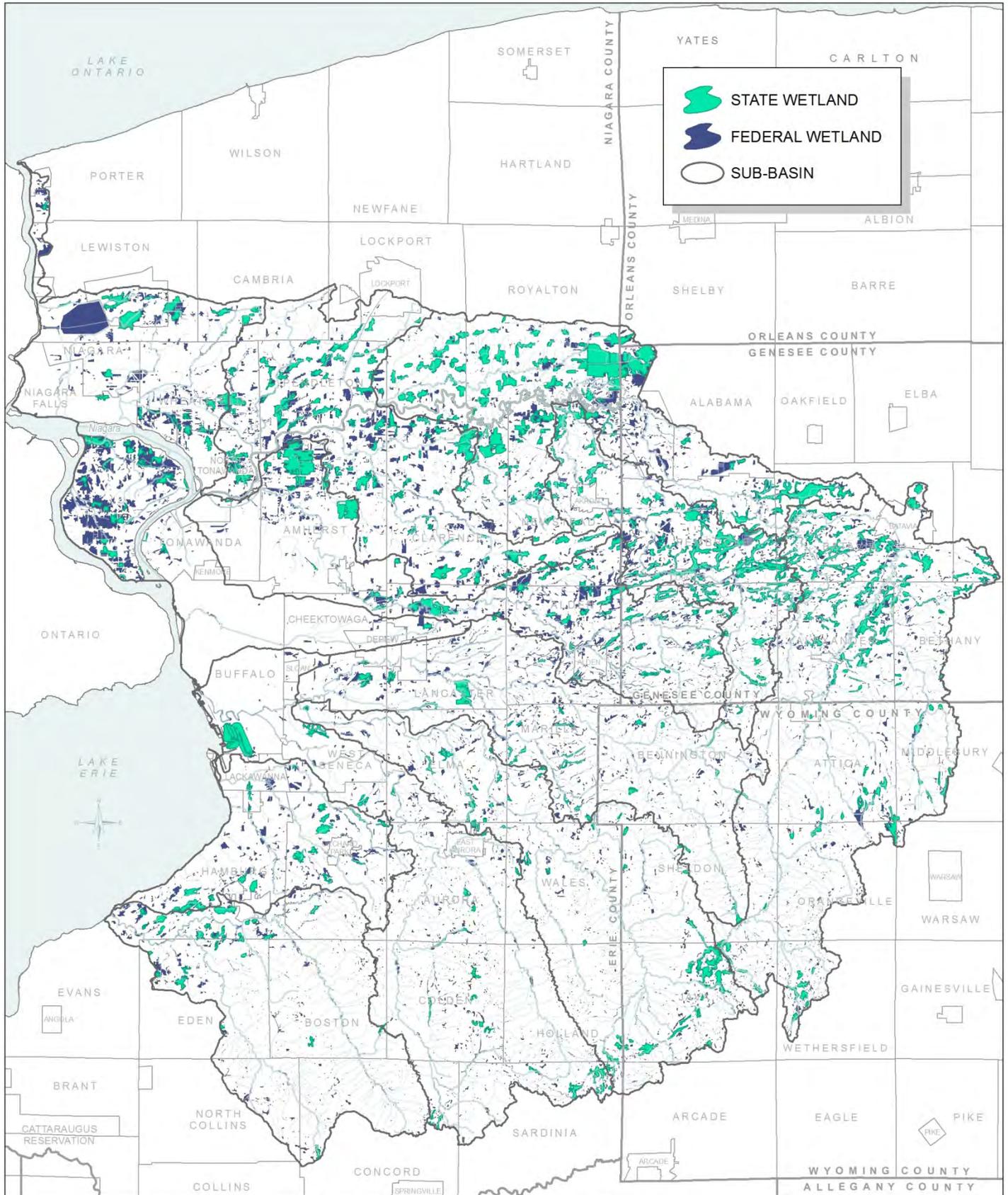


Map Notes:
 NOAA LULC Dataset, 2005 - Developed categories. 1:100000 USGS NHDPlus Waterway dataset with catchments.
 Procedure documented in Aug 6, 2012 GIS Progress Report.

**Percent Impervious Land Cover
 by Sub-Basin
 NIAGARA RIVER WATERSHED**

Map 2.4 State and Federal Wetlands Niagara River Watershed

07.REV01.2014-0311



Map Notes:
 State wetland designations by New York Department of Environmental Conservation, current to April 2010. Obtained through NYS GIS Clearinghouse. Federal wetland designations by United States Fish and Wildlife Service National Wetland Inventory, current to July, 2010.

**State and Federal Wetlands
 NIAGARA RIVER WATERSHED**

MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE NYS DEPARTMENT OF STATE IN SUPPORT OF THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

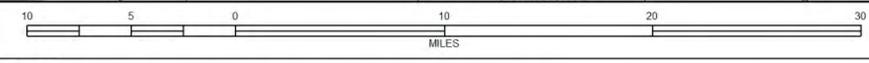
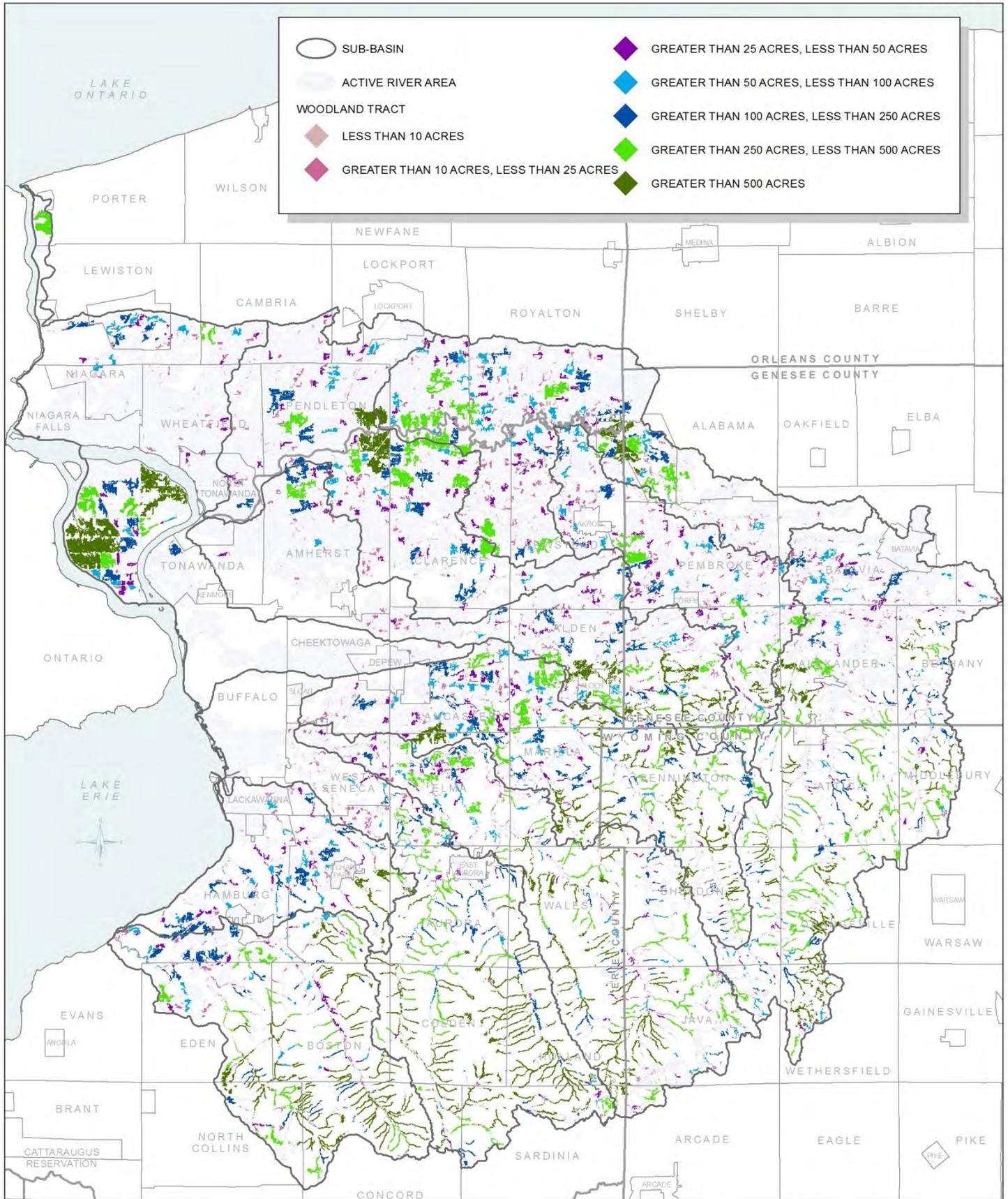
NIAGARA RIVER HABITAT CONSERVATION STRATEGY

MARCH, 2014

BUFFALO NIAGARA RIVERKEEPER®

Map 2.5 Woodland Tracts within the Active River Area Niagara River Watershed

08.REV01.2014-0311



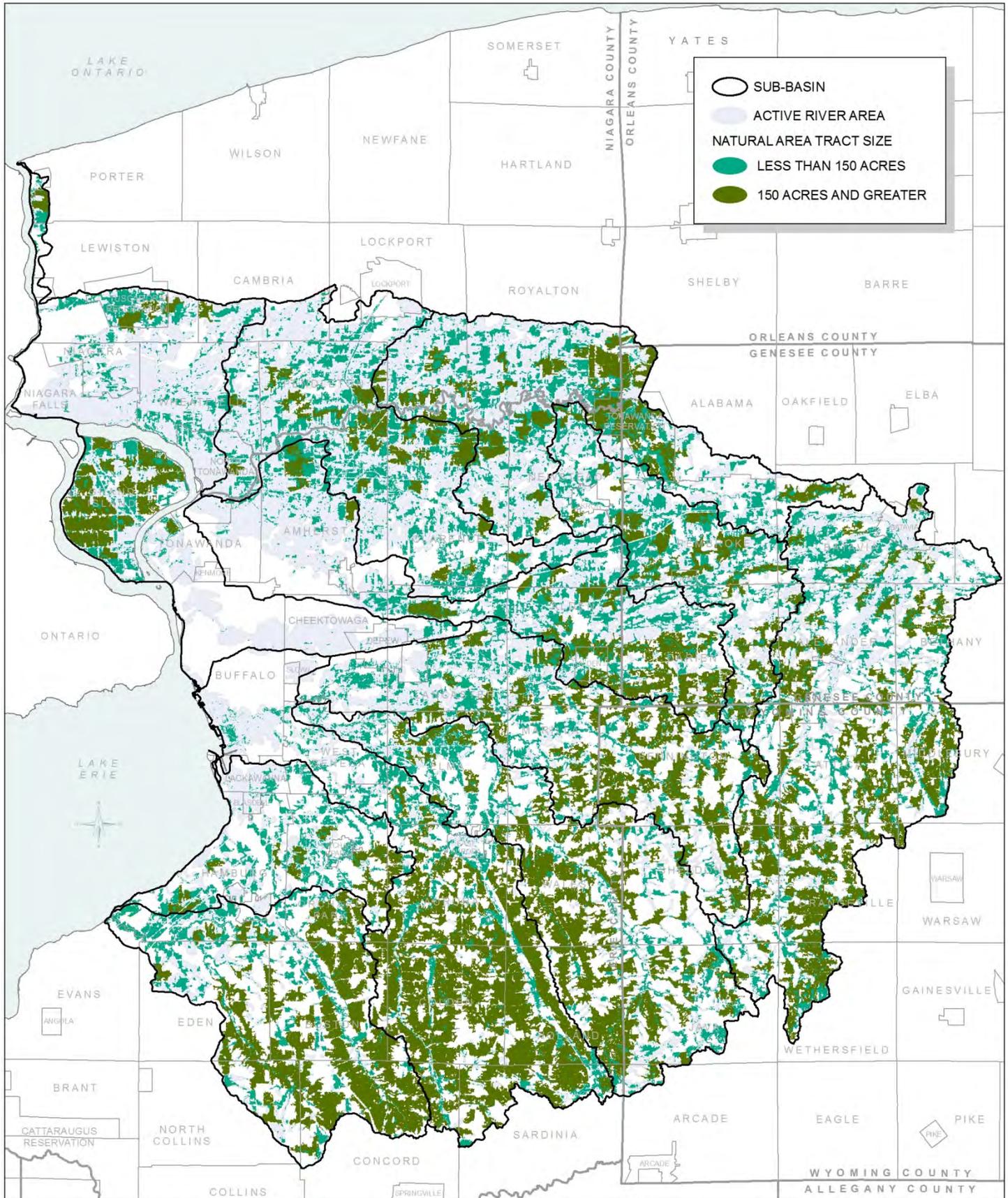
Map Notes:
Woodland tracts from NOAA Coastal Services Land Use / Land Cover, 2005.
Active River Area developed by Buffalo Niagara Riverkeeper.

**WoodlandTracts
within the Active River Area
NIAGARA RIVER WATERSHED**

MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE NYS DEPARTMENT OF STATE IN SUPPORT OF THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

Map 2.7 Natural Areas Within and Continuous with the Active River Area Niagara River Watershed

08.REV01.2014-0311



Map Notes:
 Natural Areas are Woodland, Wetland, and Grassland/Shrubland Land Cover Classes within the NOAA Coastal Services Land Use / Land Cover dataset, 2005. Active River Area developed by Buffalo Niagara Riverkeeper.

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MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE NYS DEPARTMENT OF STATE IN SUPPORT OF THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

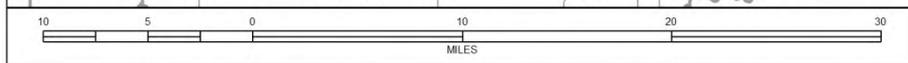
**Natural Areas
 Within and Continuous with
 the Active River Area
 NIAGARA RIVER WATERSHED**

NIAGARA RIVER HABITAT CONSERVATION STRATEGY

MARCH, 2014

Map 2.8 Ecoregions Niagara River Watershed

12.REV01.2014-0311

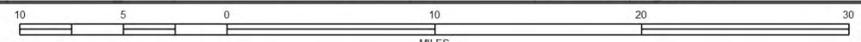
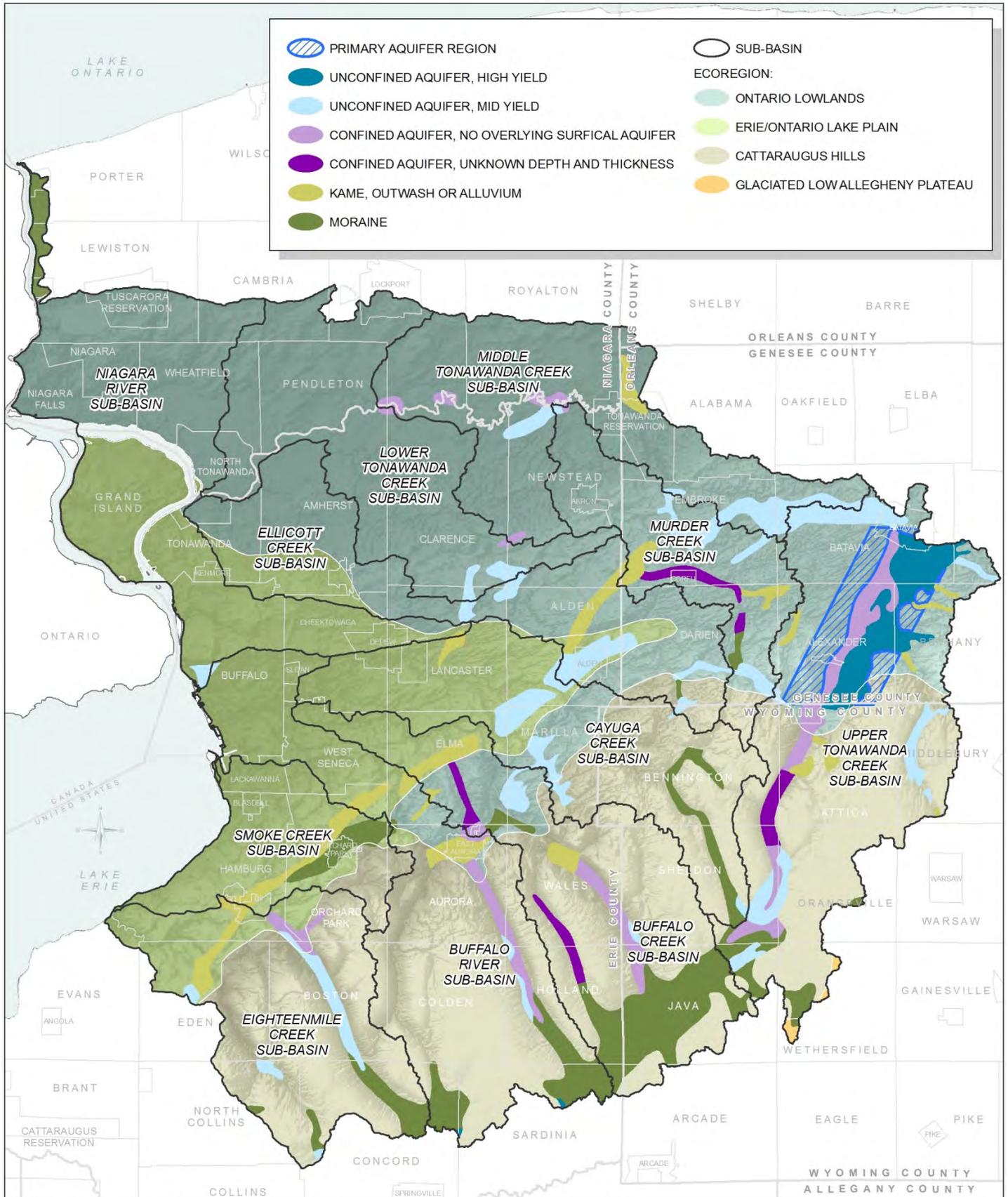


Map Notes:
 Level IV EPA ecoregions have been derived from Omernik (1987) and from refinements of Omernik's framework that have been made for other projects. More information: http://www.epa.gov/wed/pages/ecoregions/level_iii_iv.htm
 National Elevation Data (NED) obtained through USDA NRCS Geospatial Data Gateway, 30m resolution.

Ecoregions
NIAGARA RIVER WATERSHED

Map 2.9 Ecoregions and Aquifers Niagara River Watershed

01.REV01.2014-0311



Map Notes:
 Level IV EPA ecoregions have been derived from Omernik (1987) and from refinements of Omernik's framework that have been made for other projects. More information: <http://www.epa.gov/wed/pages/ecoregions.htm>
 The aquifers represented resulted from an effort by NYS DEC to facilitate the identification of the location and extent of significant unconsolidated aquifers; those that consist of sand and gravel and yield large supplies of water to wells.

**Ecoregions and Aquifers
 NIAGARA RIVER WATERSHED**

Chapter 3: Sub-Basin Reports

Cattaraugus Hills Ecoregion

Eighteenmile Creek, Buffalo River, Buffalo Creek, Cayuga Creek, and Upper Tonawanda Creek Sub-basins

The Cattaraugus Hills uplands include the Erie and Wyoming County forests, several large county “conservation parks;” the one thousand acre Carlton Hill State forest and multiple-use area; and many large wooded tracts of private land. In terms of ecological function, these upland woodlands surrounding first, second and third order streams supply high quality groundwater and nutrients that are key to water quality and aquatic habitat in the Niagara River Watershed. Besides their food and shelter habitat benefits, mature forests help fix the soil, maintain and regulate stream flow and keep the land and water cool. Gaging stations on Buffalo, Cayuga and Cazenovia Creeks show the average groundwater component of streamflow in these tributaries is between 41% and 45%.

Deciduous forests are dominant over mixed or evergreen forests. Common deciduous forest types include beech-maple mesic, maple-basswood rich mesic, successional northern hardwood, and successional southern hardwood. Eastern hemlock, white pine and eastern cedar are among the dominant native evergreen species. After the counties acquired several thousand acres of abandoned agricultural and forested land in the early 1900s, the Civilian Conservation Corps was put to work planting fast-growing conifers for soil regeneration and future harvest. Large segments of the 13 Erie County forests (ten lots, or 56% of the total acreage, are in the Niagara River Watershed) were planted with red, white and scotch pine, norway spruce and european larch. Much of this was never harvested and is slowly succeeding to native hardwood trees, shrubs and herbaceous understory.

Most of the large forest tracts in the watershed are in the Cattaraugus Hills portions of the five sub-basins. Collectively they include over 200 tracts of wooded riparian forest greater than 50 acres in size and 100 meters wide spanning a waterway. They also collectively include over 75 tracts of “core forest” defined as unbroken blocks, greater than 500 acres and greater than 100 meters from a road. Core forests support a broad diversity of species and are considered substantial enough to withstand damages associated with climate change (Jalava, 2010).

Lack of protection, lack of ecology-based management plans, lack of continuous riparian buffers, and fragmentation are all identified as critical threats to forests and other natural areas in these upland sub-basins. For example, although on average 76% of the Active River Area and contiguous forest or parkland is classified by NOAA as natural area, only about 16% of that land is semi-protected, and not necessarily managed for ecological values (see Chapter 2).

One strategy for publicly-owned forests and parklands is to evaluate their ecological values against silviculture or other resource extraction values and revise management plans accordingly. A second strategy is to identify priority core, riparian, and connecting forest parcels on private lands for public acquisition or conservation easements. A third strategy is to identify those cool-water headwater tributaries that support native or naturalized trout and other at-risk aquatic species and make sure they are not compromised by other threats including barriers or channel degradation. Strategic management of the headwater ARA will help conserve and restore healthy land and water downstream.

Most of the sites chosen for field investigation in this ecoregion were selected on the basis of these upland opportunities and constraints related to forest and stream habitat and function.

3.1 Eighteenmile Creek

Biodiversity Features

Eighteenmile Creek is a large, meandering stream whose upland forests and spring-fed headwater tributaries are part of a functional landscape providing natural overhanging cover, material contribution and good water quality to the system. Mid-reaches of both the main stream and principal tributary, South Branch, flow through steep-sided, undeveloped, wooded gorges with 70-150 foot high shale cliffs, cold springs and seeps, and talus communities of probable biodiversity significance. The lower half-mile is low gradient, 75-100 feet wide, with a broad floodplain, including potential patches of clayplain forest and/or limestone woodland with abundant swamp white oak.



The Eighteenmile Creek Active River Area has the highest percentage of woodland cover (48%) and natural area cover (60%) of all sub-basins in the watershed. In its mid reaches Eighteenmile Creek is one of three Niagara watershed sub-basins with tributary gorges to Lake Erie. The Nature Conservancy ranked Eighteenmile Gorge highest as a functional landscape based on natural land cover within the gorge, relative lack of dams and diversions, large roadless blocks, and good water quality (Hunt, 2002). The gorge has been designated a “significant fish and wildlife area” by the NYS Coastal Management Program, a “critical environmental area” by the Town of Hamburg, and a “Conservation Park” by Erie County.

Not surprisingly, given the amount and quality of riparian forest, canopy cover and the relatively low overall impervious surface, Eighteenmile Creek also has the highest amount of predicted non-impaired aquatic habitat in the Niagara River Watershed. Stream channels are mainly bedrock with cobble, gravel, sand and silt. Listed species include the northern pygmy clubtail dragonfly (in the headwaters); queen snake and freshwater drum in the lower creek near Lake Erie. From the Eighteenmile Gorge at the fork of the main and south branches downstream to the mouth, the creek is a State-designated fishing access area, known for its steelhead and smallmouth bass runs in the spring.

Conservation potential is high in this sub-basin. Less than 20% of the riparian forest is protected. The top ranking matrix forest, Fowlerville Forest is entirely privately owned. Three upland county forests, totaling over 600 acres are not explicitly managed for ecological values. Undeveloped county parks, including Eighteenmile Gorge and the 90-acre Shale Creek natural area adjacent to Chestnut Ridge County Park contain fragile areas that will benefit from trail re-routing or other public access management strategies.

BUFFALO NIAGARA RIVERKEEPER

Municipalities: Towns of Hamburg, Eden, Evans, North Collins, Orchard Park, Boston, Colden, and Concord; Village of Hamburg

Total waterways: 274 miles including South Branch, Newman Creek, and Hampton Brook

Total sub-basin: 76,843 acres

Biodiversity features by percent of ARA land cover:

- ARA: 18,547 acres or 24% of sub-basin
- Wetlands (NOAA): 1,596 acres or 9%
- Woodlands: 8,922 acres or 48%
- Grass/Shrublands: 629 acres or 3%
- Natural Areas
(% of ARA and continuous land that is natural): 37,245 acres or 84% of study area



*South Branch Gorge-near confluence with Eighteenmile Creek;
Photo credit: Amanda White*

Viability assessment:

(amount, condition, connectivity) Table 3.1

- Aquatic habitat: GOOD
- Wetlands: FAIR
- Woodlands: GOOD
- Grass/Shrublands: POOR
- Natural areas: FAIR – GOOD

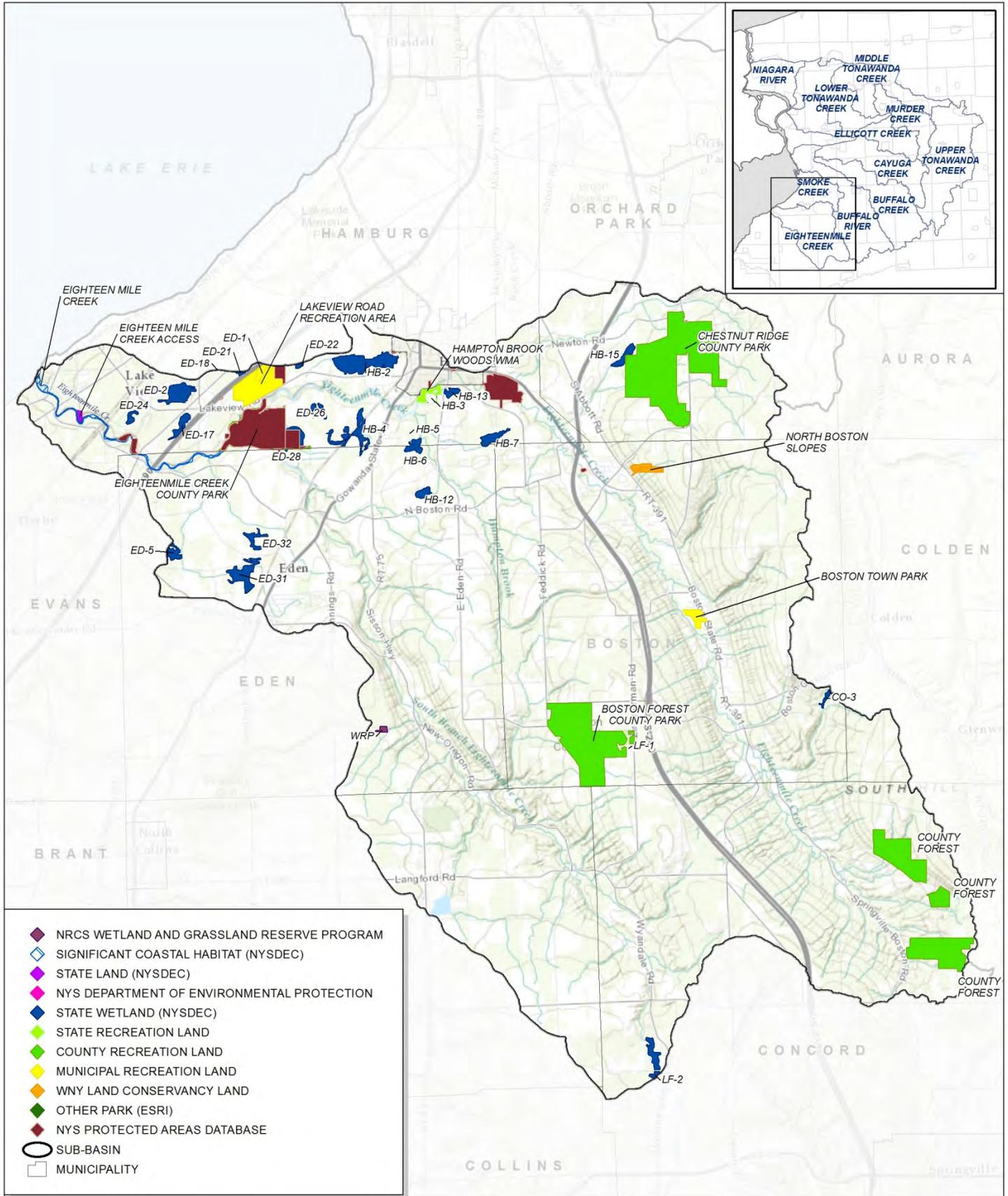
Threats:

- Aquatic habitat: Erosion/sedimentation (lack of riparian buffers); runoff; fish barriers
- Wetlands: Loss of acreage; invasive species (road management practices)
- Woodlands: Lack of ecological management plans; lack of protection
- Grasslands: Management practices on agricultural and public lands
- Natural areas: Lack of protection; fragmentation (utility, roads, rail)

Conservation Strategies:

- Assess state, county, municipal and other public lands and management plans for opportunities to increase ecological function and biodiversity values
- Identify large and/or connecting headwater forest tracts for acquisition or easements
- Promote natural buffers for erosion control for high quality aquatic habitats like South Branch
- Partner with municipality, Natural Resource Conservation Service (NRCS), and/or angler groups to remove/remediate barriers to flow and fish movement

Map 3.1 Semi-Protected Lands within the Active River Area Eighteenmile Creek Sub-Basin



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 EIGHTEENMILE CREEK SUB-BASIN**

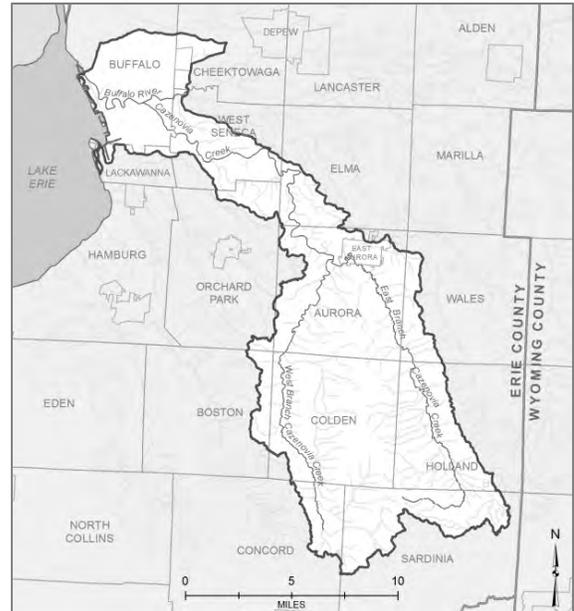
Table 3.1 Eighteenmile Creek

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 1%	5.0-7.5 89%	7.5-10 10%	
	Condition	% impervious surface	>20%	10-20%	5-10%	<5% 3.5%	
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60 51	60-69	70-79 75,77	>80	
	Landscape Context	Known barriers to migratory fish species					Y
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					Y – trout spp
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37% 26%	38-50%	>50%	704a / 2,754a
	Condition	Number of Class 1s					1
Woodlands	Condition	Functional riparian forest: >50 acres and >100m wide					28 tracts (20,531a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					15 tracts (12,270a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	11.4%				11.4%
Natural Areas	Size	% of study area (ARA and cont.) that is natural cover		<60%	>60% 84%		84%
	Condition	% semi-protected	<25% 17%	<50%	>50%		17%
	Condition	Number of tracts >150 acres					31 tracts

3.2 Buffalo River

The Buffalo River sub-basin varies across ecoregions—from high quality upland forests and streams down to the urban-industrial corridor and “Area of Concern” approaching Lake Erie. Headwaters include the East and West Branches of Cazenovia Creek, which rise in the Towns of Sardinia and Concord respectively, and flow northwest to join in the Village of East Aurora. This sub-basin has 31 tracts of riparian forest greater than 50 acres in size and at least 100 meters in width from water’s edge, and 49 tracts of unbroken core forest greater than 500 acres. As with streams originating in the Cattaraugus Hills, the cold Buffalo River headwaters support trout and other aquatic communities of statewide significance, (Hunt, 2002) but are compromised by barriers limiting fish passage.



The industrialized lower six miles of the Buffalo River was designated a Great Lakes Area of Concern (AOC) in 1987, primarily due to contaminated sediments from the steel and chemical industries that once lined the river. Most of these sediments have been removed. However, while the shoreline transitions away from industrial uses, the lower river itself remains a federally-designated navigation channel and is subject to dredging to maintain a depth of 22 feet. Today, although 48 fish species are found in the river system, including 6 listed species, the dredged zone is likely a low oxygen barrier to walleye and other species attempting to migrate upstream to spawn. The sub-basin as a whole is 11.9% impervious surface or “fair” for aquatic habitat with most of that occurring in the lake plain. Wetlands protection is relatively high at 41% and includes six listed marsh bird species.

This sub-basin also includes about four miles of Lake Erie shoreline and a few semi-protected habitats inside the harbor breakwalls such as Times Beach, Bell Slip and Tiff Nature Preserve with its remnant of what was once one of the most extensive and productive coastal marshes on Lake Erie. These areas still play an important role in the life cycles of many resident and migratory fish and bird species, including lake sturgeon, and nesting colonies of terns and gulls. Several conservation strategies already exist for these habitats through the Buffalo and Niagara River RAPs, the Niagara River Globally Important Bird Area, and Great Lakes Fishery Commission fish community objectives.

In terms of acreage, the greatest habitat conservation opportunities in this sub-basin lie in the publicly-owned or otherwise protected upland landscapes, including several Erie County forests, the botanically-rich Protection Bog, eight DEC Class 1 wetlands, and recreational lands such as parks and ski resorts which have potential to enhance ecological values while still accommodating recreational uses. Two large grassland areas—the state-owned Knox Farm and Erie County owned Sprague Brook Park—are good candidates for management plans and practices in support of grassland breeding birds.

BUFFALO NIAGARA RIVERKEEPER

Municipalities: City of Buffalo; Villages of East Aurora and Sloan; Towns of West Seneca, Elma, Aurora, Colden, Holland, Concord, Cheektowaga, Boston, Wales and Sardinia

Total waterways including Buffalo River, Cazenovia Creek: 312 miles

Total sub-basin: 105,392 acres

Biodiversity features by percent of ARA land cover:

- ARA: 23,838 acres or 23% of sub-basin
- Wetlands (NOAA): 2,036 acres or 8.61%
- Woodlands: 9,130 acres or 39%
- Grass/Shrublands: 770 acres or 3%
- Natural Areas
(% of ARA and continuous natural tracts):
52,468 acres or 82% of study area



Sprague Brook; Photo credit: Kerrie Gallo

Viability assessment:

(amount, condition, connectivity) Table 3.2

- Aquatic habitat: FAIR – GOOD
- Wetlands: FAIR – GOOD
- Woodlands: GOOD
- Grasslands: POOR
- Natural Areas: FAIR – GOOD

Threats:

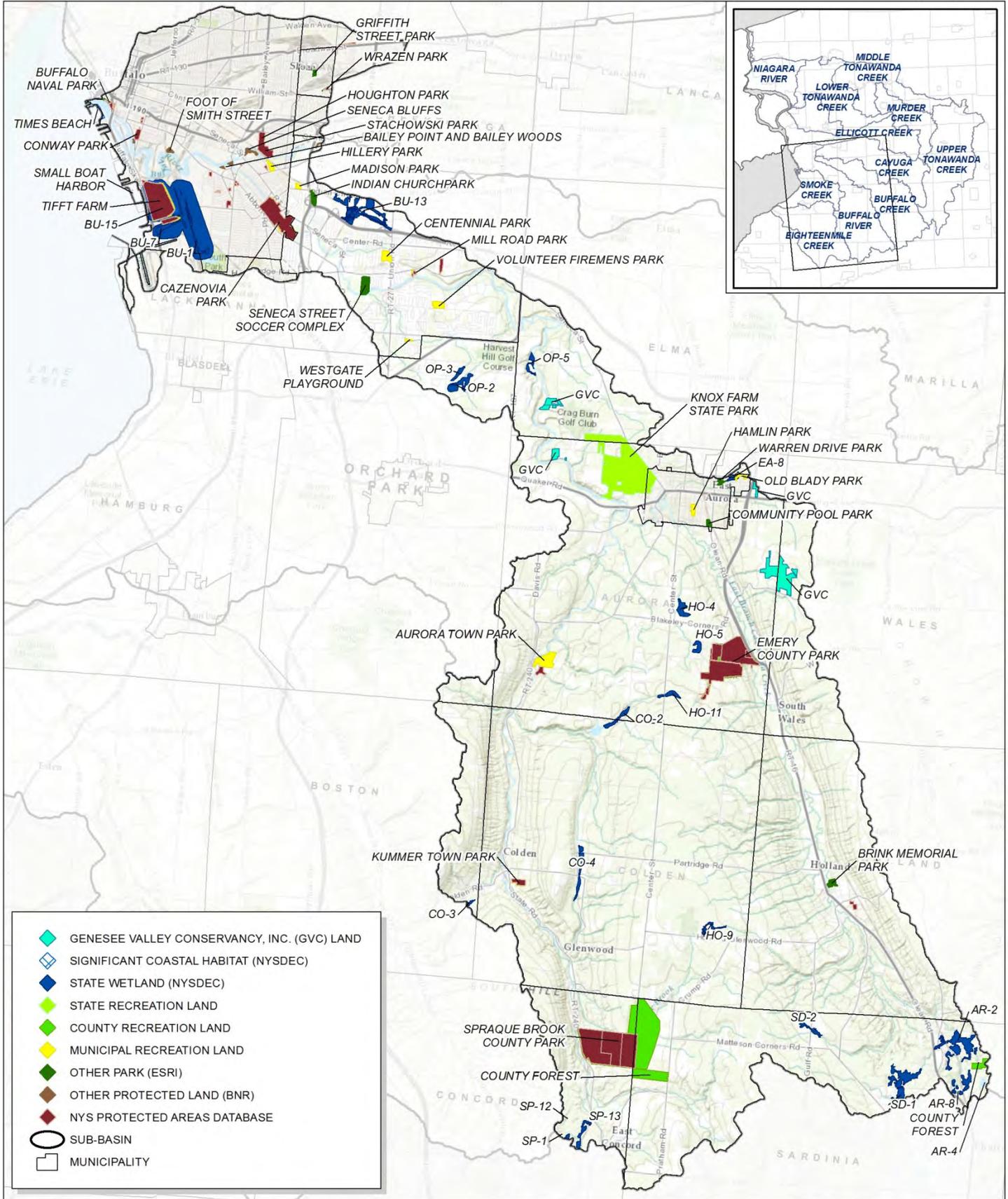
- Aquatic: Lack of riparian buffers; barriers to fish movement; channelization (lower river)
- Wetlands: Loss of acreage; highway department practices (spreading invasives/ditching)
- Woodlands: Lack of ecological management plans; lack of protection (land clearing)
- Grasslands: Mowing (agricultural practices); management practices on public lands
- Natural areas: Lack of protection; Fragmentation/Loss of connectivity

Conservation strategies:

- Assess public lands and management plans for opportunities to increase ecological values
- Partner with municipalities, Trout Unlimited (TU), NRCS to remove/remediate barriers to flow and fish movement
- Grasslands/wetlands: Assess large tracts for habitat values and opportunities for conservation of at-risk species
- Lower river and lakeshore: support ongoing shoreline, channel and floodplain conservation efforts

Map 3.2 Semi-Protected Lands within the Active River Area Buffalo River Sub-Basin

14C.REV01.2014-0311



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands within the Active River Area
 BUFFALO RIVER SUB-BASIN**

Table 3.2 Buffalo River

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0	5.0-7.5	7.5-10	
	Condition	% impervious surface	>25%	10-20% 11.9%	5-10%	<5%	11.9%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60 56, 57	60-69	70-79	>80 85	
	Landscape Context	Known barriers to migratory fish species					Y
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					Y
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37%	38-50% 41%	>50%	1,443a /3,524a
	Condition	Number of Class 1s					8
Woodlands	Condition	Functional riparian forest: >50 acres and >100m wide					31 tracts 38,622 acres
	Condition	Core forest: unbroken blocks >250 acres, >100m from road					24 >250a (8,468a) 25 >500a (22,662a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	8.12%	<50%	>50%		8.12%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60%	>60% 82%	82%	82%
	Condition	% semi-protected	<25%	<50%	>50%		10%
	Condition	Number of tracts >150 acres					20 tracts

3.3 Buffalo Creek

Buffalo Creek may have the most miles of high quality, headwater trout streams of all the Cattaraugus Hill sub-basins. Six DEC Class 1 wetlands occur in the source areas; several are hydraulically connected to the underlying aquifer and support heritage strains of brook trout. Queen snake and two listed species of freshwater mussel, fragile papershell and slippershell, are found in mid-reaches, plus several pocketbook mussel were observed there in 2013, although listed as locally extirpated (CWCS, 2010).

Upland and mid-reaches have significant tracts of natural land, including three County forests plus the 384-acre Beaver Meadow Audubon Center and the 789-acre Hunter's Creek County Park. Almost 80% of the ARA and adjacent land is natural area supporting at least eight listed bird species that require large, mixed-cover natural areas to survive and breed. However, only 16% is semi-protected.



The sub-basin includes 44 tracts of riparian forest, 39 tracts of core forest larger than 500 acres, and six reported species of listed woodland birds, plus several others observed but not yet documented in the state records. Wetlands are also an important feature in this sub-basin which includes three rare wetland communities as well as the kettle pond wetlands of Beaver Meadow and the County-owned Protection Bog, subject of several botanical studies.

Given the sprawl that has taken place in the lower Buffalo Creek basin, and the growing awareness of the municipalities and local groups of the value in their natural assets, this sub-basin offers good opportunity for partnerships in stream corridor, floodplain and farmland conservation.



Diverse habitats at Beaver Meadow; Photo credit: AES

BUFFALO NIAGARA RIVERKEEPER

Municipalities: Towns of West Seneca, Elma, Marilla, Bennington, Aurora, Wales, Sheldon, Holland, Java, Sardinia, and Arcade

Total waterways: Hunters Creek and Pond Brook tributaries: 354 stream miles

Total sub-basin: 93,165 acres

Biodiversity features by percent of ARA land cover:

- ARA: 22,944 acres or 5.5% of sub-basin
- Wetlands (NOAA): 2,329 acres or 10%
- Woodlands: 9,168 acres or 40%
- Grass/Shrublands: 868 acres or 4%
- Natural Areas (% of ARA and continuous tracts in natural cover):
38,894 acres or 79% of study area

Viability assessment:

(amount, condition, connectivity) Table 3.3

- Aquatic habitat: GOOD
- Wetlands: GOOD
- Woodlands: GOOD
- Grass/Shrublands: POOR
- Natural areas: FAIR – GOOD



*Blossom Falls, Elma, NY;
Photo credit: Margaret Wooster*

Threats:

- Aquatic: Lack of riparian buffers/erosion; barriers to fish movement; loss of headwater spring connectivity and quality
- Wetlands: Loss of acreage; highway department practices (spreading/ditching)
- Woodlands: Lack of ecological management plans; lack of protection
- Grasslands: Mowing (ag practices); management practices on public lands
- Natural Areas: Lack of protection; fragmentation (utility, roads, rail)

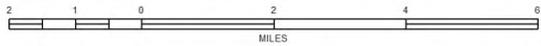
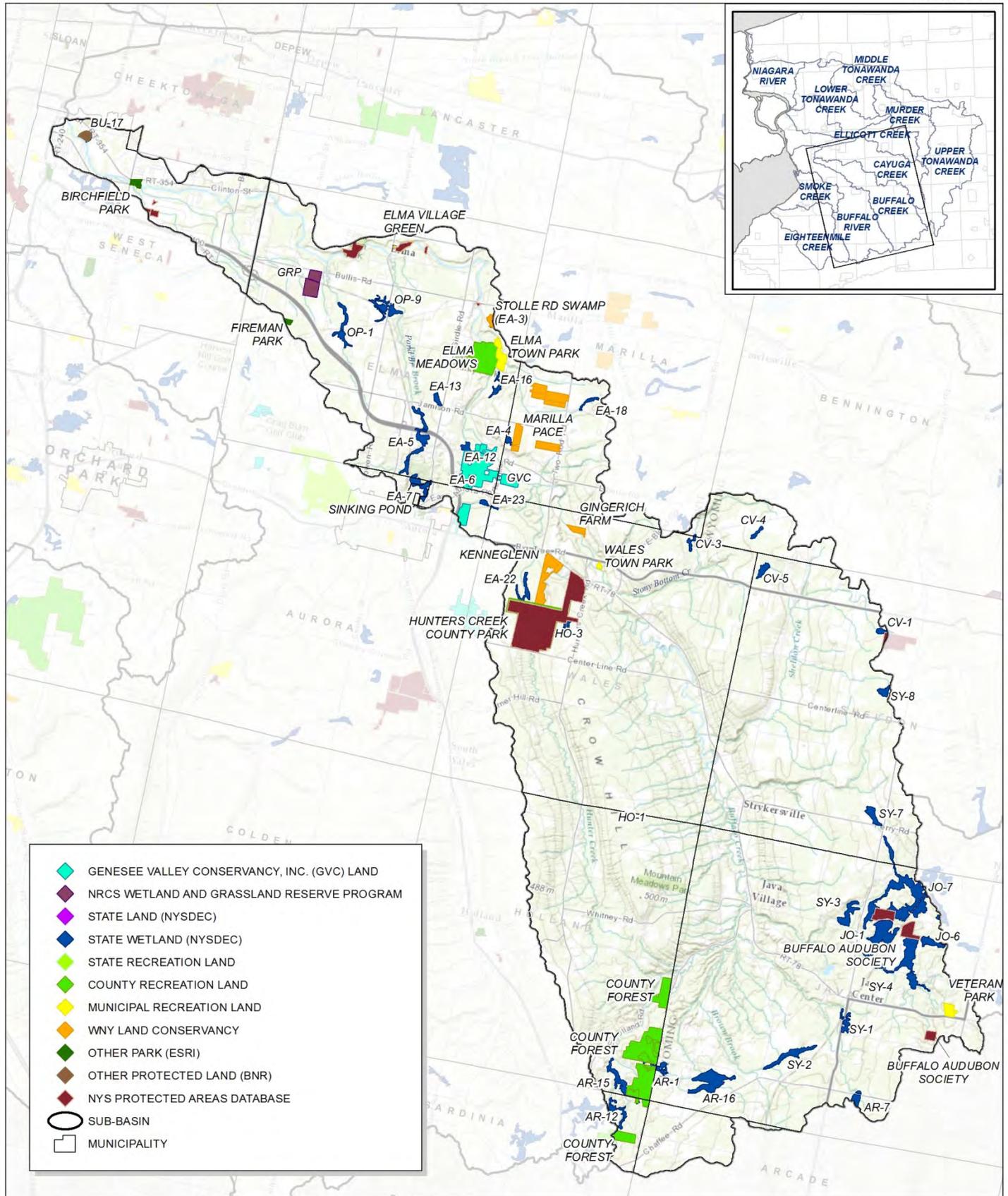
Conservation strategies

- Aquatic: Identify opportunities to build on mid and upper watershed town partnerships for stream corridor, floodplain and farmland conservation (Elma, W. Seneca, Marilla, etc.)
- Aquatic: This is a priority sub-basin for work with DEC, TU and other partners on improving trout habitat including barrier remediation (upper tribs)
- Wetlands: Identify areas where headwater spring and wetlands protection is most critical and feasible (e.g. Beaver Meadow, Protection Bog)
-
- Forests: Identify conservation opportunities on county forest and park land
- Parks: Identify practices to conserve ecological values in county and town parks



*Native Niagara River Watershed Species:
Pocketbook mussel; Photo credit: Anna Scime*

Map 3.3 Semi-Protected Lands within the Active River Area Buffalo Creek Sub-Basin



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 BUFFALO CREEK SUB-BASIN**

Table 3.3 Buffalo Creek

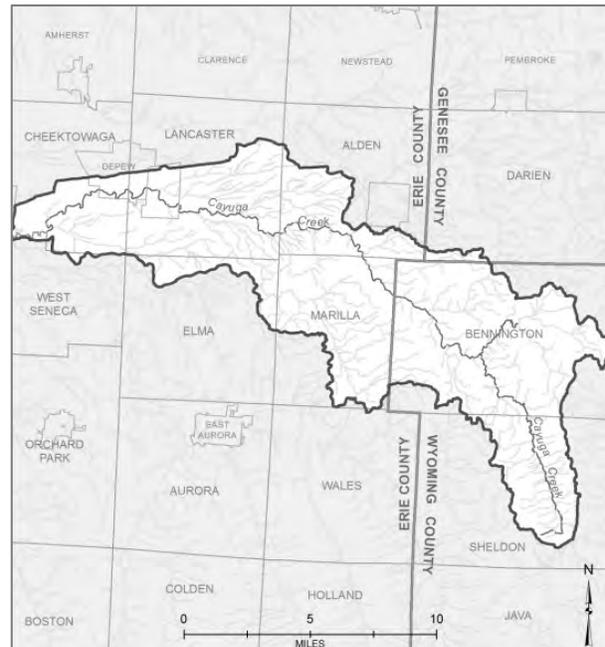
- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 5%	5.0-7.5 92%	7.5-10 3%	
	Condition	% impervious surface	>20%	10-20%	5-10% 3.8%	<5%	3.8%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60 47	60-69 67, 6.13	70-79 74, 70	>80	
	Landscape Context	Known barriers to native migratory fish species					Y – trout
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					# & status
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37% 34%	38-50%	>50%	1,240a / 3,683a
	Condition	Number of Class 1s					7
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide, spanning a waterway					44 tracts (24,373 a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					12 tracts (10,455a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	8.63%	<50%	>50%		8.63%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60%	>60% 79%		79%
	Condition	% semi-protected	<25% 16%	<50%	>50%		16%
	Condition	Number of tracts >150 acres					39 tracts

3.4 Cayuga Creek

Of the five upland sub-basins, Cayuga Creek has the least amount of land area in the Cattaraugus Hills Ecoregion (48%). The remaining Erie/Ontario Lake Plain and Lowlands are comparatively developed. Predicted BAP scores are correspondingly lower, with 17% of the stream miles considered “moderately impacted.” Silt, sedimentation and high water temperatures related to streambank erosion, storm runoff and lack of canopy are suspected of stressing fisheries in segments of Cayuga Creek in Cheektowaga.

The 1993 Buffalo River RAP baseline habitat study recommended using the creek upstream from its confluence with Buffalo Creek to the county-owned Overflow Retention Facility (ORF) as an AOC reference area for aquatic habitat restoration, as this stretch appears to be the least manipulated of the three lower tributaries. Stream bank cover, natural shoreline, boulders, pools, riffles and snags provide conditions suitable for many native fish. Four listed fish species: northern brook lamprey, Iowa darter, bigeye chub, longear sunfish; and four listed mussel species are reported.



Little Buffalo Creek, Cayuga Creek’s main tributary, contains many good reaches of aquatic habitat, which would be improved if homeowners could be encouraged to maintain or restore vegetated buffers along the banks. Dams, including one at Como Lake and another a mile upstream on Little Buffalo Creek, may impede movement and reproduction of native aquatic species as well as steelhead stocked in Cayuga Creek below the dam and brown trout stocked in Little Buffalo Creek above the dam.

Invasive species like Japanese knotweed are pervasive along lower Cayuga Creek. Of the 4,779 acres of mapped wetlands, only 1,082 or 23% are regulated by the DEC. One listed marsh bird species, one listed wetland plant, and three listed grassland bird species are recorded. The 280-acre Reinstein Woods State Nature Preserve contains a unique 80-acre forest of old growth cherry, sugar maple and beech.

The Town of Cheektowaga has designated its freshwater wetlands, Cayuga Creek and its 100-year floodplain, Reinstein Woods Preserve and its surrounding 400-foot buffer, and Stiglemeier Town Park as “critical environmental areas,” providing greater protection against development incursions (see Chapter 5). Besides these CEAs and Como Lake County Park, natural areas in the Cayuga Creek ARA are mainly privately owned, with only 12% semi-protected. A conservation overlay district along Cayuga and Little Buffalo Creek could help set up a review process to encourage best management practices designed to reverse degradation trends and benefit habitat and stream function over time.

BUFFALO NIAGARA RIVERKEEPER

Municipalities: Towns of Cheektowaga, Lancaster, Alden, Elma, Marilla, Bennington, Darien, Sheldon; Villages of Lancaster and Depew

Total waterways including Little Buffalo, Slate Bottom, Plum Bottom Creeks: 356 stream miles

Total sub-basin: 81,385 acres

Biodiversity features by percent of ARA land cover:

- ARA: 33,037 acres or 41% of sub-basin
- Wetlands (NOAA): 2,545 acres or 8%
- Woodlands: 12,247 acres or 37%
- Grass/Shrublands: 1,128 acres or 3%
- Natural Areas
(% of ARA and continuous with natural land cover): 32,758 acres or 66% of study area

Viability assessment:

(amount, condition, connectivity) Table 3.4

- Aquatic habitat: FAIR – GOOD
- Wetlands: FAIR
- Woodlands: FAIR - GOOD
- Grass/Shrublands: POOR
- Natural areas: POOR – FAIR

Threats:

- Aquatic: Lack of buffers; runoff: agricultural and residential; barriers to fish movement
- Wetlands: Loss of acreage; invasive species (road management practices)
- Woodlands: Lack of protection; lack of ecological management plans
- Grass/Shrublands: Management practices on agricultural and public lands
- Natural areas: Lack of protection; fragmentation

Conservation strategies:

- Policy: Pursue stream corridor conservation planning with neighboring municipalities
- Remove or modify known barriers to fish spawning
- Use “Very Good” micro-scale reference sites for restoration, including: Cayuga upstream from confluence w/ Buffalo Creek to ORF, Little Buffalo Creek segments, and Reinstein Woods.



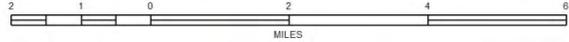
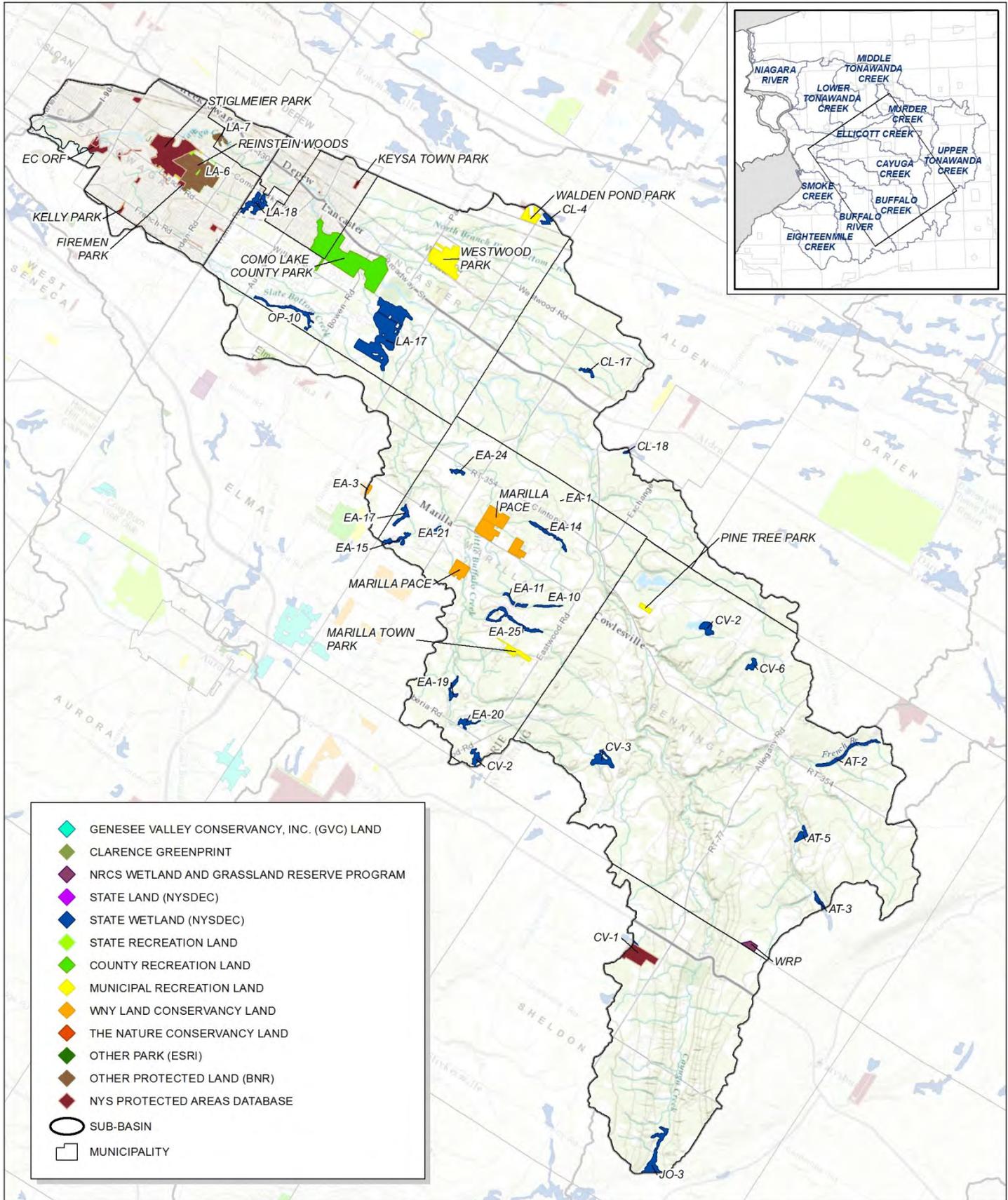
Upper Little Buffalo Creek: riffles, pools, good channel and bank stability; Photo credit: Scott Siegfried



Little Buffalo Creek Dam is 40 feet wide and 9 feet high. Photo credit: Scott Siegfried

Map 3.4 Semi-Protected Lands within the Active River Area Cayuga Creek Sub-Basin

14D.REV01.2014-0311



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 CAYUGA CREEK SUB-BASIN**

Table 3.4: Cayuga Creek

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 17%	5.0-7.5 73%	7.5-10 11%	
	Condition	% impervious surface	>20%	10-20%	5-10% 6.4%	<5%	6.4%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60 42	60-69	70-79 76	>80 85	
	Landscape Context	Known barriers to migratory fish species					Y
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					Y (but not listed)
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25% 23%	25-37%	38-50%	>50%	1,082a / 4,779a
	Condition	Number of Class 1s					6
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide, spanning a waterway					42 (20,756 a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					10 tracts (6,570a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	11.2%	<50%	>50%		11.2%
Natural Areas	Size	% study area in natural cover		<60%	>60% 65.8%		65.8%
	Condition	% semi-protected	<25%	<50%	>50%		12%
	Condition	Number of tracts >150 acres					35 tracts

BUFFALO NIAGARA RIVERKEEPER

Municipalities: Towns of Batavia, Stafford, Alexander, Bethany, Bennington, Attica, Middlebury, Sheldon, Orangeville, Java, Warsaw, Darien, and Wethersfield; City of Batavia; Villages of Attica and Alexander

Total waterways including Tannery, Stony Brooks; Little Tonawanda, Crow, Bowen Creeks: 589 miles

Total sub-basin: 127,308 acres

Biodiversity features by percent of ARA cover:

- Active River Area: 41,994 acres or 33% of sub-basin
- Wetlands (NOAA): 4,813 acres or 12%
- Woodlands: 12,820 acres or 31%
- ARA Grass/Shrublands: 2,141 acres or 5%
- ARA and continuous Natural areas: 50, 723 acres or 70% of study area

Viability assessment:

(amount, condition, connectivity) Table 3.6

- Aquatic habitat: GOOD
- Wetlands: GOOD
- Woodlands: GOOD
- Grass/Shrublands: POOR
- Natural Areas: FAIR-GOOD

Threats:

- Aquatic: Lack of riparian buffers; agricultural runoff; barriers to fish movement
- Wetlands: Loss of acreage; road management practices
- Woodlands: Lack of protection; lack of ecological management plans (invasives; overbrowsing)
- Grasslands: Management practices on agricultural and public lands
- Natural areas: Lack of protection; fragmentation (roads, utility corridors)

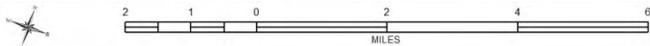
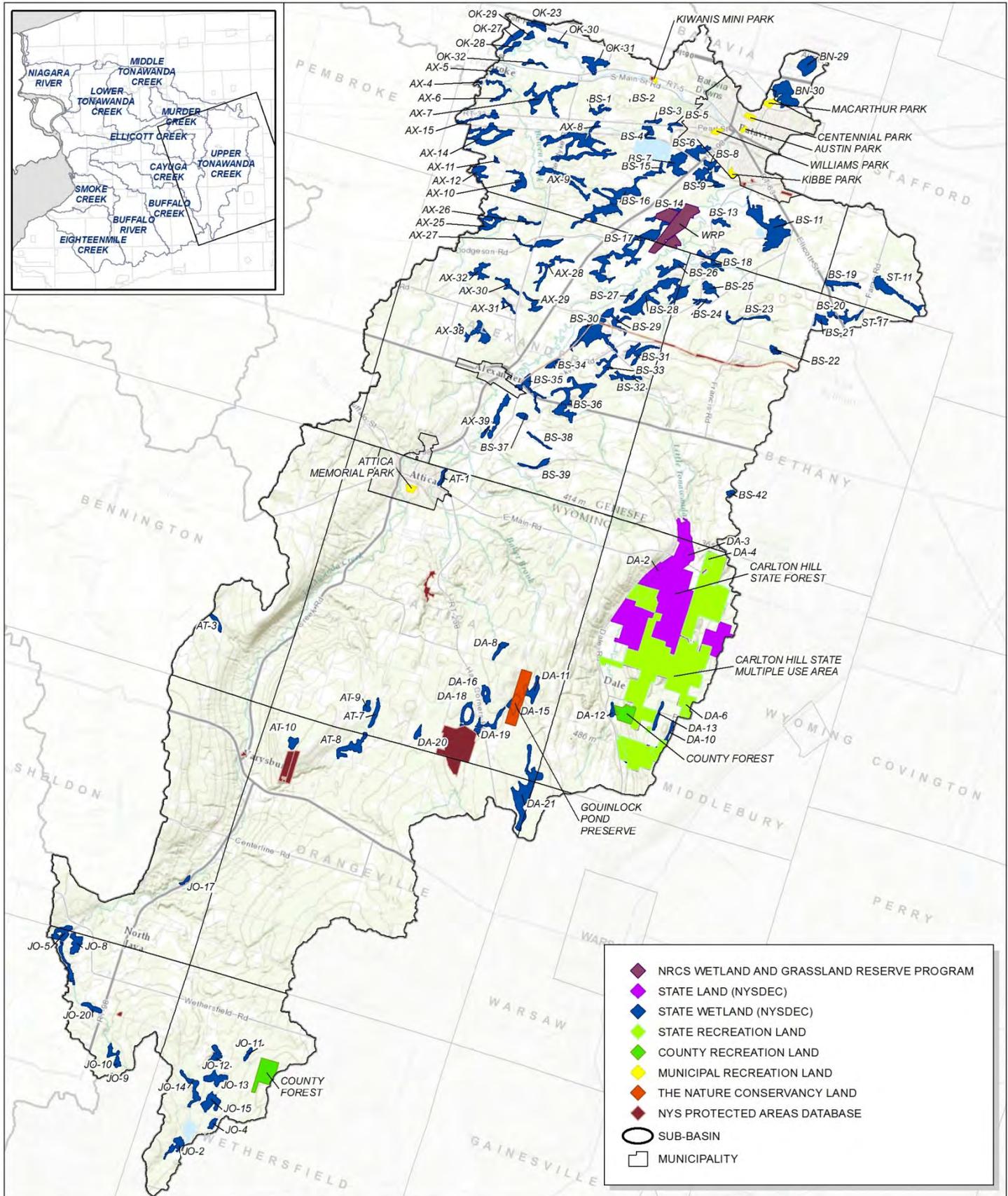
Conservation strategies:

- Assess opportunities for headwater stewardship within and across sub-basins
- Aquatic: Analyze highest BAP score sites for reference conditions to conserve/replicate
- Remediate culverts impeding trout movement
- Wetlands: Assess potential impacts and reclamation strategies for stone, sand and gravel quarries
- Woodlands: Identify opportunities to conserve/restore riparian buffers based on critical areas of need
- Natural Areas: Identify best bet opportunities (size, ownership) to acquire easements on active floodplains (Alexander)



Route 98 Bridge over Tonawanda Creek is a point-source for runoff; Photo credit: AES

Map 3.5 Semi-Protected Lands within the Active River Area Upper Tonawanda Creek Sub-Basin



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 UPPER TONAWANDA CREEK SUB-BASIN**

Table 3.5: Upper Tonawanda

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 4%	5.0-7.5 92%	7.5-10 4%	
	Condition	% impervious surface	>20%	10-20%	5-10%	<5% 3.3%	3.3%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69	70-79 79	>80	
	Landscape Context	Known barriers to migratory fish species					Y
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					Y – trout spp.
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37%	38-50% 47%	>50%	4,742a / 10,094a
	Condition	Number of Class 1s					9
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide, spanning a waterway					66 tracts (29,763a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					13 tracts (9,061a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	16.9%	<50%	>50%		16.9%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60%	>60% 70%		70%
	Condition	% semi-protected	<25%	<50%	>50%		27%
	Condition	Number of tracts >150 acres					57 tracts

Ontario Lowlands

Middle Tonawanda, Lower Tonawanda, Murder and Ellicott Creek Sub-basins

The four sub-basins that are mainly contained within the Ontario Lowlands Ecoregion have a significant amount of wetland habitat, hydric soils, and connection with underlying aquifers including the Onondaga Aquifer. Wetlands constitute an average 18% of sub-basin habitat within this ecoregion, compared to an average 9% in the Cattaraugus Highlands. Important habitat for native mussel species exists within this area. Native mussels are the most at-risk taxa in the Niagara River Watershed with 12 species in greatest conservation need plus another 17 thought to be regionally extirpated.

The thousand-acre Tonawanda Floodplain complex spans the Middle and Lower Tonawanda sub-basins and is of statewide importance as a functional floodplain and wetland habitat.

Lack of riparian buffers, erosion and runoff are identified as critical threats in these sub-basins. Data from Riverkeeper's Riverwatch program shows especially high turbidity in Ellicott, Middle and Lower Tonawanda Creeks and high conductivity in Ellicott Creek for 2011-2013 (Murawski, 2014). Aquatic life is stressed or impaired by silt and sediment from urban and agricultural runoff, and from municipal wastewater discharges in some segments. Natural function and aquatic species are also threatened by hydrologic modifications including the Erie Canal (dredging and flow reversals), water level fluctuations related to power plant operations, and flood control projects in Lower Tonawanda and Ellicott Creeks.

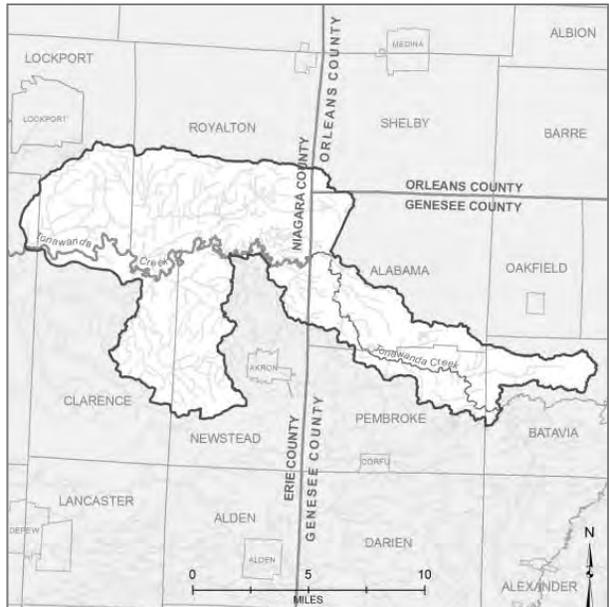
Active and abandoned stone, sand and gravel quarries are a major land use/land cover in this ecoregion and both present a threat and an opportunity for wetland and grassland habitat. High densities of sand and gravel quarries occur in the Towns of Clarence, Newstead and Alden, often in connection with the Onondaga Aquifer. Because these quarries have limited life spans and yet far-reaching potential to impact surface and groundwater recharge and discharge, local involvement in plans for development, operation, closure and reclamation is an important strategy for conserving habitat and functional integrity in this region and in towns across the watershed where quarries are a common use. Plans designed from the beginning with a habitat or recreational end use in mind may also yield economic benefits to quarry owners. This strategy is further explored in Chapter 4.

Woodlands in the Ontario Lowland sub-basins tend to be privately owned and fragmented. The Onondaga Escarpment spans this ecoregion. This north-facing bedrock outcrop of limestone and shale with occasional high cliffs and talus slopes, offers opportunities for woodland connectivity and for conservation of historic and culturally significant plant communities.

Several large tracts of protected grass and shrubland habitat include the Tonawanda Wildlife Management Area and Darien Lakes State Park. Two recent New York grassland breeding bird studies consider management of these and surrounding agricultural as a major opportunity to support populations whose numbers are rapidly decreasing (Norment, 2010; Morgan, 2008). The strategy for this feature involves working with public and private owners or managers of these tracts to restore habitats for targeted species. Available information on the needs of grass and shrubland breeding birds includes the amounts and types of natural cover and the timing of nesting seasons, so mowing and other disturbances can be avoided.

3.6 Middle Tonawanda Creek

From the City of Batavia to the Village of Pendleton, Middle Tonawanda Creek includes parts of seven towns and the Tonawanda Seneca territory. Its northern border is formed by the Niagara Escarpment and its southern, in part, by the Onondaga Escarpment which the creek crosses at Indian Falls. In the 20-mile stretch from Indian Falls downstream to the Village of Pendleton, where the creek meets the Barge Canal, Tonawanda Creek’s broad floodplain and many wetlands are a remnant of glacial Lake Tonawanda. New York’s Freshwater Blueprint program recognizes this wetland-floodplain complex as “a critical area for floodplain protection and restoration” based on the presence of a large active floodplain adjacent to core patches of wetland, grassland and forest. These patches include parts of the 20,000-acre “Alabama Swamp” including the State Tonawanda Wildlife Management Area.



The Middle Tonawanda sub-basin has approximately twice as much wetland (20% of the ARA land cover) as all the other sub-basins in the watershed except Murder Creek. Of the Federally mapped and State regulated wetland acreage, 56% is State regulated, including 24 large (>100 acre) tracts and four Class 1 wetlands.

According to a 1998 survey, Middle Tonawanda’s freshwater mussel population is regionally significant with 19 species recorded below Indian Falls (Marangelo, 2000), including several NYS-listed species. Other protected aquatic species here include redbfin shiner, black redhorse, and longear sunfish. However, in terms of aquatic habitat, Middle Tonawanda Creek “is nearing the threshold of impaired uses,” (RIBS, 2010) due to a variety of threats including increasing pollution from agricultural and residential runoff and lack of buffering. The amount of stream predicted to be moderately impaired is about the same as the amount slightly impaired, based on benthic macroinvertebrate profiles. Dams, flow alterations and other barriers to host fish species for baby mussels (glochidae) also may affect mussel recruitment, meaning that presence of adult mussels does not necessarily indicate reproducing populations.

At least five listed grassland bird species breed in the area, though grassland cover is less than 1%. Large natural areas of mixed native vegetation support species like northern harrier, short-eared owl and henslow’s sparrow. Patches of lupine support three State-protected butterfly species.

Conservation opportunities in this sub-basin include in-filling, connecting and protecting unique riparian natural feature complexes such as the thousand-acre Tonawanda wetland-floodplain complex and unique features like the Onondaga Escarpment, with its rare limestone-loving plants.

Municipalities/Governments: Tonawanda Seneca Nation, Towns of Lockport, Royalton, Alabama, Clarence, Newstead, Pembroke, Shelby and Batavia

Total waterways including principle tributaries Mud and Beeman Creek: 331 miles

Total sub-basin: 79,116 acres

Biodiversity features by percent of ARA cover:

- ARA: 60,859 acres or 80% of sub-basin
- Wetlands (NOAA): 11,978 acres or 20%
- Woodlands: 14,781 acres or 24%
- Grass/Shrublands: 762 acres or 1%
- Natural areas (ARA and continuous): 30,609 acres or 49% of study area

Viability assessment

- Aquatic habitat: FAIR-GOOD
- Wetlands: GOOD
- Grass/Shrublands: POOR
- Woodlands: FAIR
- Natural Areas: GOOD

Threats

- Aquatic: Lack of riparian buffer, runoff
- Wetlands: Loss of acreage; highway dept practices (spreading invasives, ditching)
- Woodlands: Fragmentation, lack of protection (invasive species, overbrowsing)
- Grasslands: Management practices on agricultural and public lands
- Natural areas: Fragmentation, loss of acreage

Conservation Strategies

- Aquatic: Identify good reference areas for benthic/mussel habitat conservation and restoration
- Identify acquisition, easement, and/or best management opportunities for stream buffering
- Grasslands: Identify priority tracts for conservation within Tonawanda Creek floodplain complex
- Woodlands: Identify opportunities to conserve and connect Onondaga Escarpment parcels



Indian Falls; Photo credit: Margaret Wooster

Table 3.6: Middle Tonawanda

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 51%	5.0-7.5 49%	7.5-10	
	"	% impervious surface	>20%	10-20%	5-10%	<5% 3.4%	3.4%
	"	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69 63	70-79	>80 80	
	Landscape Context	Known barriers to migratory fish species					Y
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					N
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37%	38-50%	>50% 56%	8,455a / 15,595a
	"	Number of Class 1s					4
Woodlands	Condition	Riparian forest tracts: >50a and >100m wide, spanning a waterway					31 tracts (14,490a)
	"	Core forest: unbroken blocks >500 acres, >100m from road					9 tracts (6,170a)
Grass/Shrublands	Condition	% of acreage in tracts >10a	1.4%	<50%	>50%		1.4%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60% 49%	>60%		49%
	Condition	% semi-protected	<25%	<50%	>50%		59%
		Number of tracts >150a					26 tracts

3.7 Lower Tonawanda Creek

From the Village of Pendleton to its mouth on the Niagara River, the last 11.6 miles of Tonawanda Creek is channelized and dredged to a width of 75 feet and a depth of 12 feet to accommodate the Erie Canal. From April through November, a lock diverts Lower Tonawanda Creek to flow backward approximately 19 miles northeast through the canal to Lockport. The Erie Canal channelization and flow reversal regime limits habitat connectivity between the Niagara River and Tonawanda Creek, its main tributary, and has likely impaired aquatic biodiversity in both systems. Flow reversals also affect water temperatures and may be responsible for periodic fish die-offs in the creek.



Biological and channel assessments show Lower Tonawanda tributaries to be moderately impaired, with lack of stream cover, lack of water clarity, and lack of aquatic vegetation affecting many segments of Ransom, Bull, and Gott Creeks. The lack of mussel species below Pendleton is likely an impact of the Erie Canal. Upstream from Pendleton, Lower Tonawanda Creek is similar to Middle Tonawanda Creek in that both receive high (non-impacted) BAP scores, and include many listed aquatic species including longear sunfish, redbfin shiner, black redhorse, and eight species of native mussel.

The DEC regulates about 5,000 acres of wetlands or 37% of the State regulated and Federally mapped wetlands in the Lower Tonawanda ARA. These 51 tracts include eight Class 1 wetlands including three near the source of Ransom Creek that are hydraulically connected to the Onondaga Aquifer, a high quality limestone aquifer whose northern border is the Onondaga Escarpment. Several crushed stone quarries along the escarpment have historically influenced water well yields as have surface water channelizations that rerouted streams away from aquifer recharge areas (Staubitz, 1987). Listed species associated with this escarpment-aquifer-wetland habitat include pied-billed grebe, sedge wren, upland sandpiper and swamp lousewort.

Conservation opportunities include outreach and education on mitigating the habitat impacts of the Erie Canal including native buffers and shallow water habitat improvements; working with willing quarry owners on habitat-enhancing design and implementation for quarry reclamations; and working with towns and land conservancies to target high quality riparian parcels for protection or acquisition.

BUFFALO NIAGARA RIVERKEEPER

Municipalities: Towns of Cambria, Lockport, Wheatfield, Pendleton, Clarence, Amherst, Lancaster, and Newstead

City of North Tonawanda and Lockport.

Total waterways including Bull and Sawyer Creeks, Erie Canal, Black, Gott, and Ransom Creeks: 217 miles

Total sub-basin: 78,802 acres

Biodiversity features by percent of ARA land cover:

- Active River Area: 62,938 acres or 79% of sub-basin
- Wetlands (NOAA): 7,698 acres or 12%

Woodlands: 15,092a or 23.9%

- Grass/Shrublands: 1,142 acres or 2%
- Natural areas
(% of ARA and continuous that has natural cover):
23,932 acres or 41% of study area

Viability assessment:

(amount, condition, connectivity) Table 3.7

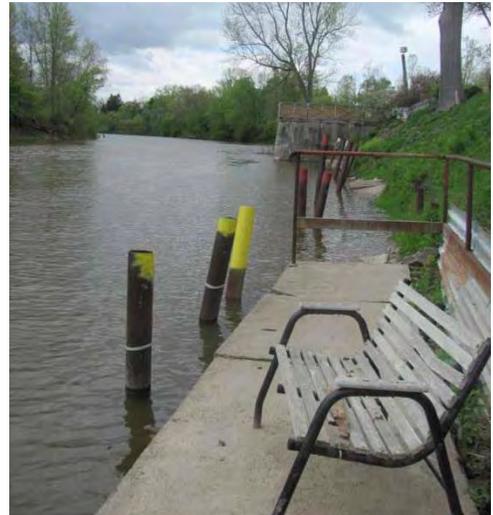
- Aquatic habitat: FAIR
- Wetlands: FAIR-GOOD
- Grass/Shrublands: POOR
- Woodlands: FAIR
- Natural Areas: FAIR

Threats:

- Aquatic: Lack of riparian buffers; runoff; channelization (invasives)
- Wetlands: Loss of acreage; Highway department practices; hydrologic alterations
- Woodland: Lack of protection; fragmentation
- Grasslands: Management on public lands; invasive species (loss of native vegetation)
- Natural areas: Fragmentation; invasive species

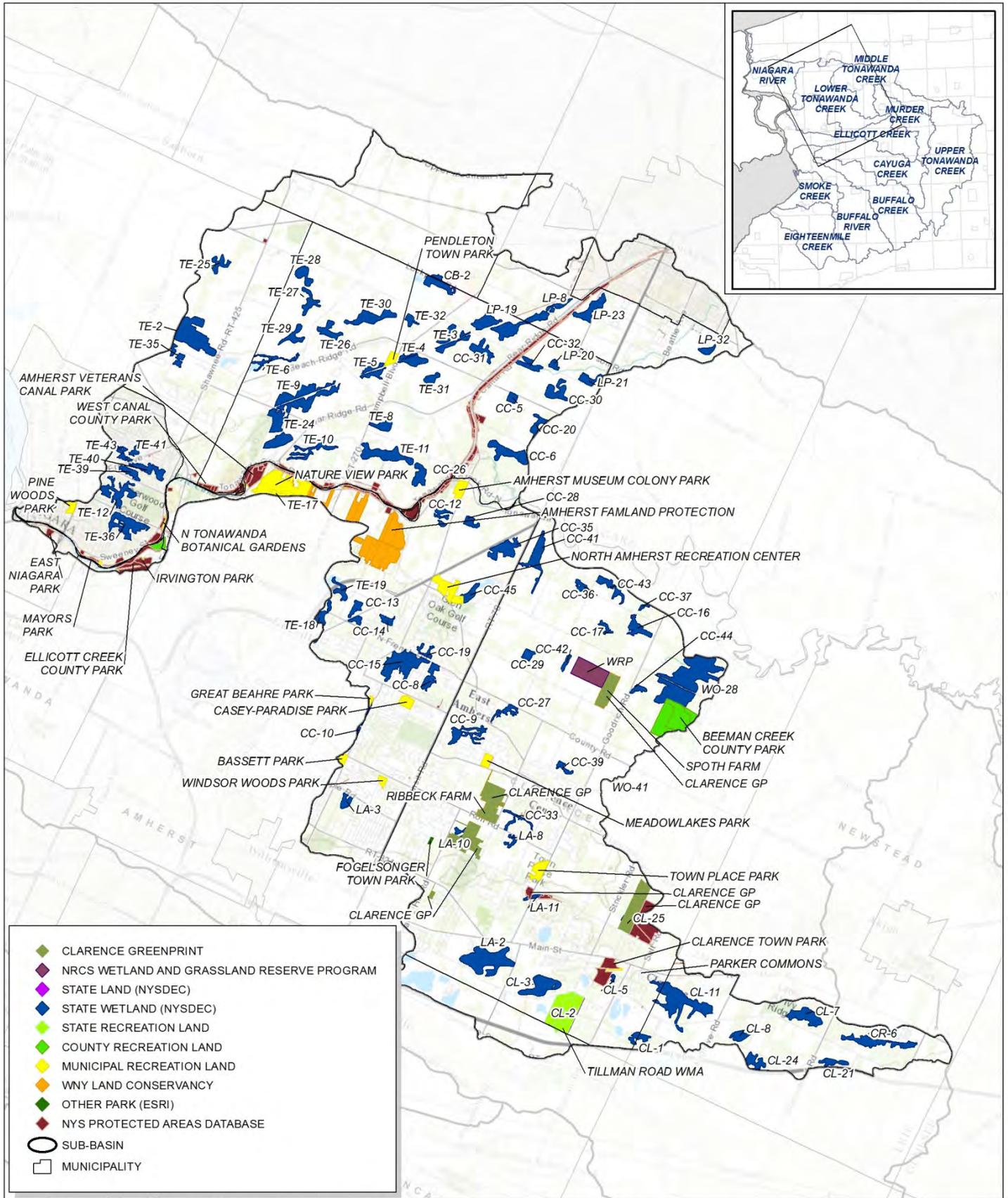
Conservation strategies:

- Aquatic: Identify best public land opportunities (Canal Corps; T's of Amherst & Pendleton) for naturalizing/buffering shoreline or increasing wetland values between Veterans Park & Pendleton.
- Wetlands/grasslands/groundwater: Assess Tillman Swamp as a reference area for wetland habitat
- Natural Areas: Assess conservation easement opportunities with interested private owners.



*Creek in the Town of Pendleton;
Photo credit: Margaret Wooster*

Map 3.7 Semi-Protected Lands within the Active River Area Lower Tonawanda Creek Sub-Basin



- ◆ CLARENCE GREENPRINT
- ◆ NRCS WETLAND AND GRASSLAND RESERVE PROGRAM
- ◆ STATE LAND (NYSDEC)
- ◆ STATE WETLAND (NYSDEC)
- ◆ STATE RECREATION LAND
- ◆ COUNTY RECREATION LAND
- ◆ MUNICIPAL RECREATION LAND
- ◆ WNY LAND CONSERVANCY
- ◆ OTHER PARK (ESRI)
- ◆ NYS PROTECTED AREAS DATABASE
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 LOWER TONAWANDA CREEK SUB-BASIN**

Table 3.7: Lower Tonawanda

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 77%	5.0-7.5 23%	7.5-10	
	Condition	% impervious surface	>20%	10-20%	5-10% 8.4%	<5%	8.4%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69	70-79	>80	N/A
	Landscape Context	Known barriers to migratory fish species					Y
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					N
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37%	38-50% 37%	>50%	4,688a / 12,683 a
	Condition	Number of Class 1s					8
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide, spanning a waterway					24 tracts (8,274a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					2 tracts (1,134a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	<25% 20%	<50%	>50%		20%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60% 41%	>60%		41%
	Condition	% semi-protected	<25%	<50% 44%	>50%		44%
	Condition	Number of tracts >150 acres					36 tracts

3.8 Murder Creek

Murder Creek is the major tributary to Middle Tonawanda Creek, with its mouth about two miles downstream from the western boundary of Tonawanda Seneca territory. The two sub-basins share many characteristics. In both, over half of the Active River Area has natural land cover evenly divided between forest and wetland. A major difference is in the amount of natural area that is protected. Only 29% of the Murder Creek ARA and continuous natural area is protected, compared with 63% of the Middle Tonawanda ARA. Murder Creek has fewer state-protected wetlands, no wildlife management areas, and only one major habitat preserve, Counterfeiter’s Ledge on the Onondaga Escarpment.



DEC RIBS assessments find Murder Creek’s aquatic habitat to be moderately impacted, with urban and industrial contaminants found in the reach between Corfu and Akron. However, predicted BAP scores for most of the creek and its main tributary, Ledge Creek, are good, or slightly impacted. As a C(t) classified stream with a Class 1 wetland at its source, Ledge Creek may be a priority for aquatic habitat conservation. Only three recent records of living native mussel species occur in the sub-basin, including one at Ledge Creek (Marangelo, 2000).

Of the federally mapped and state-regulated wetland acreage, 50% is state-protected, with three tracts greater than 500 acres. The NHP lists no protected wetlands species. The Spring Marsh created wetlands complex along Ledge Creek at Koepsel Road was field assessed and rejected as a possible reference area for wetlands habitat restoration. A Class 1 wetland (AT-4) at the headwaters of Murder Creek in the Town of Bennington partially supplies the Attica Reservoir, a public drinking water supply.

Historic (NHP) woodland communities and plants are associated with the Onondaga Escarpment and provide some good connectivity along the Pembroke Creek tributary, with opportunity to link core forest areas. Non-native invasive species, dumping and ATV use negatively impact the potential habitat value of these corridors.

Municipalities: Tonawanda Seneca Nation; Towns of Newstead, Pembroke, Darien, Alexander, Batavia, Bennington; Villages of Akron and Corfu.

Total waterways: including principle tributaries Ledge Creek, Pembroke, Darien: 222 miles

Total sub-basin: 46,686 acres

Biodiversity features by percent of ARA land cover:

- ARA: 27,533 acres or 59% of sub-basin
- Wetlands (NOAA): 6,794 acres or 25%
- Woodlands: 7,190 acres or 26%
- Grass/Shrublands: 446 acres or 2%
- Natural areas: 14,431 acres or 53% of ARA
- ARA and continuous Natural areas: 19,586 acres or 60% of study area

Viability assessment:

(amount, condition, connectivity) Table 3.8

- Aquatic habitat: GOOD
- Wetlands: GOOD
- Woodlands: FAIR – GOOD
- Grass/Shrublands: POOR
- Natural Areas: FAIR - GOOD



Pollinator on Chickory species at Counterfeiter's Ledge, Murder Creek; Photo credit: AES

Threats:

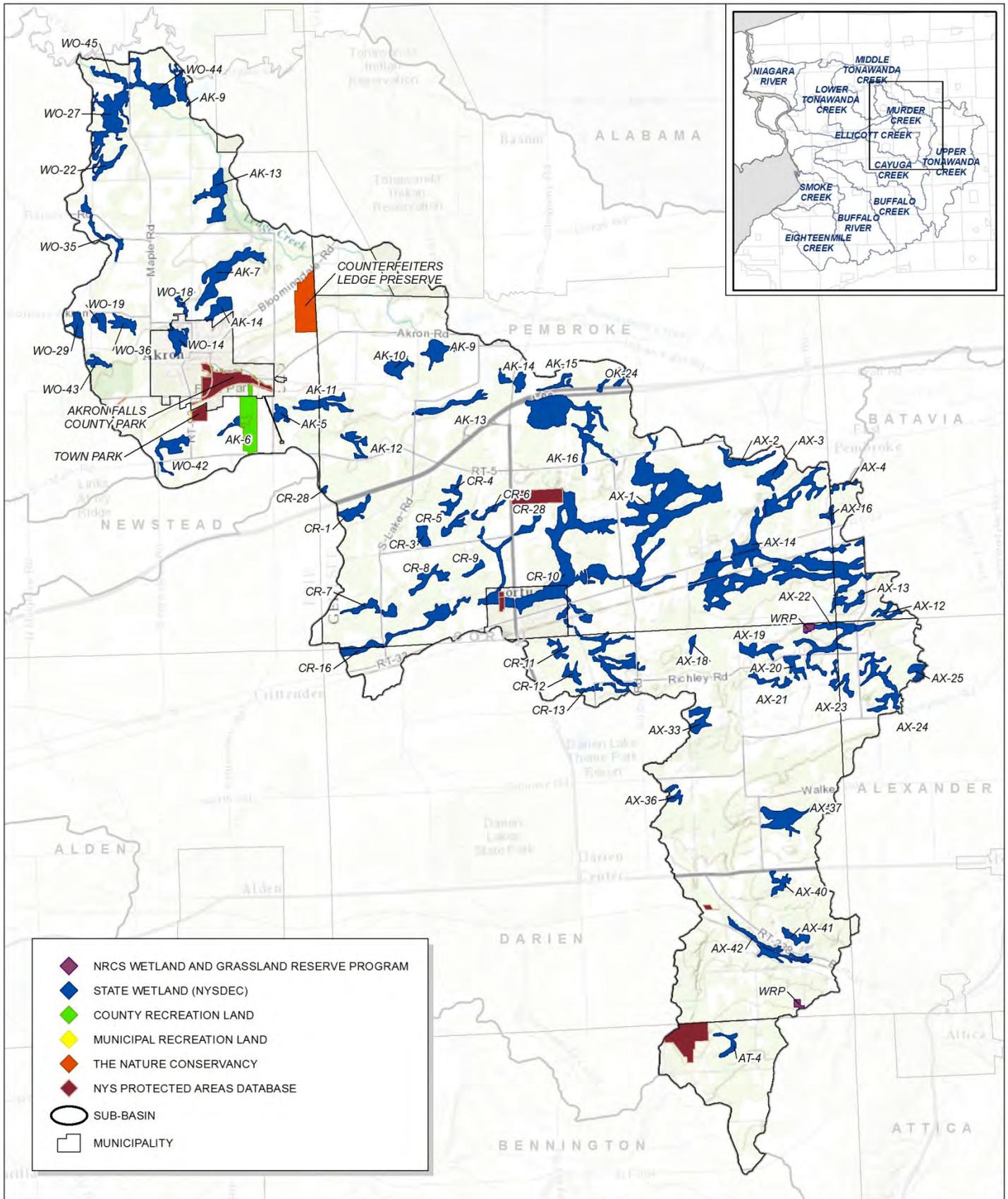
- Aquatic: Lack of riparian buffers; runoff (from agriculture, urban, roads); failing septic systems
- Wetlands: Loss of acreage; highway department practices (spreading invasive species)
- Woodlands: Fragmentation; land clearing
- Grasslands: Agricultural practices; unprotected status
- Natural areas: Fragmentation; loss of acreage/ lack of protection

Conservation Strategies:

- Protect and connect wooded uplands and wetlands along Onondaga Escarpment
- Assess created Spring Marsh as a gravel pit reclamation reference area, as recommended in the Akron/Newstead Comprehensive Plan
- Aquatic: Assess tributary along Dodgeson Rd for confined animal feedlot operation (CAFO) impacts and remediation opportunities
- Work with highway departments to reduce invasives spreading
- Woodlands: Identify opportunities to connect large riparian woodland tracts in Pembroke and Newstead

Map 3.8 Semi-Protected Lands within the Active River Area Murder Creek Sub-Basin

14H.REV01.2014-0311



- ◆ NRCS WETLAND AND GRASSLAND RESERVE PROGRAM
- ◆ STATE WETLAND (NYSDEC)
- ◆ COUNTY RECREATION LAND
- ◆ MUNICIPAL RECREATION LAND
- ◆ THE NATURE CONSERVANCY
- ◆ NYS PROTECTED AREAS DATABASE
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 MURDER CREEK SUB-BASIN**

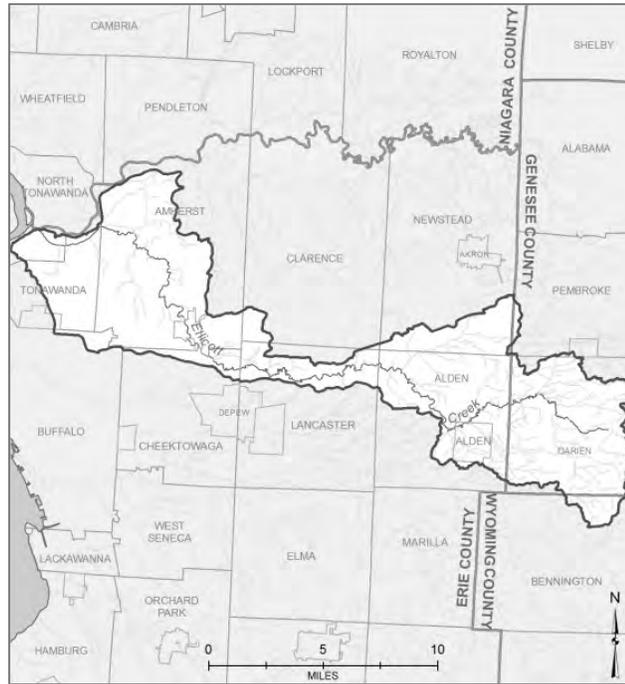
Table 3.8: Murder Creek

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 19%	5.0-7.5 81%	7.5-10	
	Condition	% impervious surface	>20%	10-20%	5-10%	<5% 3.3%	3.3%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69	70-79 73	>80	
	Landscape Context	Known barriers to migratory fish species					N
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					N
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37%	38-50% 50%	>50%	4,671a / 9,413a
	Condition	Number of Class 1s					2
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide, spanning a waterway					25 tracts (11,631a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					6 tracts (4,758a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	<25% 5.2%	<50%	>50%		
Natural Areas	Size	% of study area that is natural		<60%	>60%		60%
	Condition	% of natural areas that is semi-protected	<25%	<50% 29%	>50%		29%
	Condition	Number of tracts >150 acres					19 tracts

3.9 Ellicott Creek

Ellicott Creek flows northwest from headwater wetlands in the Town of Darien (southwest corner of Genesee County) to the City of Tonawanda where it joins Tonawanda Creek about a half mile above its mouth at the Niagara River. While the upper reaches (upstream of Transit Rd.) are less developed; the lower reaches flow through the residentially and commercially developed Towns of Lancaster, Amherst and Tonawanda. Overall the sub-basin is 14.7% impervious, second only to the Niagara sub-basin in the amount of impervious surface. Aquatic biological assessment profiles follow this pattern: slightly impacted in the upper watershed; moderately impacted downstream in Lancaster and Amherst. Variables like agricultural activity upstream, and groundwater discharge downstream affect these conditions.



In the 1930's lower Ellicott was widened and a dam was built at Island Park 2.4 miles upstream of the United States Geological Survey gage near the Village of Williamsville to control flooding. Regulation occurs today by the seasonal manipulation of that dam and also by intermittent pumping from stone quarries into the stream. In 1965, Erie County completed construction of a 1.5 mile long diversion channel between Rt. 990 and Niagara Falls Blvd. to control flooding in the Town of Amherst. This also affects stream and riparian habitat quality.

The Onondaga Escarpment and Aquifer are major features across the sub-basin (as in the Lower Tonawanda and Murder Creek sub-basins), along with many associated active and abandoned stone quarries. The Onondaga Aquifer discharges to and is recharged by many of the wetlands along this northern edge, including five Class 1 wetlands in the Towns of Clarence, Lancaster, Newstead and Alden (LA-14 is in the Ellicott sub-basin). Springs, swallets and sinks are important connecting features that should be protected by setbacks and buffers.

Grasslands associated with the 1,800-acre Darien Lakes State Park and its grassland breeding bird species are another feature with potential opportunities for conservation.

BUFFALO NIAGARA RIVERKEEPER

Municipalities: Towns of Tonawanda, Amherst, Lancaster, Newstead, Alden, Bennington, Cheektowaga, Clarence, and Darien; Cities of Tonawanda and Buffalo; Villages of Williamsville and Alden

Total waterways: 244 miles including Elevenmile, Crooked, Spring/Peck and Dorsch Creeks

Total sub-basin: 76,843 acres

Biodiversity features by percent of ARA land cover

- ARA: 44,699 acres or 58% of sub-basin
- Wetlands (NOAA): 6,729 acres or 15%
- Woodlands: 10,146 acres or 23%
- Grass/Shrublands: 769 acres or 2%
- Natural areas: 17,645 acres or 40%
- ARA and continuous Natural areas: 25,679 acres or 49% of study area



*Grassland Habitat at Darien Lakes State Park;
Photo credit: AES*

Viability assessment:

(amount, condition, connectivity) Table 3.9

- Aquatic habitat: FAIR
- Wetlands: GOOD
- Woodlands: FAIR
- Grass/Shrublands: FAIR
- Natural Areas: FAIR

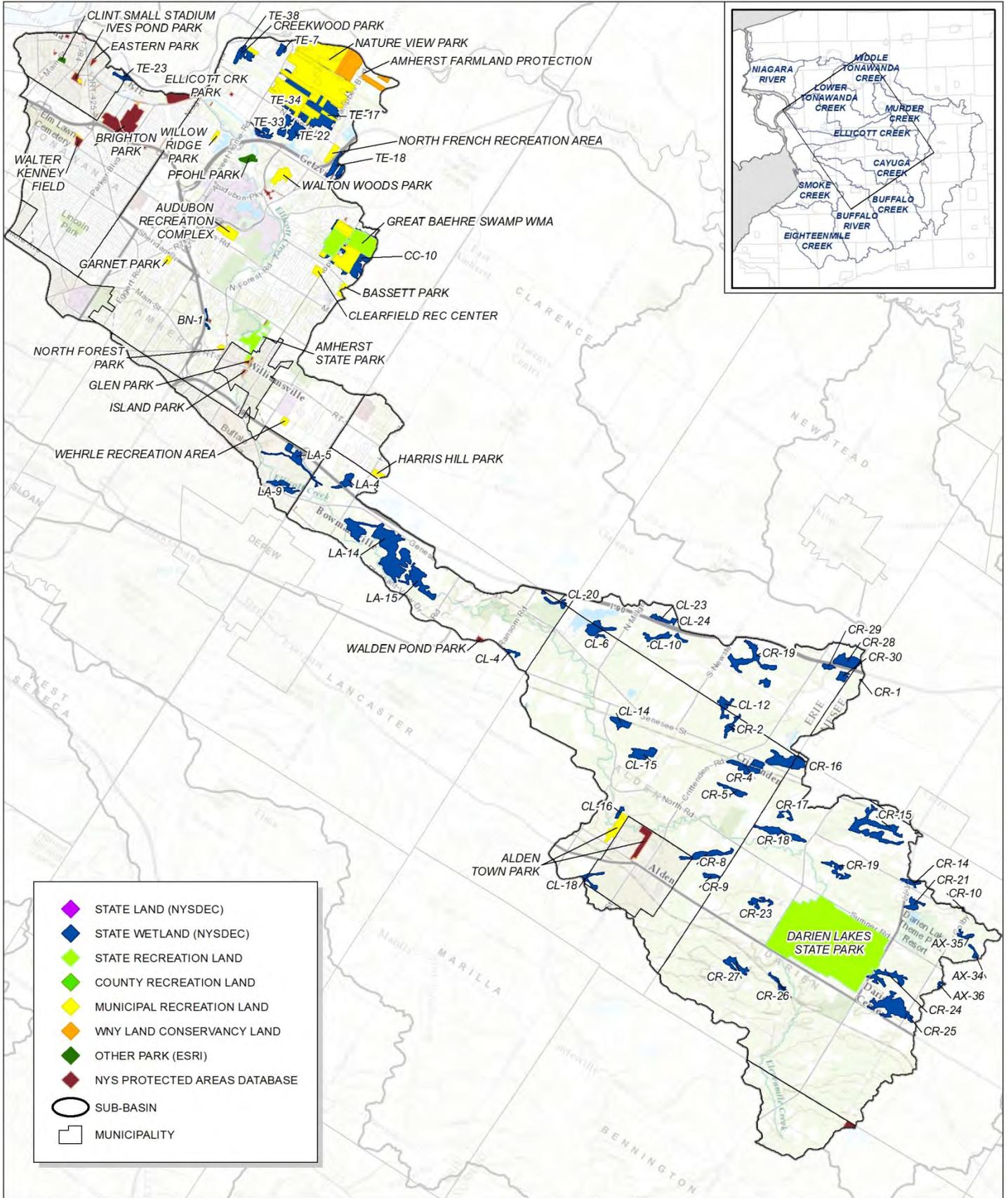
Threats:

- Aquatic: Channelization; lack of riparian vegetation; runoff
- Wetlands: Loss of acreage; invasives
- Woodlands: Lack of protection; fragmentation
- Grasslands: Lack of protection; mowing-planting regimes on public lands (e.g. Darien Lakes SP)
- Natural areas: Lack of protection; invasive species; fragmentation

Conservation Strategies:

- Aquatic: Assess the Dorsch Creek area of the Onondaga Escarpment and Aquifer for threats to significant areas of surface and groundwater recharge (sinks, swallets, springs) and conservation options (Recommend to include in the Town of Alden Proposed Aquifer Overlay District)
- Grassland: Darien Lakes State Park. Assess for grassland breeding bird habitat opportunities
- Assess the Town of Amherst's Nature View Park for habitat and functional values including stormwater retention benefits provided to neighboring property owners

Map 3.9 Semi-Protected Lands within the Active River Area Ellicott Creek Sub-Basin



- ◆ STATE LAND (NYSDEC)
- ◆ STATE WETLAND (NYSDEC)
- ◆ STATE RECREATION LAND
- ◆ COUNTY RECREATION LAND
- ◆ MUNICIPAL RECREATION LAND
- ◆ WNY LAND CONSERVANCY LAND
- ◆ OTHER PARK (ESRI)
- ◆ NYS PROTECTED AREAS DATABASE
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 ELLICOTT CREEK SUB-BASIN**

Table 3.9: Ellicott Creek

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 30%	5.0-7.5 69%	7.5-10	
	Condition	% impervious surface	>20%	10-20% 14.7%	5-10%	<5%	14.7%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69 66	70-79	>80	
	Landscape Context	Known barriers to migratory fish species					N
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					N
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37% 35%	38-50%	>50%	3,714a / 10,774a
	Condition	Number of Class 1s					4
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide,spanning a waterway					26 tracts (14,363a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					6 tracts (4,758a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	15%	<50%	>50%		15%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60% 49%	>60%		49%
	Condition	% semi-protected	<25%	<50% 41%	>50%	>75%	41%
	Condition	Number of tracts >150 acres					29 tracts

Erie/Ontario Lake Plain

Smoke's Creek and Niagara River Sub-basins

The focus in this ecoregion is mainly the Erie Lake Plain, given that the drainage north of the Niagara Escarpment is almost entirely to Lake Ontario and thus not part of the Niagara River Watershed. The ecoregion includes 86% of the Smoke's Creek sub-basin and about 51% of the Niagara River sub-basin, which are discussed in full in this section. It also includes the lower reaches (25% on average) of the Cayuga, Buffalo River, Buffalo Creek and Eighteenmile Creek sub-basins, which are mainly discussed in the Cattaraugus Hills section.

The Lake Erie Plain portions of these sub-basins have the highest amount of developed land and the highest percent of impervious surface in the watershed. These are major contributing factors to degraded aquatic habitat quality reflected by low (moderately impacted) existing and predicted BAP scores. Channelization, flow alterations and daily water level fluctuations related to the building and continuing operation of power plants and the Erie Canal impact the physical viability of Niagara River and lower tributary coastal areas for aquatic species. Lack of riparian buffers and barriers to fish and mussel movement between the Niagara River and its tributaries are also threats.

Industrial, commercial, residential and highway development along shorelines and in floodplains has led to the loss and degradation of coastal wetlands. In the Niagara River corridor an estimated 90% of historic riparian wetlands have been lost. Tributaries like Scajaquada and Cornelius Creeks in Buffalo, once supported by vast riparian marshes, have been partially or wholly tunneled underground.

A small amount of grassland habitat exists within the region, sometimes consisting of remediated landfills in the Niagara River sub-basin. However, even where intentionally remediated to support grassland habitat and limited succession, landfills often represent a lost or underused opportunity to support grassland species as management plans are lost or forgotten. Management plans for grassland habitats on public lands are needed as well. Due to the high amount of disturbed land in this intensely developed ecoregion, invasive species are a critical threat to all terrestrial habitats.

Despite the present degraded conditions, the Niagara River and Smoke's Creek sub-basins include features that are key to global and Great Lakes ecologies. The Niagara River is a globally significant Important Bird Area due to the diversity and numbers of globally at-risk birds that breed, overwinter or migrate through. It supports the greatest number of listed species in the watershed. Smoke's Creek Shoals is a NYS DOS "significant coastal area" because of its importance as a spawning and nursery area for Lake Erie walleye, perch, pike and other species. Large tracts of wooded wetlands still remain on Grand Island and also near the headwaters of Smoke's Creek, some of high quality, and should be priorities for conservation.

Strategies for this ecoregion focus on conserving and restoring the functionality of the river-tributary connection to the greatest extent possible by removing known barriers to fish movement, increasing natural shoreline habitat (shallows, vegetation, gradual slope natural cover) and mitigating for the impacts of channelization and severely altered flows.

Strategies also focus on conserving some of the world-class natural features of this ecoregion, including the Niagara Gorge and the Niagara River islands. These will be further explored in the Niagara River Greenway Habitat Conservation Strategy, a companion planning effort currently underway.

3.10 Smoke's Creek

Smoke's Creek rises in the Town of Orchard Park and flows northwest for 15 miles to its mouth on Lake Erie. Its one principal tributary, South Branch, is 12 miles long. The creek is named after "Old Smoke," a Seneca leader whose son traditionally carried the fire—the "smoking brand"—from the Haudenosaunee or Iroquois Confederacy Council fire at Onondaga to the Seneca Nation council fire in Western New York. Old Smoke lived near this creek in his later years and was buried here.

Smoke's Creek is a tributary to a NYS DOS "significant coastal habitat"—the 500-acre shallow water Smoke's Creek Shoals—a spawning grounds for important Lake Erie fish species like walleye and small mouth bass. However, over the past decades, Smoke's Creek itself was severely degraded by cyanide and other toxic waste from the Bethlehem Steel plant and inadequately treated sewage effluent. The creek's habitat value was further impaired by complete buffer removal and channelization of the last mile of the creek. 2010 RIBS data at three of four sites sampled shows aquatic life to be moderately impacted by elevated nutrient and silt/sediment loads, sludge banks, and other pollutants associated with urban runoff and other nonpoint source inputs. Hydrologic modification for flood control and a high density of roads and culverts are also a concern. The US Army Corp of Engineers is considering a plan to restore ecology and natural flows to areas along the main stem and South Branch (2014).



This sub-basin includes several small direct tributaries to Lake Erie, all unnamed except for Rush Creek, within a mile of Smoke's Creek on the south. The coastal area here includes an NHP-listed remnant Great Lakes dune system, with a wide sand beach and a strip of wooded dunes partially protected by Woodlawn Beach State Park and used by colonial nesting gulls and terns. Another of the unnamed Lake Erie tributaries supports a high predicted number (5-7) of native mussel species (White, 2011). With the major industrial use gone, this once significant Lake Erie coastal area—associated with three state-listed mussel species and three listed fish species, including Lake sturgeon—needs to be assessed for any opportunity to improve its viability and connectivity for these important remaining Great Lakes species.

Two Hamburg municipal parks are part of larger (200-500 acre) woodland communities, including a high quality hardwood swamp in the headwater areas. These parks and adjacent natural areas offer many potential opportunities to improve ecological function and habitat in and along Smoke's Creek.

BUFFALO NIAGARA RIVERKEEPER

Municipalities: Towns of Hamburg, Orchard Park, Aurora, and West Seneca. City of Lackawanna. Villages of Blasdell and Orchard Park

Total waterways: 109 miles including principle tributaries Rush Creek, South Branch

Total sub-basin: 39,527 acres

Biodiversity Features by percent of ARA cover

- ARA: 15,680 acres or 40% of sub-basin
- Wetlands (NOAA): 1,306 acres or 8%
- ARA Woodlands: 4,563 acres or 29%
- ARA Grass/Shrublands: 462 acres or 3%
- ARA and continuous Natural areas: 11,654 acres or 56% of study area

Viability assessment:

(amount, condition, connectivity) Table 3.10

- Aquatic habitat: FAIR
- Wetlands: FAIR
- Woodlands: FAIR
- Grasslands: POOR
- Natural Areas: POOR



Hardwood Woodland in Orchard Park; Photo credit: AES

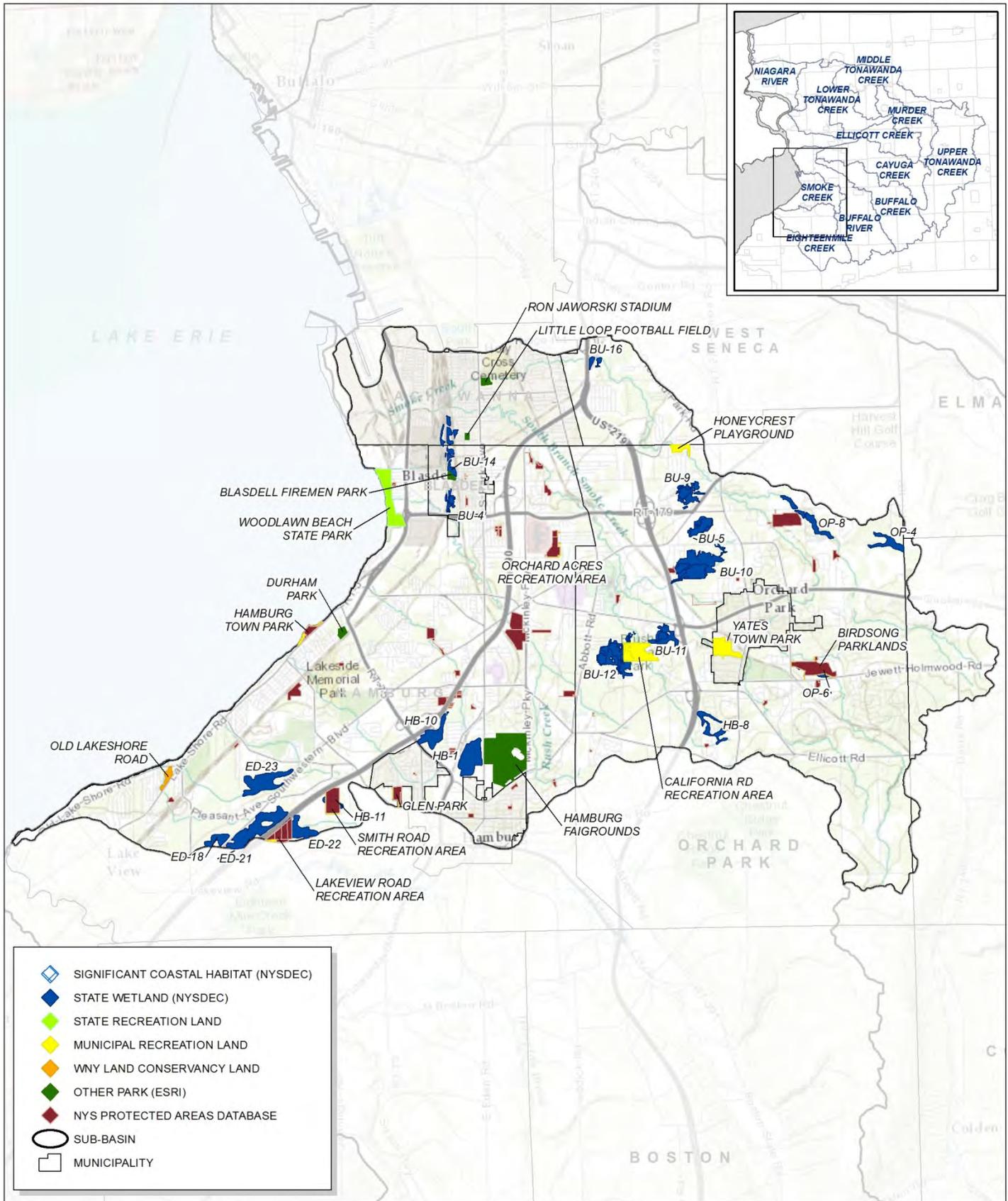
Threats:

- Aquatic habitat: Lack of riparian buffer; channelization (culverts)
- Wetlands: Loss of acreage; road management practices
- Woodlands: Lack of protection; lack of ecological management plans
- Grasslands: Invasive species; management on public lands
- Natural Areas: Lack of protection; fragmentation

Conservation strategies:

- Identify forest, wetland and/or aquatic habitat values and needs in county owned parcels around California Rd. Recreation Area (Brush Mountain Park) and Lakeview Rd. Recreation Area
- Identify any opportunities to mitigate flood control channelization with shoreline softening
- Investigate lakeshore/tributary restoration opportunities including mussel habitat protection

Map 3.10 Semi-Protected Lands within the Active River Area Smoke Creek Sub-Basin



- SIGNIFICANT COASTAL HABITAT (NYSDEC)
- STATE WETLAND (NYSDEC)
- STATE RECREATION LAND
- MUNICIPAL RECREATION LAND
- WNY LAND CONSERVANCY LAND
- OTHER PARK (ESRI)
- NYS PROTECTED AREAS DATABASE
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 SMOKE CREEK SUB-BASIN**

Table 3.10 Smoke’s Creek

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 23%	5.0-7.5 77%	7.5-10	
	Condition	% impervious surface	>20%	10-20% 18.3%	5-10%	<5%	18.3%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69 60	70-79	>80	
	Landscape Context	Known barriers to migratory fish species					Y
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					Unknown
Wetlands	Condition	DEC compared to total mapped (DEC, NWI)	<25%	25-37% 30%	38-50%	>50%	724a / 2,452a
	Condition	Number of Class 1s					1
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide, spanning a waterway					22 tracts (3,912a)
	Condition	Core forest: unbroken blocks >500 acres, >100m from road					1 tract (543a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	8%	<50%	>50%		8%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60% 56%	>60%		11,654a or 56%
	Condition	% semi-protected	<25% 21%	<50%	>50%		21%
	Condition	Number of tracts >150 acres					15 tracts

3.11 Niagara River

Biodiversity features and conservation opportunities in the Niagara River sub-basin vary according to three major geographies: the Upper River including the stream drainages above Niagara Falls; the Lower River, including the Niagara Gorge; and the natural (unpopulated) islands. Niagara Falls was the historic natural barrier between the four Upper Great Lakes and the Lower Lake Ontario-St. Lawrence River system. Fish species like atlantic salmon and american eel migrated to and from the Atlantic Ocean as far as the lower river, but no further. Canals like the Erie Canal changed all of that, and yet even today the assemblages and even genotypes of some Upper River-Lake Erie aquatic species differ from those in the Lower River-Lake Ontario system.



Direct drainage to the Upper River includes the lower Buffalo River, Scajaquada Creek, Twomile Creek, Tonawanda Creek, Cayuga Creek, and Gill Creek tributaries. Shoreline and riparian areas have been highly modified by navigational dredging, diversions (Ontario and New York power plants and the Erie Canal), industrialization, landfills, and waste discharges. The land disturbance and contamination caused by this history led to significant loss and degradation of habitat. Based on existing and predicted BAP scores, 88% of the stream miles are moderately impacted for aquatic life, and lower Scajaquada Creek is “precluded” for aquatic life. In the lower Niagara River, below the falls, the one major tributary, Fish Creek, was channelized to accommodate the NYPA power reservoir, and much of the Greenway area is highly modified by power plant infrastructure.

Island habitat has been decreased by quarrying (Strawberry), infilling of channels (Rattlesnake), removal (Bird) and park development (Three Sisters). Restoration efforts are underway to restore components of these historic island complexes but much work is needed to ensure long-term protection and management practices are in place and practical.

Despite this history, the Niagara River sub-basin is the most biodiverse of all the tributary sub-basins in its watershed, in part because of its key role in the migratory cycles of so many Great Lakes and global species. Globally significant numbers of bonaparte’s gull, common tern and lesser scaup overwinter here. The islands and shoreline areas support breeding colonies of black-crowned night heron, great egret and great blue heron, as well as nesting osprey, bald eagle and peregrine falcon. Lake sturgeon are found in increasing numbers in both the upper and lower river, likely representing two different genetic variants from Lake Erie and Lake Ontario. Keystone species like the emerald shiner support many of these resident and migratory species. The Niagara Gorge, once considered one of the most botanically diverse places in North America, still supports many rare plants and communities.

There are several major existing proposals to protect these features, including designation of the Niagara Gorge as a bi-national park or biosphere reserve; removal of redundant roads like the Robert

Moses Parkway to restore a natural condition to the gorge rim; and protection of the islands and shallow water habitats with no or low-wake zones and other measures limiting human disturbance. The eight state parks and many municipal parks along the river, along with the Niagara River Greenway initiative offer opportunities to coordinate restoration work.

Scajaquada Creek is one of the greatest restoration priorities within the urbanized Greenway corridor of this sub-basin. Listed as either “impaired” or “precluded” for aquatic life and buried for much of its journey to the Niagara River, the creek’s water quality is degraded due to point and non-point source pollution. Most notably, urban storm and waste water inputs from both the upper and lower portions of the sub-basin result in frequent sewage overflows, intense sediment loads and decreased aquatic habitat availability. Both human and wildlife are threatened by exposure to these impaired conditions. Yet, spring and seeps within the entirety of the creek provide a portion of the stream’s baseflow with high-quality water inputs and offer opportunities for restoration where documented problems can be addressed.

Other strategies involve reconnecting the river with its tributaries through strategic barrier removal (where barriers limit the capacity of fish or mussels to reproduce), restoring (or mimicking) natural flows, and compensating for the loss of wetland and shallow water habitat. These will be further explored in the Niagara River Greenway Habitat Conservation Strategy, a companion planning effort currently underway.

Niagara River Habitat Conservation Strategy

Niagara River Municipalities: Towns of Porter, Lewiston, Niagara, Grand Island, Wheatfield, Tonawanda, Cheektowaga, Lancaster; Cities of Buffalo, Niagara Falls, North Tonawanda, Cambria, and Tonawanda; Villages of Youngstown, Kenmore, Depew, and Lewiston, Tuscarora Indian Reservation

Total waterways: Including Fish Creek, Gill Creek, Cayuga Creek, Bergholtz Creek, Black Creek, Two Mile Creek, Scajaquada Creek, and Grand Island creeks: 185 miles

Total sub-basin: 98,211 acres

Biodiversity features by percent of ARA land cover:

- ARA: 62,452 acres or 64% of sub-basin
- Wetlands (NOAA): 5,149 acres or 8%
- Woodlands: 12,442 acres or 20%
- Grass/Shrublands: 1,136 acres or 2%
- ARA and Continuous Natural areas: 22,179 acres or 34% of study area

Viability assessment:

(amount, condition, connectivity) Table 3.11

- Aquatic habitat: POOR-FAIR
- Wetlands: FAIR
- Woodlands: FAIR
- Grass/Shrublands: POOR
- Natural areas: FAIR



Niagara River heron colony; Photo credit: Margaret Wooster

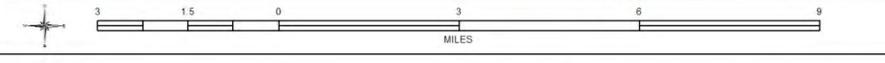
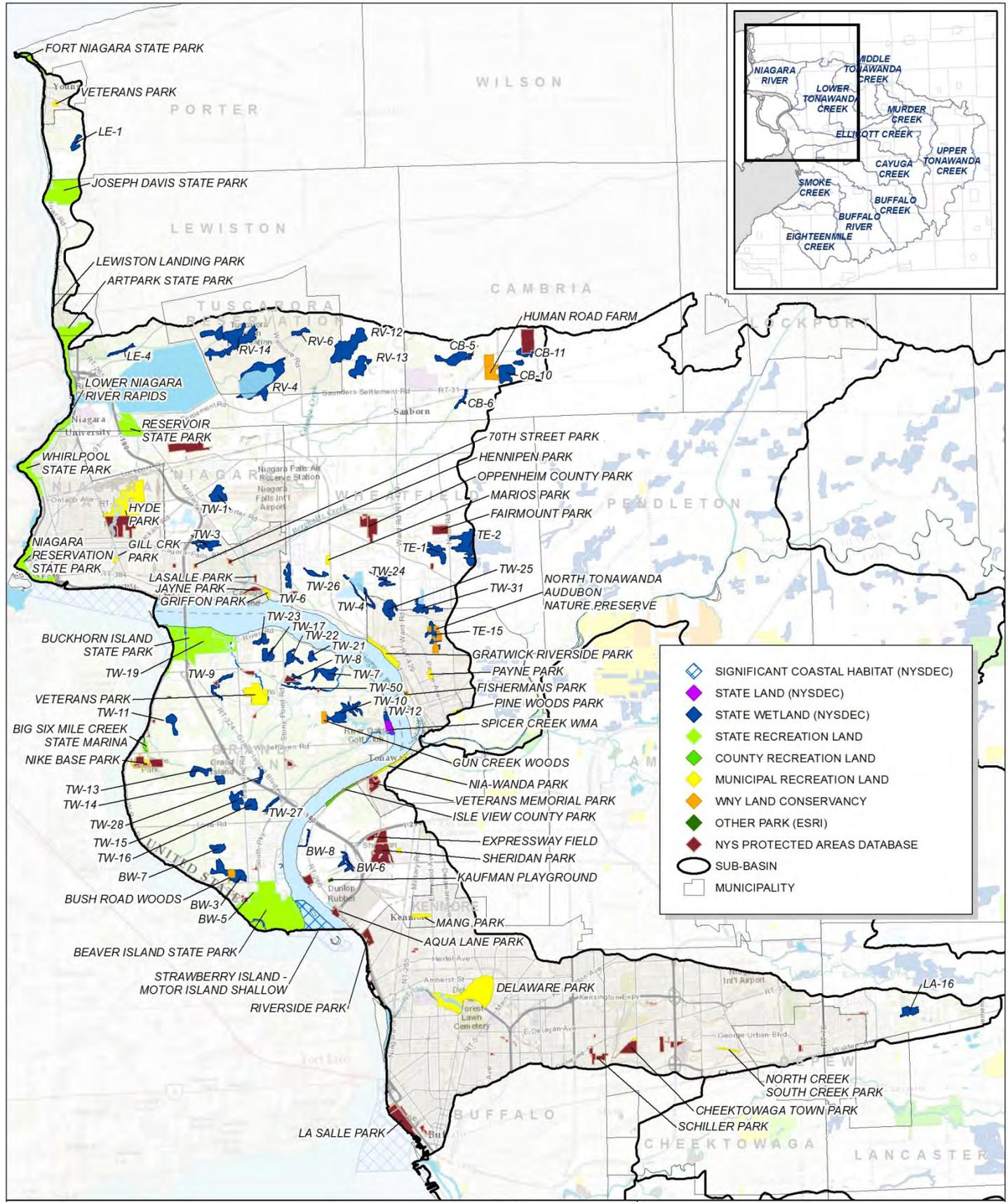
Threats:

- Aquatic: Channelization; flow alterations/water level fluctuations; hazardous waste (sediments, landfills, discharges); fish barriers; invasives
- Wetlands: Loss of acreage; invasive species; water level fluctuations
- Woodlands: Lack of ecological management plans; lack of protection
- Grasslands: Management practices on public lands; invasive species
- Natural areas: Lack of protection; fragmentation

Conservation strategies:

- Assess shorelines for softening and buffering opportunities
- Include living shoreline Best Management Practices in waterfront regulations and policies
- Prioritize and remediate barriers to migratory fish use of tributaries
- Investigate water level fluctuation influence on reproduction of fish, mussel and shore birds
- Assess identified high quality woodland parcels for conservation easements or acquisition
- Develop and implement ecology-based management plans for public lands including NY State parks, WMAs, Class 1 wetlands and Niagara River islands

Map 3.11 Semi-Protected Lands within the Active River Area Niagara River Sub-Basin



Map Notes:
 1:24000 USGS NHD Waterway dataset. ARA developed by Buffalo Niagara Riverkeeper. Procedure documented in Aug 6, 2012 GIS Progress Report. Semi-Protected Lands from various sources utilizing the NYS GIS Clearinghouse. Additional protected lands added July 8, 2013.

**Semi-Protected Lands
 within the Active River Area
 NIAGARA RIVER SUB-BASIN**

Table 3.11: Niagara River

- **Bold** = Current condition
- Listed plant and animal species are identified in technical report
- For unranked indicators, see sub-basin descriptions

FEATURE	ATTRIBUTE	INDICATOR	POOR	FAIR	GOOD	V. GOOD	OTHER
Open Water Aquatic Habitat	Condition	Actual & predicted BAP scores (by % of stream)	0-2.5	2.5-5.0 88%	5.0-7.5 12%	7.5-10	
	Condition	% impervious surface	>20% 23.3%	10-20%	5-10%	<5%	23.3%
	Condition	Bed/ bank assessments (HMA/SVAP scores)	<60	60-69	70-79	>80	See Greenway
	Landscape Context	Known barriers to migratory fish species					Y
	Species	Presence of listed fish or mussel species					9 birds; 2 bird communities; 6 fish; 10 mussels
Nested Feature	Migratory Fish	Reproducing trout or sturgeon populations					Y
Wetlands	Condition	DEC compared to total mapped (DEC, <25% NWI)	<25% 24.7%	25-37%	38-50%	>50%	3,166a / 12,722a
	Condition	Number of Class 1s					10
Woodlands	Condition	Riparian forest tracts: >50 acres and >100m wide, spanning waterways					15 tracts (9,249a)
	Condition	Core forest: unbroken blocks >250 acres, >100m from road					7 tracts (5,342a)
Grass/Shrublands	Condition	% of acreage in tracts >10 acres	<25% 14%	<50%	>50%		14%
Natural Areas	Size	% of study area in & cont. w/ ARA that is natural		<60% 34%	>60%		34%
	Condition	% semi-protected	<25%	<50% 35%	>50%		35%
	Condition	Number of tracts >150 acres					17 tracts

Chapter 4: Conservation Opportunities & Recommended Actions

Guided by the CAP process, the Strategy's primary goal is to identify opportunities directly addressing the relationship between key watershed habitats and the threats affecting the current and future health of those habitats. Regional priorities and ongoing conservation initiatives play a role in influencing various stakeholders' abilities to respond to ecologically-derived opportunities, as do land ownership considerations and real world constraints to implementation. In addition, the Niagara River watershed is home to two Areas of Concern which play a major ecological role at the mouths of all watershed tributaries. The recommended actions detailed in Chapter 4 coordinate across each of these considerations to produce a suite of opportunities for conservation that span various planning scales and are implementable within a 5-10 year timeframe.

Chapter Overview:

- 4.1 Trout barrier findings and proposed actions:** Identifies needed stream classification upgrades and specific sites for aquatic habitat restoration based on known headwater populations of native or naturalized trout and known impediments such as blocked culverts or obsolete dams.
- 4.2 Field assessment findings and action plans:** Action plans for these field-assessed sites are grounded in the CAP viability, threats and general objectives analysis for the Niagara River Watershed. Some sites were selected as potential micro-scale reference sites for habitat restoration.
- 4.3 AOC delisting priorities through the CAP lens:** A list of priority habitats for conservation or restoration actions has been identified for the Niagara River Area of Concern. CAP indicators provide a way to further assess and prioritize those actions. Here we discuss needed actions to address two Beneficial Use Impairments: "Degradation of Benthos" and "Loss of Fish and Wildlife Habitat."
- 4.4 Landscape level policy recommendations:** Based on strategies with the broadest potential benefits for habitat conservation across the watershed.
- 4.5 Threat-based desktop analysis:** Targeted queries for opportunities to abate some of the most critical threats identified throughout the watershed. Most of the opportunities are on private lands and have not been field checked. However, they provide a strategic basis for exploring future conservation efforts.



Strategies

- *Conserve headwater forests for water quality, stream habitat and climate change resilience*
- *Identify high quality aquatic and riparian wetlands for conservation*
- *Identify critical needs for stream buffering*
- *Identify opportunities to mitigate the effects of channelization and altered flows*
- *Assess and address known barriers to native and naturalized trout spawning*
- *Identify and protect areas with high ecological value and use as reference sites for restoration projects*
- *Increase grassland habitat values for breeding birds*
- *Identify opportunities to connect and protect significant natural areas*
- *Restore fullest biodiversity and functionality values possible in quarry reclamation projects*
- *Identify opportunities for landscape ecology stewardship including inter-municipal coordination, stewardship partnerships, and Highway Department trainings*
- *Identify and conserve State-listed fish and wildlife species and plant communities*
- *Provide support to delisting habitat-related impairments in the Niagara River Area*

4.1 Trout Barrier Findings and Proposed Actions: Cattaraugus Hills Ecoregion

PRIORITY: High

Strategy: Address known barriers to native and naturalized trout spawning

The primary objective of this strategy is to remove priority barriers to native or naturalized trout, increasing aquatic connectivity between the headwaters and the Niagara River. Creating and providing access to educational materials for local municipalities and community residents is an integral component of successful restoration efforts under this strategy.

Background: A critical component in assessing water quality is the presence or absence of key or sentinel species. For the Niagara River Watershed, native and naturalized spawning trout represent an imperiled species that thrives in only the coldest, cleanest stretches of streams. Most often, these areas are correlated with good canopy coverage, stable stream channels and minimal interaction with humans. These areas are found within the headwater areas of the Cattaraugus Hill Ecoregion. Unfortunately, few areas remain within the watershed to support the habitats of this sentinel species. By using native brook trout and naturalized brown and rainbow trout as biological indicators, it is easy to identify priority stream segments requiring immediate conservation and restoration opportunities.

Process: In cooperation with DEC, Riverkeeper obtained and digitized historic records dating back to the 1950s. These records document known locations for native and naturalized spawning trout within the Niagara River Watershed as well as known barriers to trout passage through culverts (Map 4.1). Additional analysis was completed using Geographic Information Systems (GIS) to compare stream temperature and trout presence within the watershed (Map 4.2). While the historic records are not expansive enough in geographic scope to provide a complete picture of all possible trout spawning within the watershed, the results of this effort led to four specific proposed actions that target some of the most vulnerable known locations of important and imperiled native trout.

Action 1: Using the data for known native and naturalized trout locations, support DEC Fisheries' petition to upgrade the stream classifications to (TS) where trout spawning occurs.

Currently, many of the streams documented to contain native and naturalized trout spawning are classified as Class B or C streams and do not contain the necessary (TS) classification to afford adequate protection. The reasons for this gap in protection appear generally related to lack of staffing for the lengthy process of upgrading a stream classification. Without the proper classifications in place, permit reviewers at both the local and State level have no way of knowing that a particular stream contains trout and therefore are without the regulatory tools to ensure that native trout populations are protected. Map 4.3 should be used both as an educational tool and in support of State and regional fishery managers' efforts to restore native habitat.



*Native NY brook trout;
Photo credit: Scott Cornett*

Action 2: Target priority barriers to trout passage and implement mitigation measures.

Using historic DEC data, known barriers (culverts) to trout passage were mapped by the project team. In addition, comparisons were made to existing records for dams. The project team worked with DEC fisheries biologists to identify priority barrier locations based on this information. Map 4.4 should be used as a blueprint for priority fish passage barrier mitigation projects based on current data. In certain cases retention of barriers may be warranted to prevent interspecies competition or the spread of aquatic invasive species. Surrounding streams with similar biologic characteristics should be assessed to determine a more complete range of existing trout populations.

Action 3: Develop technical outreach materials that can be distributed to municipalities and highway departments. Across all conversations with experts regarding efforts to protect and conserve remaining native trout populations, education remains a key recommendation. In the absence of updated stream classifications, education of highway departments, municipal planners, and local permit reviewers can go a long way in affording protections. It is recommended that an outreach package containing maps of known native and naturalized trout locations be developed and distributed to all stakeholders and practitioners within the listed sub-basins.

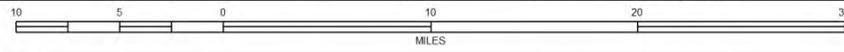
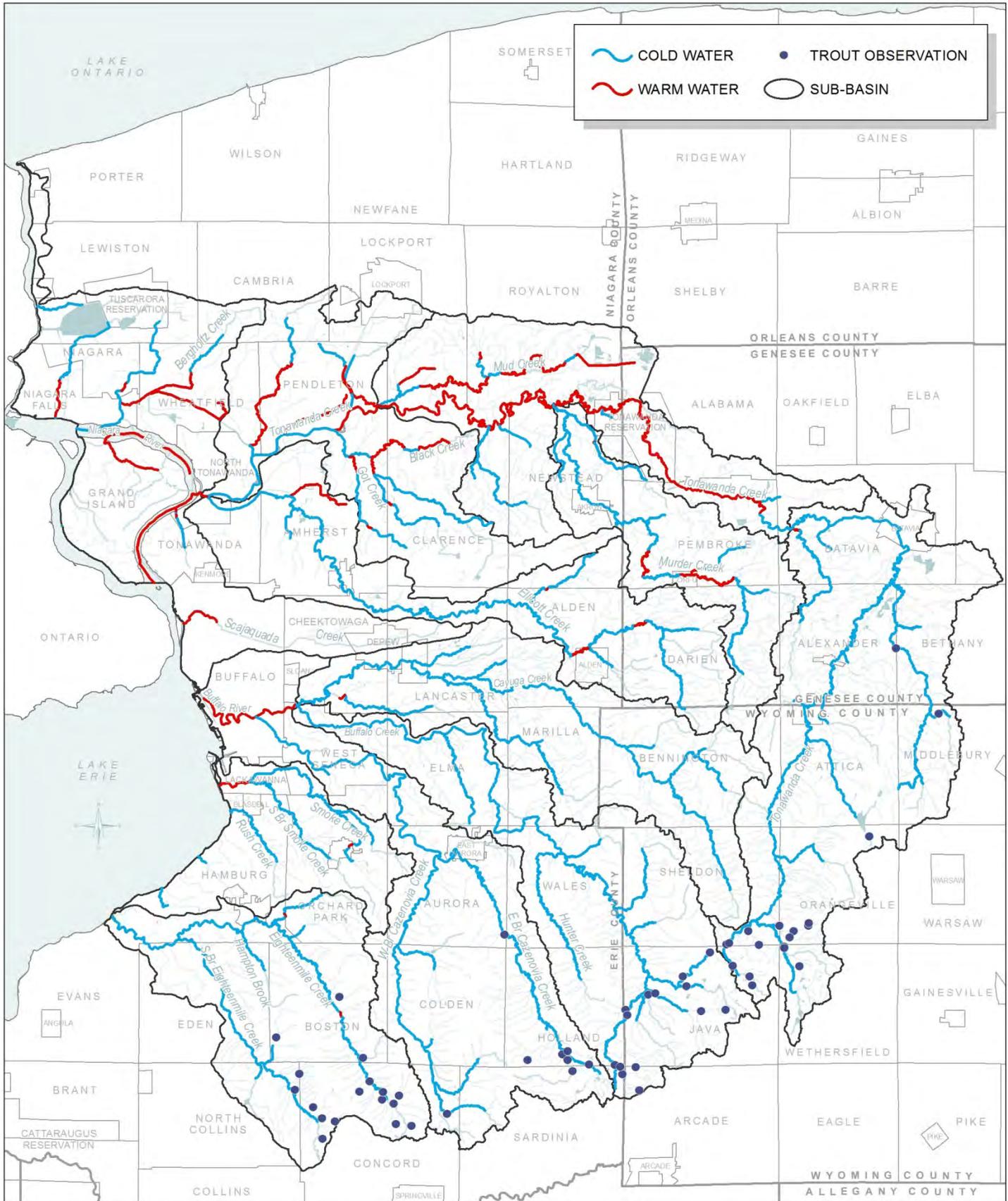
Action 4: Develop educational materials and an outreach program targeted at collecting additional data on the presence or absence of native and naturalized trout spawning in local streams. Identified as one of the obstacles to updating the NYS stream classifications and maps, a lack of resources to conduct further sampling exists. Correspondingly, a lack of comprehensive data exists regarding the presence or absence of native and naturalized spawning trout in specific streams. By investing in outreach initiative and developing some educational materials, local fisherman or sporting groups could be engaged in the collection of data that may ultimately contribute to further identification of priority stream areas for protection of species and water quality.



*Native WNY brook trout species;
Photo credit: Scott Cornett*

Map 4.2 Trout Observations and Stream Temperatures Niagara River Watershed

18.REV01.2014-0311



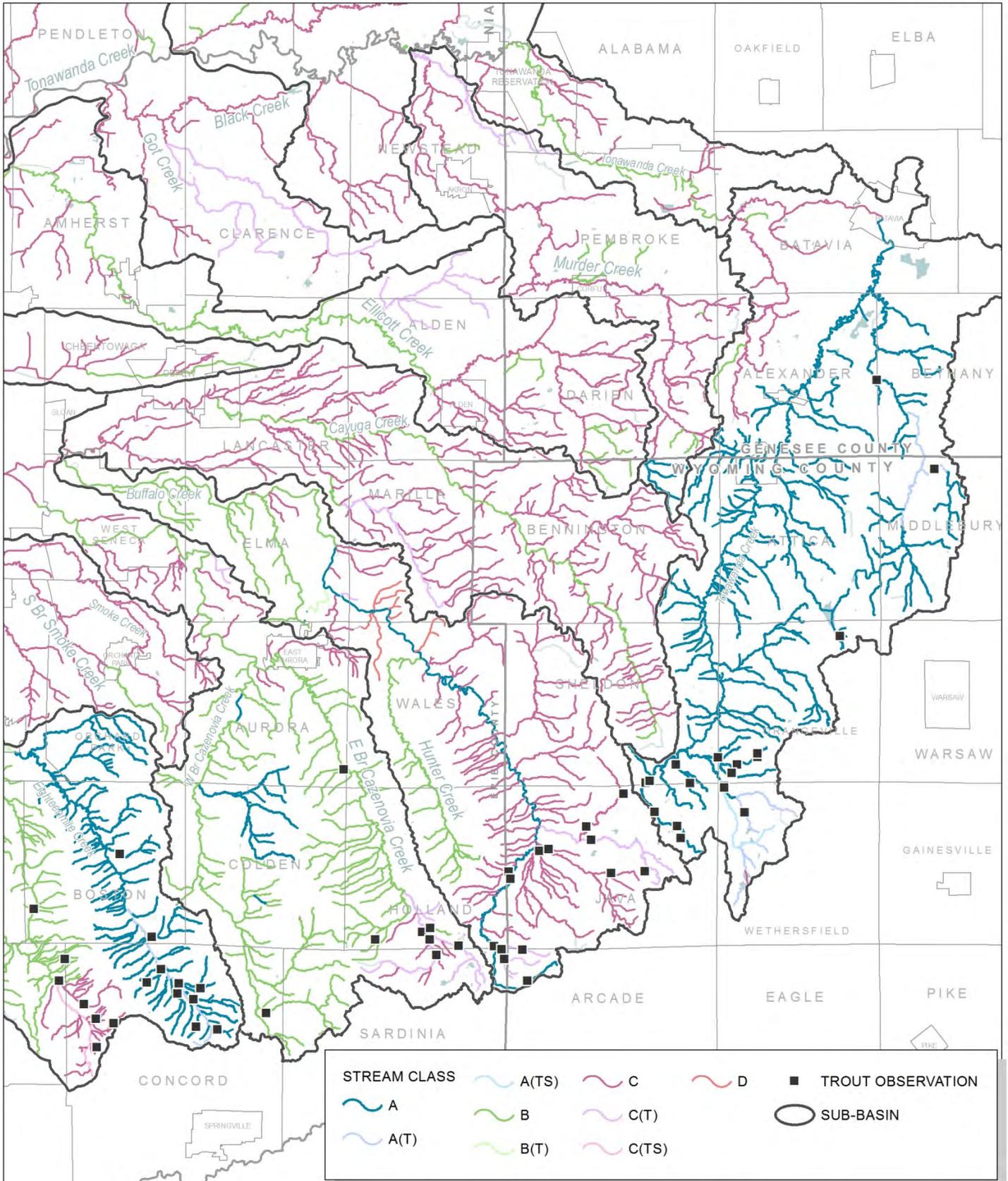
Map Notes:
 Based on NYS DEC Classifications and Standards of Quality and Purity Which Are Assigned to All Surface Waters within the Lake Erie-Niagara River Drainage Basin. State of New York Codes, Rules, and Regulations; Section 6 - Conservation, 1979. Cold/Warm water designations from USGS National Hydrography Dataset Plus. 1:100000.

**Trout Observations and Stream Temperature
 NIAGARA RIVER WATERSHED**

MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE NYS DEPARTMENT OF STATE IN SUPPORT OF THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

Map 4.3 Trout Observations and State Water Quality Classifications Niagara River Watershed

19.REV01.2014-0311



Map Notes:
 Trout observations based on NYS DEC Classifications and Standards of Quality and Purity Which Are Assigned to All Surface Waters within the Lake Erie-Niagara River Drainage Basin. State of New York Codes, Rules, and Regulations; Section 6 - Conservation, 1979. The stream class data set provides the NYS DEC water quality classifications of New York State water bodies.

BUFFALO NIAGARA RIVERKEEPER® MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

**Trout Observations and State Water Quality Classifications
 NIAGARA RIVER WATERSHED**

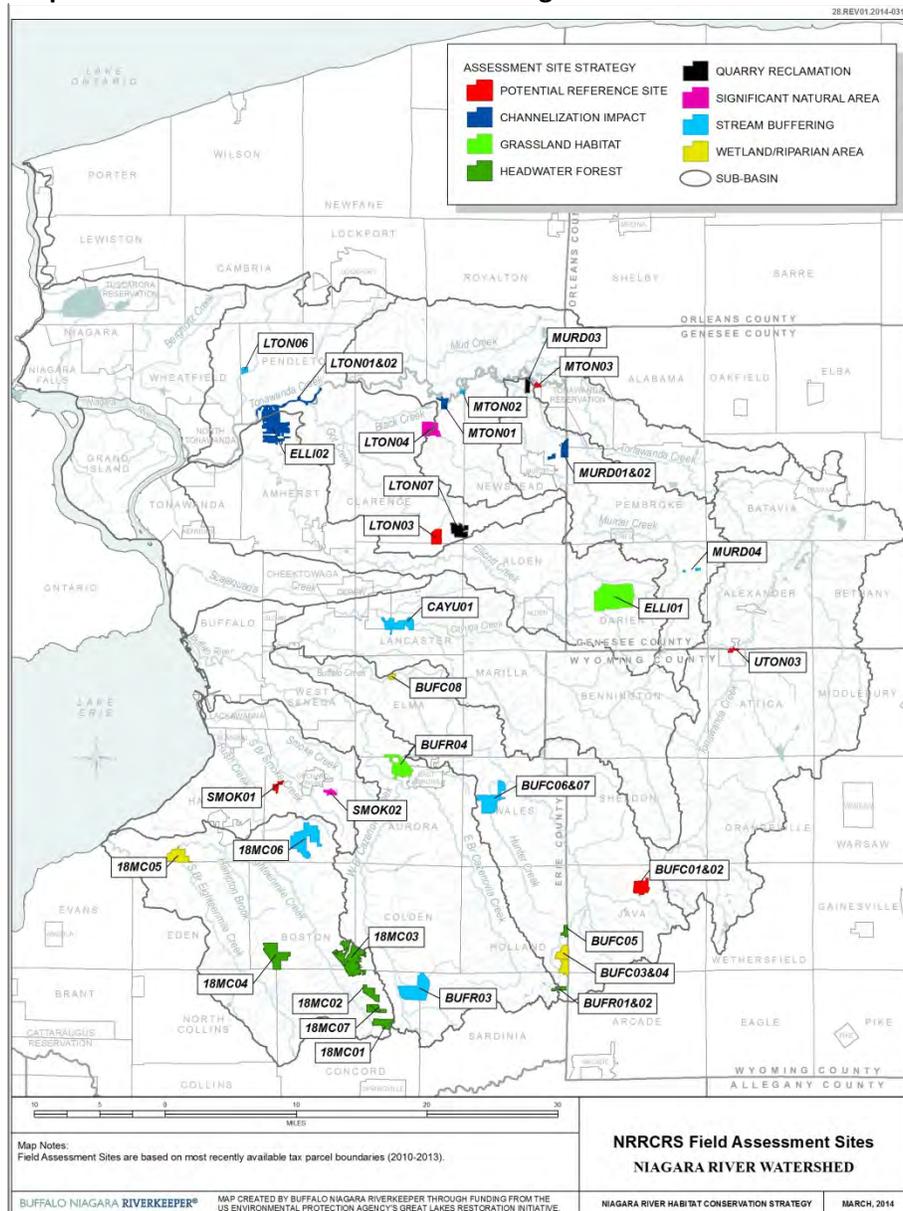
NIAGARA RIVER HABITAT CONSERVATION STRATEGY MARCH, 2014

4.2 Field Site Findings and Action Plans: All Ecoregions

The project team selected 37 potential “best bet” habitat opportunity sites for further field assessment. Wildlife and habitat experts from Applied Ecological Services, Inc. (AES) visited these sites over the summer and early fall of 2013 and assessed conditions in Active River Area focal areas at each site. Map 4.5 provides an overview of all sites visited by the field team, as well as displays the sites selected as best-bet actions.

Action Plans for selected sites follow, providing a fuller description of findings and site-based recommendations. Some private lands and sites with comparatively little ecological value are not included. Exceptions on private land include opportunities that have imminent potential and property owner permissions.

Map 4.5 NRRCRS Field Assessment Sites Niagara River Watershed



Niagara River Habitat Conservation Strategy

ERIE COUNTY FOREST LOT 13 (18MC01- HEAD) Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: Conserve headwater forests for water quality, stream habitat and climate change resilience

Conservation Opportunities: Enhancement of ecological management plans; invasive species management; enhanced land protection; mitigation of landscape fragmentation

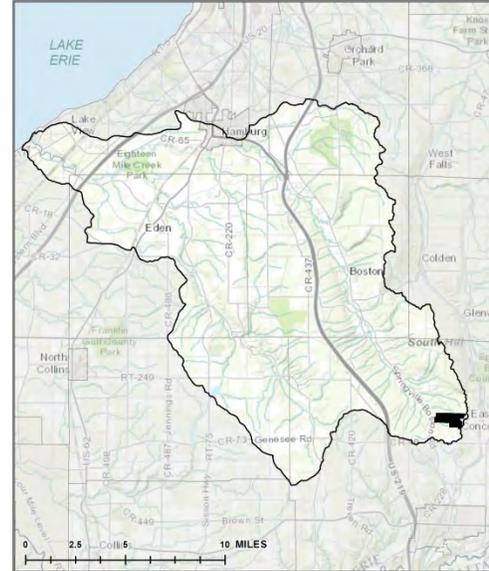
Site Description: Lot 13 is the uppermost county forest located in the Eighteenmile Creek Sub-basin and the largest in the Niagara River Watershed. It contains an uneven-age stand of native hardwoods, a Class A stream, trout and other Natural Heritage Program (NHP) protected species, as well as adjacent wetland and abandoned land potential to increase connectivity. According to the County Master Plan, this lot has the greatest ecological value of all 13 county forests and should be preserved for wildlife diversity, passive recreation and environmental education. Silviculture recommendations include harvesting mature trees of poor form and crop thinning in select areas.

Acreage: 295 acres

Location (road crossing): Sibley and Sharp Rd, Concord NY

Ownership: Erie County

Biodiversity Features: Woodlands: Uneven-aged native hardwoods (maple-beech-hemlock), wetlands, headwater stream



Crayfish Holes along 18-Mile Creek; Photo credit: AES

Proposed Action/Restoration Potential: Clarify ecological management goals and needs in County Forest Master Plan. Consider not removing trees of poor form as they may have significant ecological value—providing cavities for roosting, stream protection, nutrients and habitats to the forest floor, and control of invasive species. Maintain a minimum 100-ft buffer along streams, and manage invasives, including a large Japanese knotweed patch bordering the stream near Sharp and Sibley intersection.

Potential Implementers/Partners: Erie County Department of Parks, Recreation, and Forestry; Erie County Department of Environment and Planning; Erie County SWCD/NRCS

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Great Lake Basin Program Soil Erosion and Sediment Control Grant, US Forest Service Northeastern Area State and Private Forestry Grant, Freshwater Future Project Grant Program

ERIE COUNTY FOREST LOT 9 (18MC02)

Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: Conserve headwater forests for water quality, stream habitat and climate change resilience

Conservation Opportunities: Enhanced ecological management plans; invasive species management; potential woodland reference site

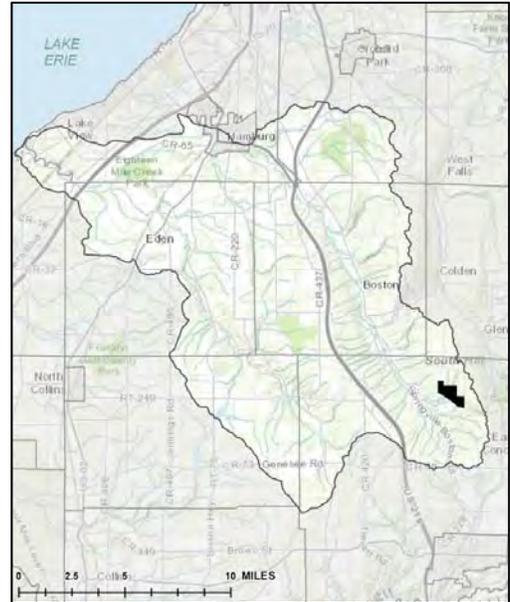
Site Description: This County Forest lot includes steep terrain and, according to the County forester, is reserved for headwater protection. The site includes a healthy functioning secondary growth forest with stream channels of good riffle and pool structure and very high water quality, which could serve as a reference area for healthy functioning woodlands.

Acreage: 278 acres

Location (road crossing): Morse and Sharp Rd, Concord NY

Ownership: Erie County

Biodiversity Features: Woodlands: Contains an uneven-aged stand of northern hardwoods (mainly maple-beech-hemlock) on steep ravines with spring seeps, NYS-protected streams and long forested slopes. Sub-canopy, shrub and herbaceous layers include a good diversity of native plants. Aquatic: Stream channels have good riffle and pool structure and very high quality water. Salamander species were observed onsite.



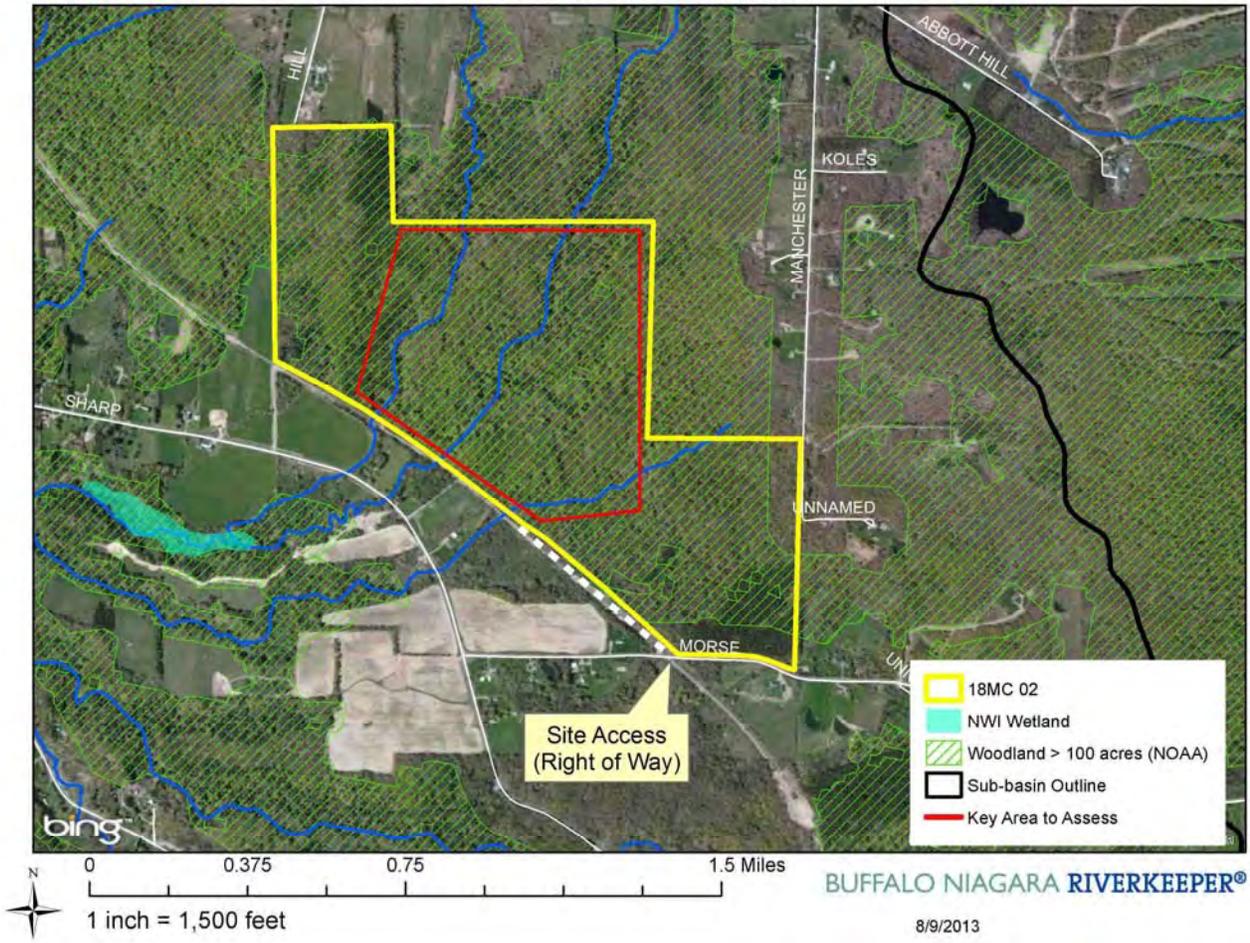
Northern Dusky Salamanders, native to this area; Photo credit: AES

Proposed Action/Restoration Potential: Clarify ecological management goals and needs in County Forest Master Plan. This site would benefit from management of invasives along Right of Ways (ROWs) and streams. A no-cut buffer should be maintained along the ROW, ephemeral seeps, and a minimum of 500 feet on either side of streams. Select harvesting is not recommended. The lot is a priority for conservation due to its high quality forest and steep slopes. A plant and animal inventory should be completed to determine if the site is suitable for Rare, Threatened, and Endangered species including Cerulean warbler.

Potential Implementers/Partners: Erie County Department of Parks, Recreation, and Forestry; Erie County Department of Environment and Planning; Erie County SWCD/NRCS

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Great Lake Basin Program Soil Erosion and Sediment Control Grant, US Forest Service Northeastern Area State and Private Forestry Grant, Freshwater Future Project Grant Program

18MC 02- LOT 09



FOWLerville FOREST (18MC03)

Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: *Conserve headwater forests for water quality, stream habitat and climate change resilience*

Conservation Opportunities: Land protection; Mitigation of fragmentation; culvert maintenance/removal; streambank erosion control

Site Description: Ranked high by the The Nature Conservancy as a functional forest due to contiguity and relatively low road density (LEGBI, 2010), this forest is entirely privately owned in over a dozen parcels many of them tax-labeled “rural vacant” land. The 1,300+ acre roadless block is a priority for conservation. The northernmost tributary, Landon Brook, is a NYS Natural Heritage Program-noted rocky headwater stream. Rainbow trout are documented. A shrub carr wetland at Dunn Road hosts a diverse plant community. Potential wetland reference site.



Acreage: 1,386 acres

Location (road crossing): Generally, Dunn and Fowlerville Rds, Boston NY

Ownership: Private, multiple owners and parcels

Biodiversity Features: Woodlands/Wetlands: Second growth maple-beech-hemlock forest present. High quality headwater brook and native shrub carr wetland that may support flycatcher species of concern and other shrub wetland-dependent birds is present. A wide diversity of amphibian species were observed, with potential for listed reptiles.



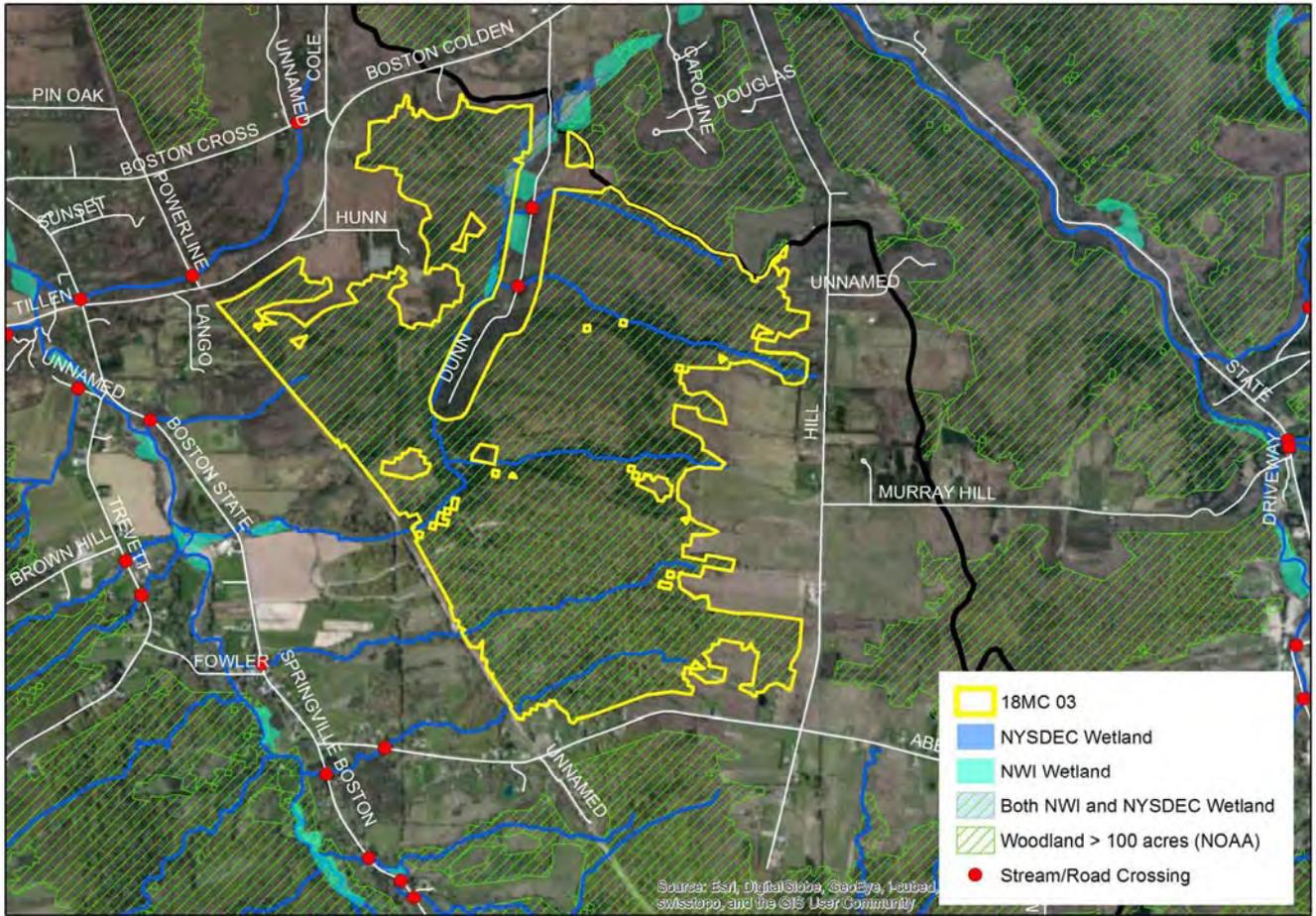
Landon Brook, northernmost tributary at Fowlerville; Photo credit: AES

Proposed Action/Restoration Potential: Prevent forest fragmentation through public acquisition of forested land or easements and promotion of collective stewardship among private landowners should target the 1,300-acre forested roadless block. Improve the flow of Landon Brook from impoundments at road crossings and protect banks from more clearing, allowing regeneration along the entire course of the stream. **Consider the shrub-carr wetland as a reference area and a high priority for protection.** AES field assessments of 22 road culverts provide a preliminary analysis of where there are blockage and erosion problems that need to be addressed.

Potential Implementers/Partners: The Nature Conservancy; Western New York Land Conservancy; NYS DEC; Erie County SWCD/NRCS; Towns of Boston and Concord.

Potential Funding Sources: US Forest Service Northeastern Area State and Private Forestry Grant, US Forest Service Community Forest and Open Space Program, NRCS Wetland Reserve Program, National Fish and Wildlife Foundation Acres for America

18MC 03- FOWLerville



Niagara River Habitat Conservation Strategy

BOSTON FOREST PARK - ERIE COUNTY LOT 10 (18MC04)

Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: *Conserve headwater forests for water quality, stream habitat and climate change resilience*

Conservation Opportunities: Enhanced ecological management plans; invasive species management; fish passage/barrier removal

Site Description: Boston Forest Park is an undeveloped County Park/Forest with three Eighteenmile Creek tributaries on steep slopes flowing east to west across it. Streams in the interior forest are well buffered with amphibian populations noted. Non-forested areas nearer the road had a high percentage of invasive plant species. Some disturbance was observed in upland areas.

Acreage: 710 acres

Location (road crossing): Feddick and Rice Hill Rd, Boston NY

Ownership: Erie County

Biodiversity Features: Woodlands: An uneven-aged stand of native hardwoods (sugar maple, black cherry, cucumber, yellow birch) with some hemlock and white pine. Aquatic : Two Class B streams support healthy amphibian populations and potential listed reptiles.



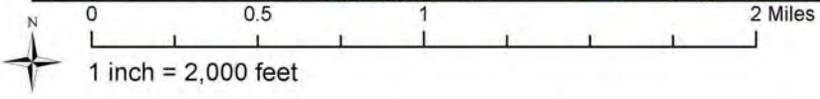
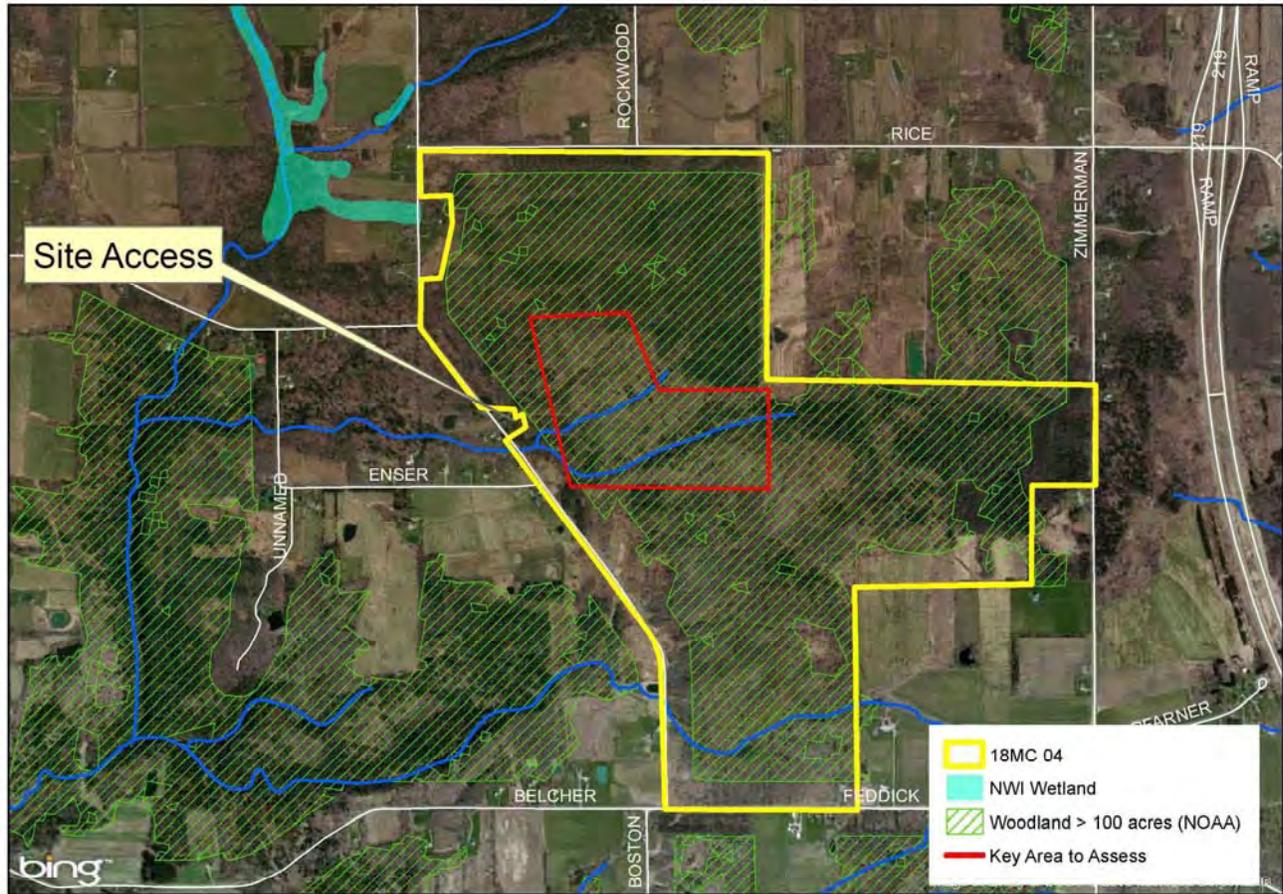
*Streams in the interior forest are well buffered;
Photo credit: AES*

Proposed Action/Restoration Potential: Clarify management goals in master planning for this park. Currently, the well-buffered interior forest and streams support notable biodiversity. Prior to any silviculture activity, a wildlife survey should be conducted to understand potential impacts and target areas and species to be protected. Invasive species intrusion should be evaluated against canopy thinning, as the open area nearest Feddick Road already contains 75% invasive species. The culvert under Feddick Road is blocked by woody debris and sediment, which likely impedes fish and wildlife passage.

Potential Implementers/Partners: Erie County Department of Parks, Recreation, and Forestry; Erie County Department of Environment and Planning; Erie County SWCD/NRCS; T of Boston highway department.

Potential Funding Sources: EPA Great Lakes Restoration Initiative, US Forest Service Northeastern Area State and Private Forestry Grant, Freshwater Future Project Grant Program, Fish and Wildlife Service Candidate Conservation Action Funds

18MC 04- BOSTON



BUFFALO NIAGARA RIVERKEEPER®

8/9/2013

Niagara River Habitat Conservation Strategy

EIGHTEENMILE CREEK COUNTY PARK (18MC05)

Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: *Identify high quality aquatic and riparian wetlands for conservation*

Conservation Opportunities: Invasive species management; erosion/sediment control; enhanced land protection

Site Description: This undeveloped Erie County Park is centered on the confluence of the main and south branches (and gorges) of Eighteenmile Creek. Of the 3 Lake Erie gorges within the Niagara River watershed, The Nature Conservancy ranked Eighteenmile highest as a functional landscape based on land cover within 400 meters of the stream, lack of dams/diversions, roadless blocks and water quality (LEGBI, 2010). The park is a NYS “significant fish and wildlife area,” and also the upstream end of a DEC-designated fishing access area known for its spring Steelhead run.

Acres: 464 acres

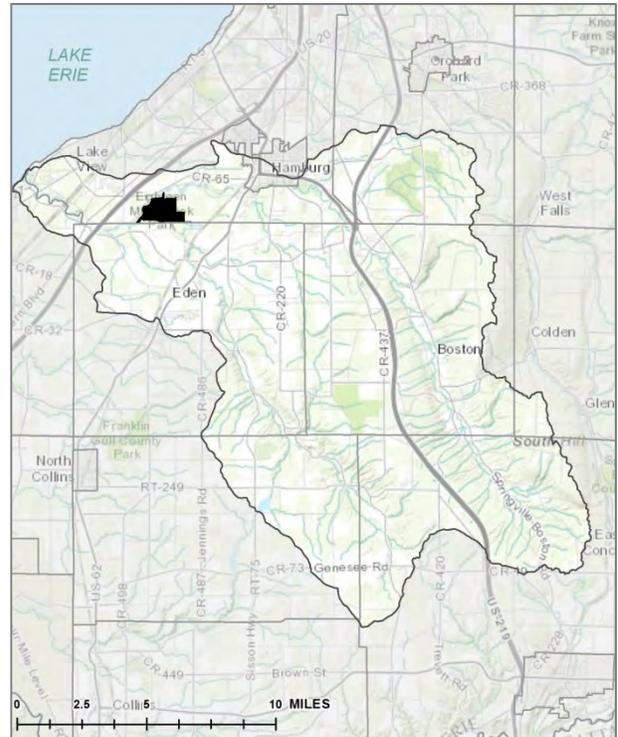
Location (road crossing): North Creek and Lakeview Rd, Hamburg NY

Ownership: Erie County

Biodiversity Features: Woodlands: Maturing hemlock-maple-oak forest (90% native woodland) found at the convergence of two major streams suitable to flycatcher, vireo and wood warbler species; shale cliff and talus communities present; cold spring micro-habitats present, botanically diverse functional floodplain.



Fishing access in Eighteenmile Creek Park;
Photo credit: AES

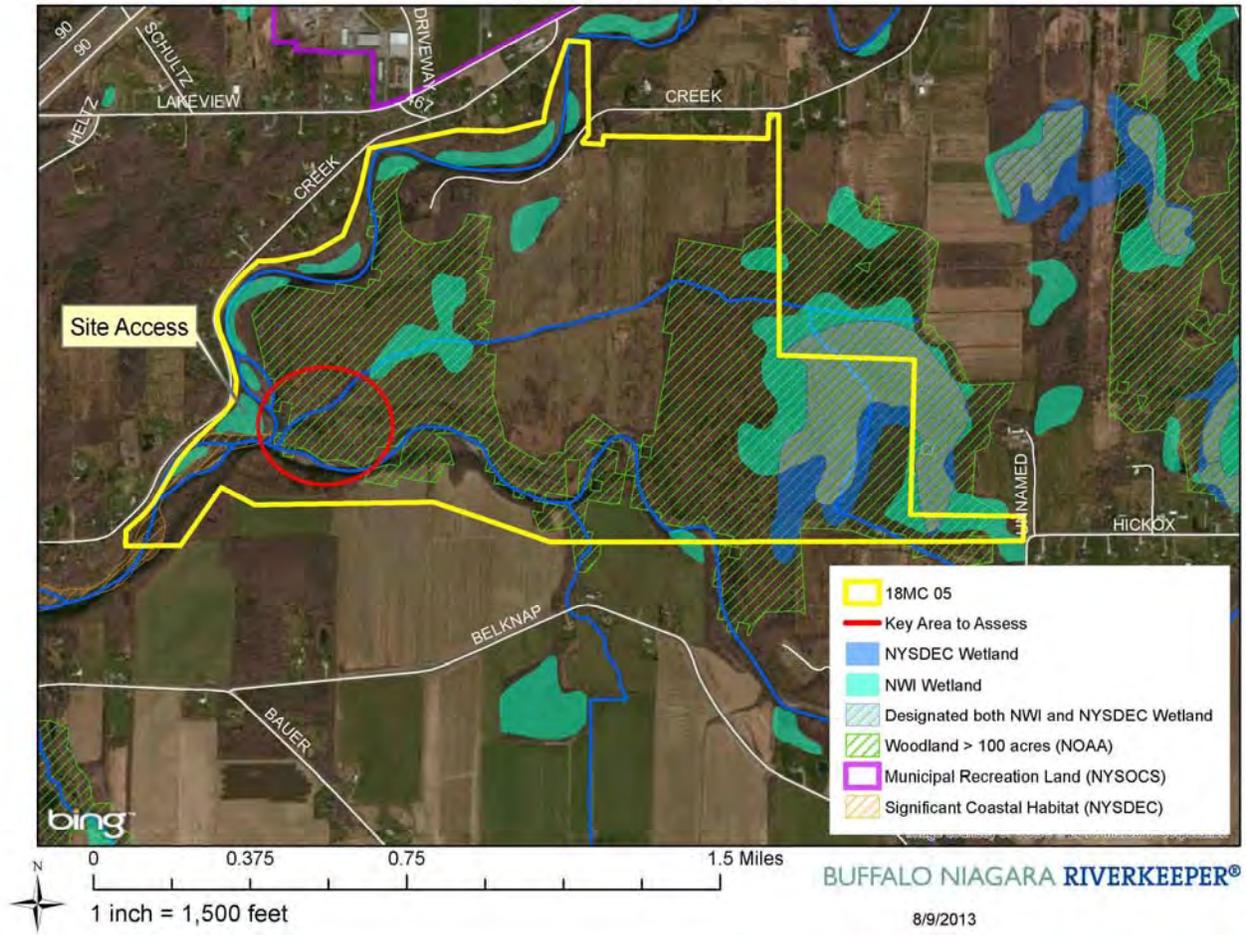


Proposed Action/Restoration Potential: This site would benefit most from invasive species control, especially in the floodplain, which is 40-50% invasives, mainly Japanese knotweed, purple loosestrife, mugwort, and reed canary grass. Continued protection of this site as an undeveloped, conservation county park is recommended to maintain a high level of biodiversity. Monitoring is needed for impacts from trail and other human encroachments. Completing a comprehensive wildlife assessment is recommended to document important species and would assist in defining further management goals.

Potential Implementers/Partners: Erie County Department of Parks, Recreation, and Forestry; Erie County Department of Environment and Planning; Erie County SWCD/NRCS; Town of Hamburg

Potential Funding Sources: EPA Great Lakes Restoration Initiative, US Forest Service Northeastern Area State and Private Forestry Grant, Great Lakes Basin Program Soil Erosion and Sediment Control

18MC 05- FORK



SHALE CREEK - CHESTNUT RIDGE COUNTY PARK (18MC06)

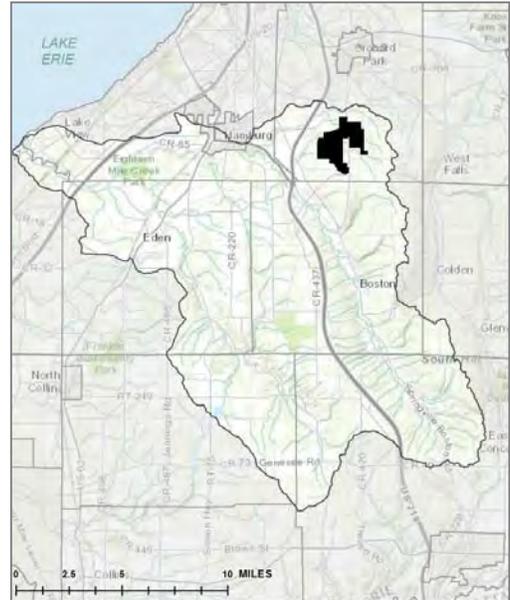
Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: *Identify critical needs and opportunities for stream buffering.*

Conservation Opportunities: erosion/sediment control; enhanced best management practices; enhanced ecological management plans

Site Description: This 90-acre undeveloped southwestern portion of the Chestnut Ridge multi-use park includes “Eternal Flame Falls.” It was previously managed separately from the park by the Buffalo Museum of Science as a reference and field trip site for local woodland ecology. The forest includes a significant community of intact maturing second growth hemlock, maple, and beech. Areas of invasives are present, associated with canopy openings. Trails in this park are heavily used and excessively widened causing disturbance to the ecological community by erosion, compaction, and trampling of vegetation.



Acreage: 90 acres (Chestnut Ridge Park total: 1,231 acres)

Location (road crossing): Boston Ridge and Seufert Rd, Orchard Park NY

Ownership: Erie County

Biodiversity Features: Woodland: Second growth maple-beech-hemlock forest with a potentially diverse herbaceous understory, narrow shale ravine and waterfall.



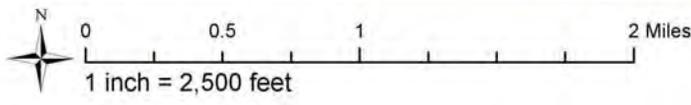
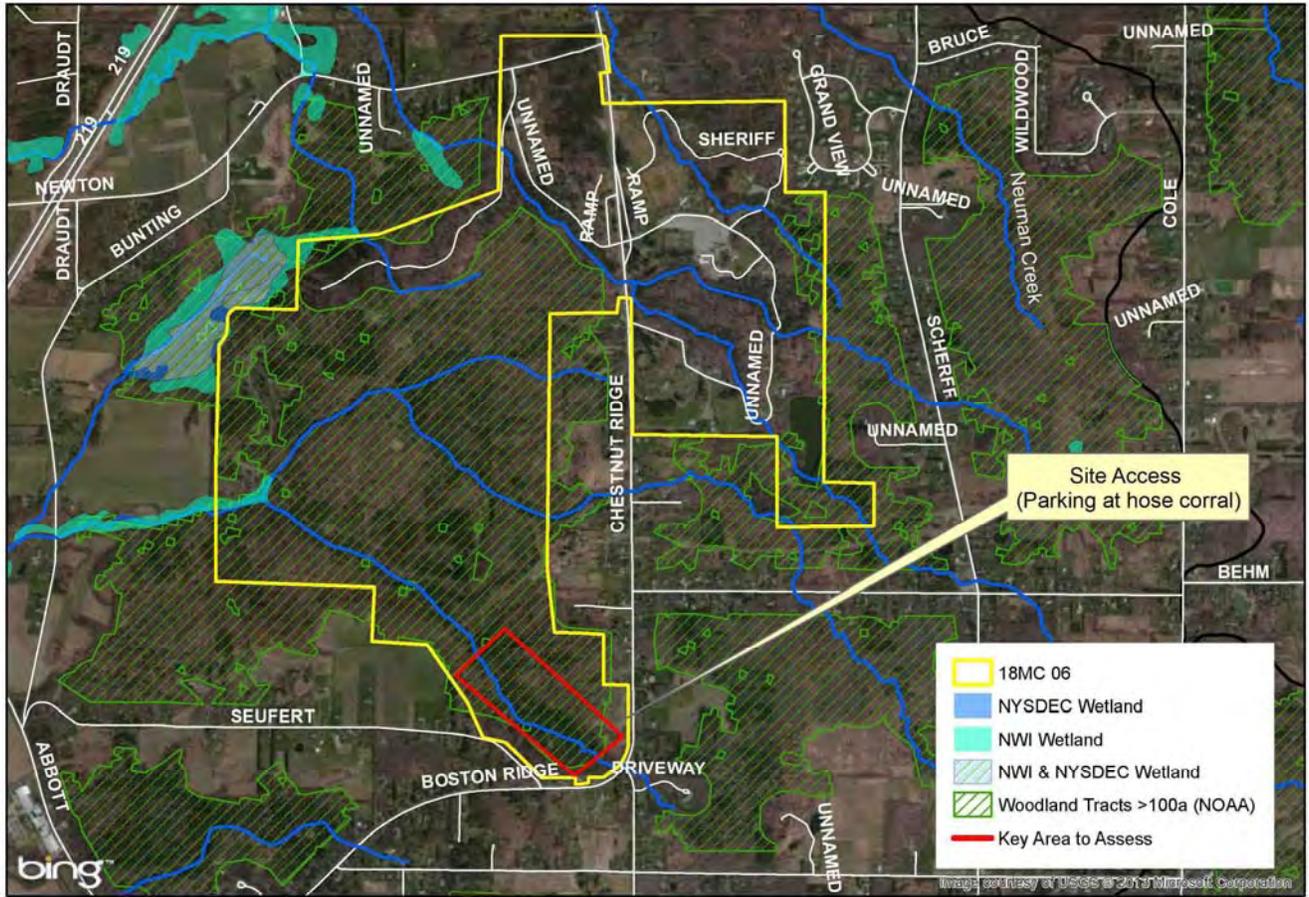
*Trail erosion along Eternal Flame trail;
Photo credit: Kerrie Gallo*

Proposed Action/Restoration Potential: The trail system should be reworked to address the risks posed to water quality and riparian and upland habitat (especially near the gorge rim and falls) due to human disturbance. Interpretive signage and trail maintenance should be paired with off-limits areas for natural and assisted regeneration. “Herd trails” down the steep gorge faces to the “Eternal Flame” need to be addressed as a safety and erosion issue. Conduct a natural resource inventory to determine the presence/absence of RTE species and priority areas for limited access. Monitoring and management of invasive species is needed.

Potential Implementers/Partners: Chestnut Ridge Conservancy; Erie County Department of Parks; Recreation, and Forestry; Erie County SWCD/NRCS; Town of Orchard Park

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Freshwater Future Project Grant Program, Fields Pond Foundation Grant

18MC06- SHALE



Niagara River Habitat Conservation Strategy

FORESTED LINK (18MC 07)

Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: Conserve headwater forests for water quality, stream habitat and climate change resilience

Conservation Opportunities: Mitigate forest fragmentation; restore native trout populations

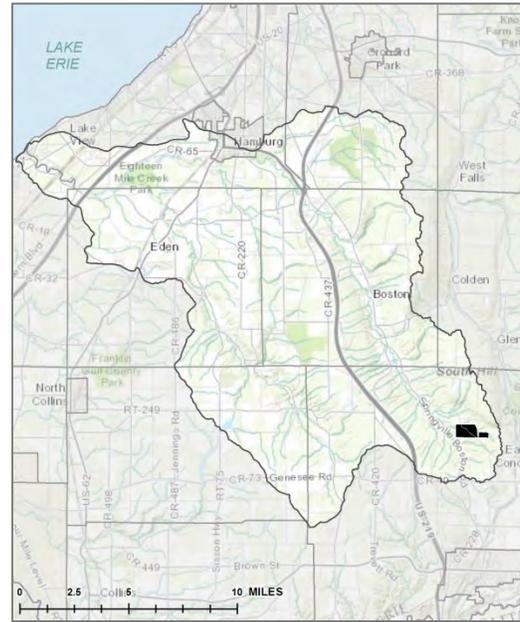
Site Description: This headwater forest site consists of 75% forested land on steep terrain at the headwaters of the main branch of Eighteenmile Creek in the Town of Concord. The land was farmed 100 years ago but has since reforested and is currently made up of a mature mixed hardwood forest overlying a glacial moraine aquifer that feeds a Class A trout stream. It is surrounded by disjointed parcels of state wetland, county forest, private wildlife refuges, and a few large farms. Conservation of this parcel would bring the total protected natural area to over 1,000 acres of almost continuous woodland and wetland acreage. A utility ROW and the road fragment the property.

Acreage: 223.5 acres

Location (road crossing): Generally, Sharp Street

Ownership: Private

Biodiversity Features: Woodland and Aquatic: Mature hardwood forest with few areas of invasive species. Potentially valuable habitat for salamanders, queen snakes, and brook trout.



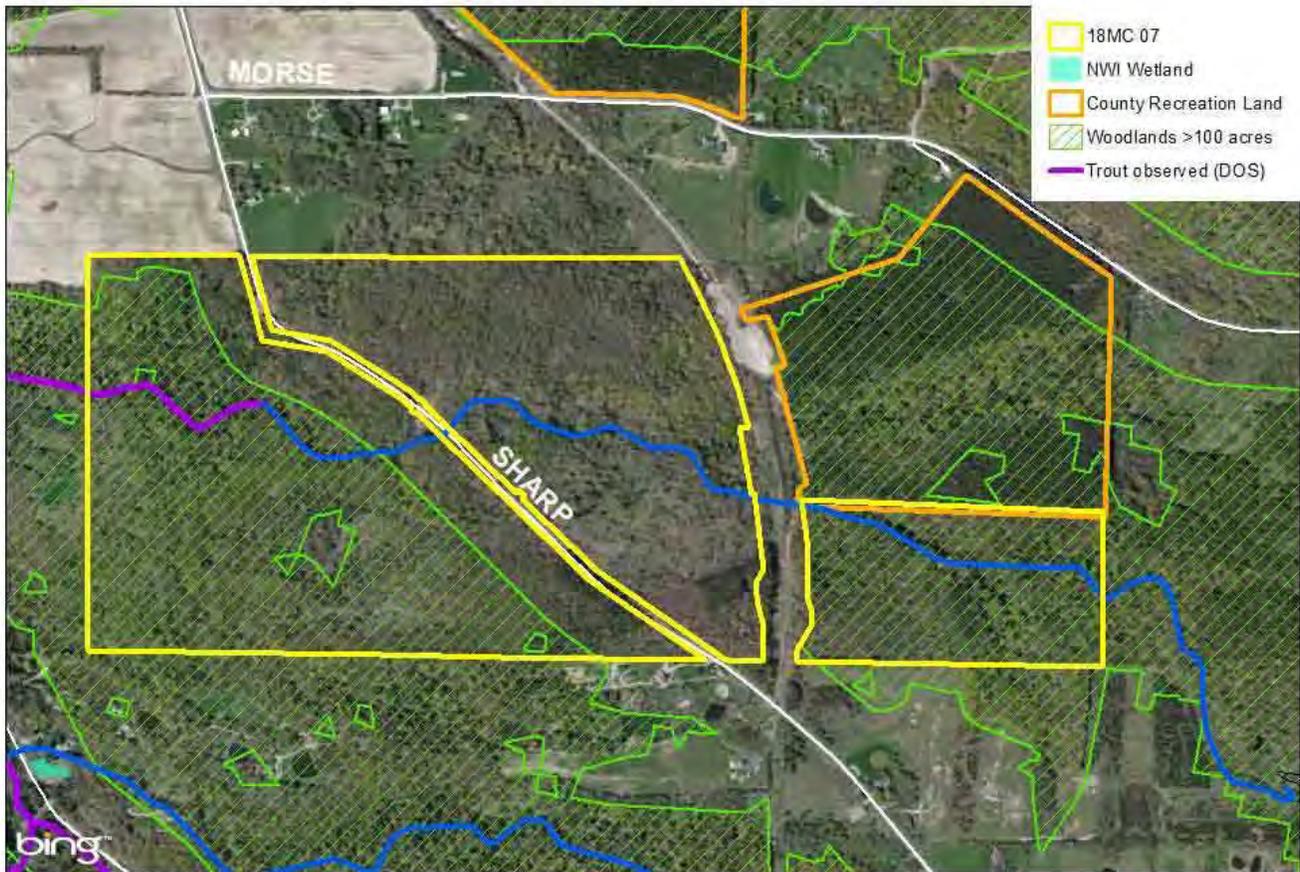
Unauthorized ATV trails in the area contribute to habitat fragmentation; Photo credit: AES

Proposed Action/Restoration Potential: If acquired and preserved the proximity to 18MC 01 and 02 would be significant in creating a headwater forest matrix of over 1,000 acres. The most positive impact would be on water quality and climate change resiliency. Forest connectivity would be maintained to the highest extent possible and invasive species encroachment would be minimal. Identify funds to purchase the site and develop a conservation easement, ideally with Erie County Department of Parks, Recreation and Forestry serving as the long-term owner and manager of the site.

Potential Implementers/Partners: The Nature Conservancy; Erie County; Town of Concord, Buffalo Niagara Riverkeeper, Western New York Land Conservancy

Potential Funding Sources: Private Foundations; USGS Community Forestry Grant; DEC Environmental Protection Funds, NYS Open Space Funds

18MC 07- LINK



0 0.25 0.5 1 Miles

1 inch = 1,000 feet

BUFFALO NIAGARA RIVERKEEPER®

10/8/2013

COUNTY FOREST LOT 11 (BUFR 01 & 02)

Cattaraugus Hills Ecoregion

PRIORITY: MEDIUM

Strategy: *Conserve headwater forests for water quality, stream habitat and climate change resilience*

Conservation Opportunities: Increased forest protection; invasive species management

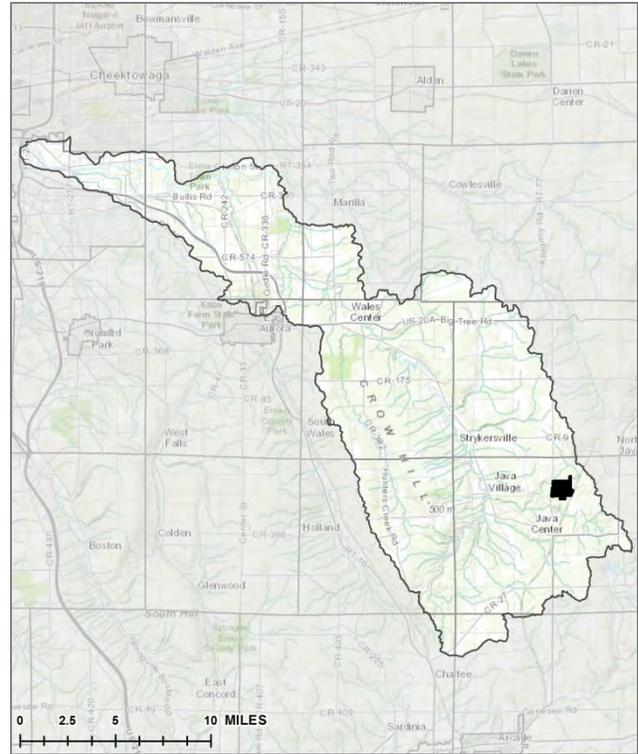
Site Description: County Forest Lot 11 is divided between Buffalo River and Buffalo Creek sub-basins and is located at the headwaters of the East Branch of Cazenovia Creek. This area is noted for extensive marsh/pond communities and also includes well-buffered trout streams and young secondary growth hardwoods among an old pine plantation.

Acreage: 94 acres

Location (road crossing): Miller and Greer Rd, Sardinia NY

Ownership: Erie County

Biodiversity Features: Woodlands: Young and old successional northern hardwood (beech-maple mesic) forests. Multiple seeps from east and northeast facing forested slopes support a fen, a Class 1 wetland, and a C(t) (brown trout) stream. Potential to support forest breeding raptors and deciduous/mixed forest breeding birds exists.



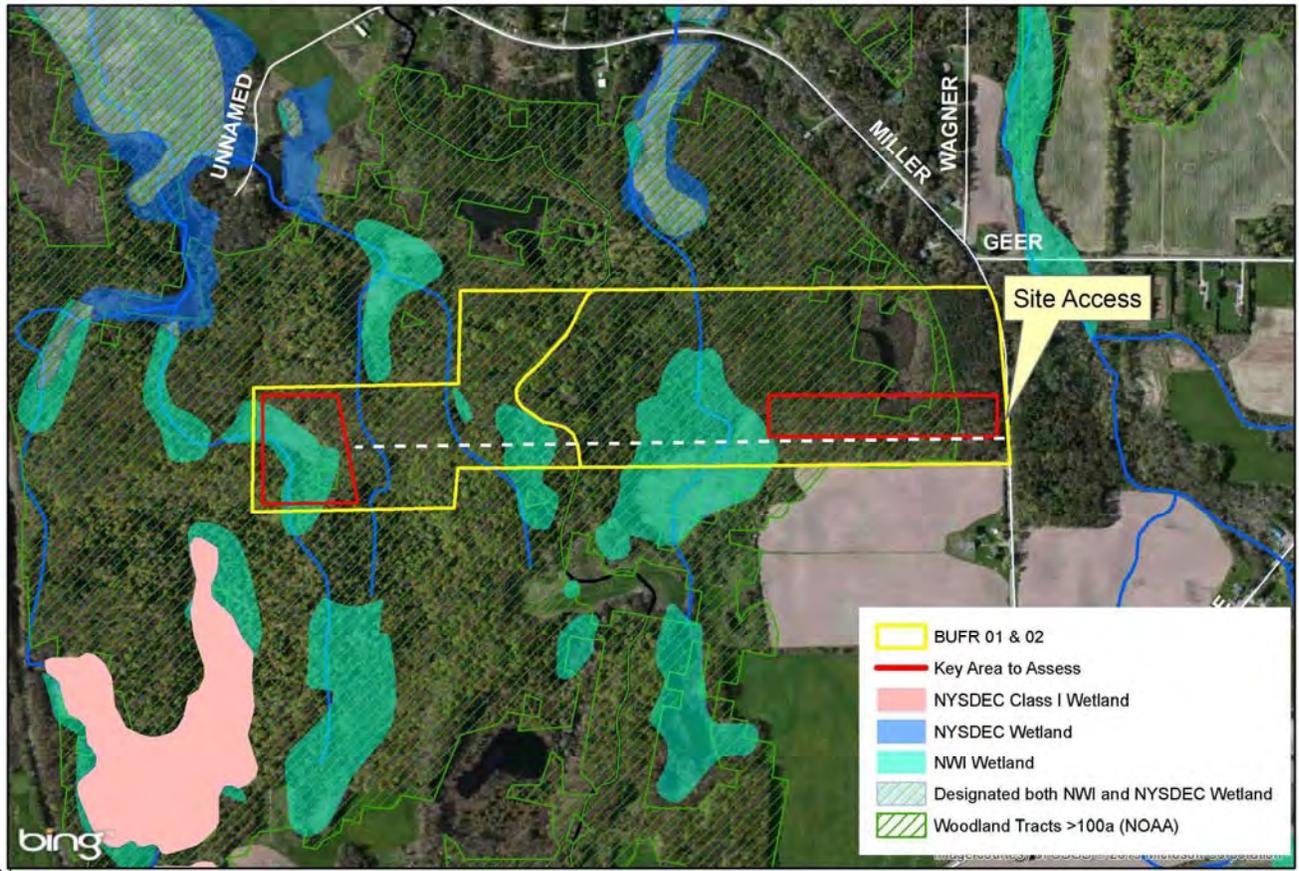
Invasive species should be removed from wetland area to reduce spreading; Photo credit: AES

Proposed Action/Restoration Potential: This site is a priority for protection due to its high quality stream, wetland, and wetland seepages. The County Master Plan calls for thinning or patch harvesting the young hardwood forest to aid transition to native hardwoods but this could negatively impact adjacent streams and wetlands. If thinning does occur, a buffer should be maintained around the NWI wetland to the west. Investigate dirt road at the west end of property that may be impacting the wetland. Soils are currently stable and streams well buffered by the mature interior forest. A small amount of invasive species (e.g. Glossy buckthorn, Tartarian honeysuckle) was observed in the wetland area and should be addressed to reduce spreading.

Potential Implementers/Partners: The Nature Conservancy; The Western New York Land Conservancy; Erie County SWCD/NRCS; Erie County Department of Environment and Planning; Town of Concord

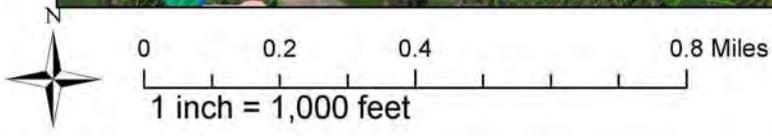
Potential Funding Sources: EPA Great Lakes Restoration Initiative, EPA Region 2 Wetland Program Development Grant, Freshwater Future Project Grant Program

BUFR 01 & 02- HEAD



- BUFR 01 & 02
- Key Area to Assess
- NYSDEC Class I Wetland
- NYSDEC Wetland
- NWI Wetland
- Designated both NWI and NYSDEC Wetland
- Woodland Tracts >100a (NOAA)

8/9/2013



SPRAGUE BROOK COUNTY PARK (BUFR03)

Cattaraugus Hills Ecoregion

PRIORITY: MEDIUM

Strategies: *Identify critical needs and opportunities for stream buffering. Increase grassland habitat values for breeding birds.*

Conservation Opportunities: Riparian buffer installation and management; erosion control; best management practice establishment (mowing); fragmentation/loss of connectivity

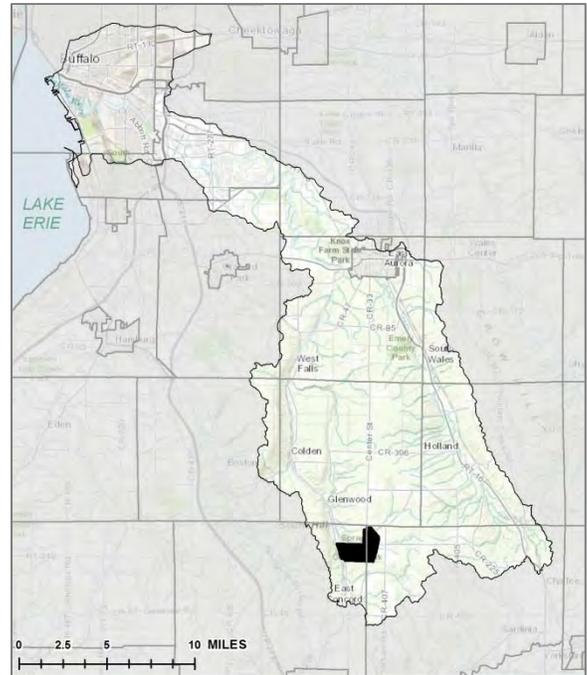
Site Description: Sprague Brook Park is one of the largest of the developed multi-purpose County Parks. Main uses include overnight camping, cross-country skiing and other recreation. The park is located in the headwaters of the West Branch of Cazenovia Creek and includes large patches of catchments without culverts. The terrain is gently sloping throughout, with some severe topography in the park’s northeast section. A number of problems were found at the site including large areas of mowed lawn, unstable and eroding stream banks, and invasive species in the eroding riparian and grassland areas.

Acreage: 974 acres

Location (road crossing): Crane and Glenwood East Concord Roads, Sardinia NY

Ownership: Erie County

Biodiversity Features: Woodlands: Mature stands of maple-beech-hemlock forest buffer upstream reaches of creek. Breeding Bird Survey notes potential for forest interior-dwelling birds as well as grassland birds.



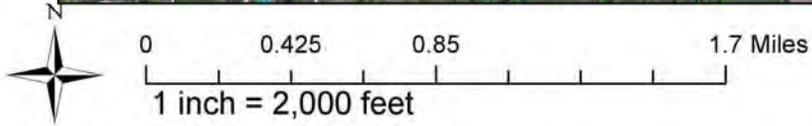
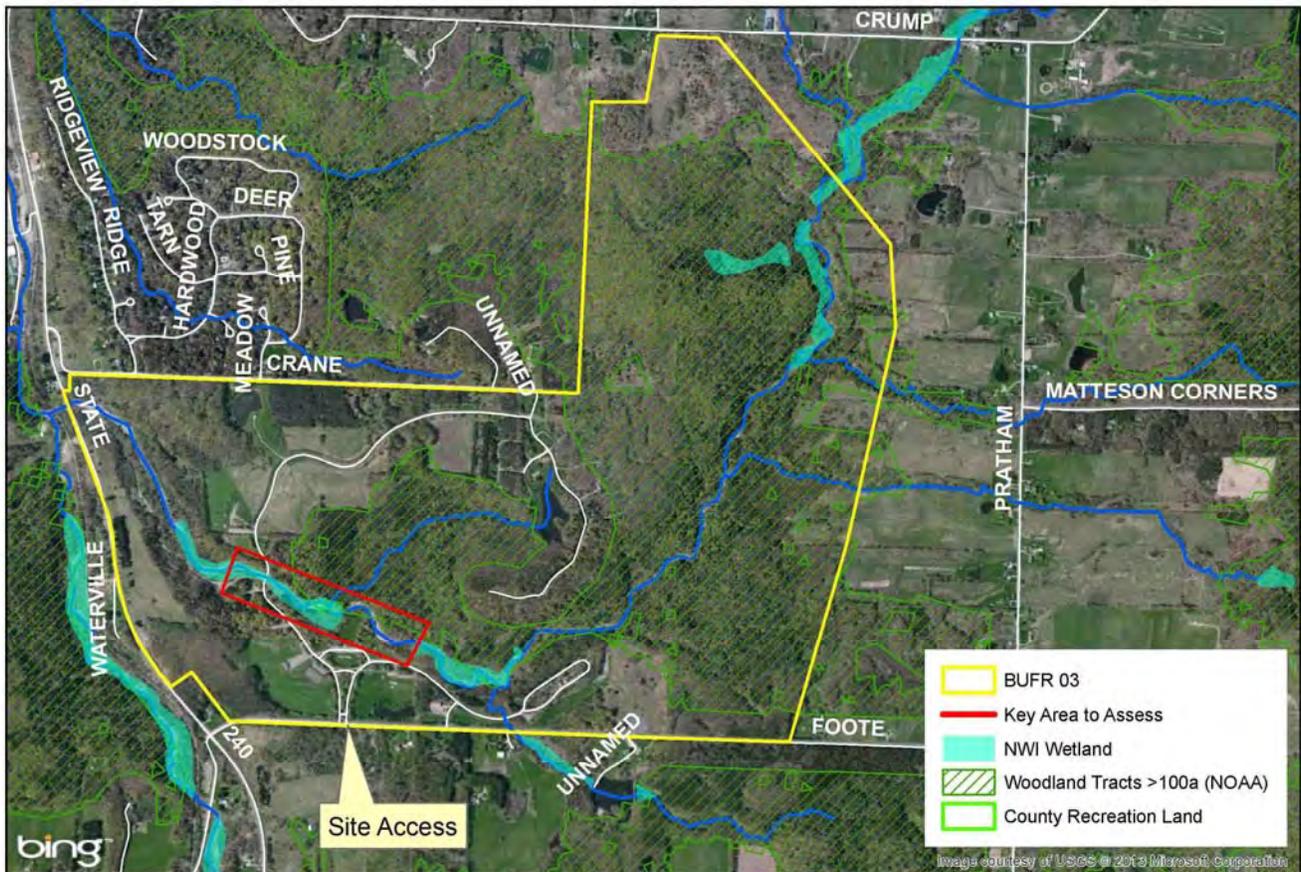
*Unmown grassy areas provide good habitat for grassland birds and other wildlife;
Photo credit: Kerrie Gallo*

Proposed Action/Restoration Potential: Restore and connect grassland/meadow habitat in the Northwestern area of the park to support valuable host plants and nectar sources for pollinators and declining species of grassland birds. Revisit the mowing plan to maximize the amount of natural area, reduce cost of maintenance, and benefit breeding birds. Restore native plants and remove knapweed and tree rows within the grassland. Restore woodland or meadow in buffer zones on the south side of the stream and remove invasives in riparian areas, targeting the small population of *Phragmites*. Monitor the spread of invasives and the effects on stream bank erosion as buffers are restored.

Potential Implementers/Partners: Erie County Department of Parks; Recreation, and Forestry; Erie County SWCD/NRCS

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Freshwater Future Project Grant Program, Great Lake Basin Program Soil Erosion and Sediment Control Grant, Fish and Wildlife Service Joint Venture Habitat Restoration and Protection Grant

BUFR 03- SPRAGUE



BUFFALO NIAGARA RIVERKEEPER®

Niagara River Habitat Conservation Strategy

BEAVER MEADOW AND GHOST POND (BUFC01 & 02)

CATTARAUGUS HILLS ECOREGION

PRIORITY: HIGH

Strategy: *Identify and protect sites with high ecological value and use as reference sites for habitat restoration; Identify high quality aquatic and riparian wetlands for conservation*

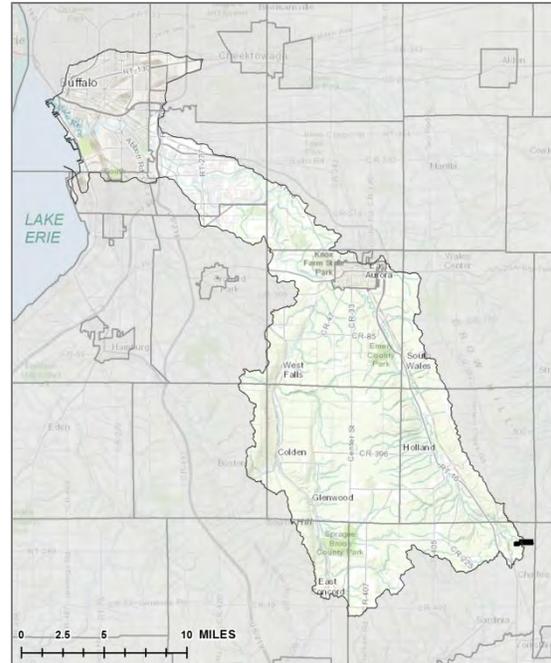
Conservation Opportunities: development of ecological headwater management plans; invasive species management; potential headwater wetland reference site.

Site Description: Ghost Pond is an artificial pond created by a railway embankment that feeds the wetlands and ponds of Beaver Meadow Nature Preserve, owned by the Buffalo Audubon Society, Inc. The pond is fed by cold groundwater seeps along the east side. A strong cold mineral spring flow at the east end of pond has created a unique peat-based wetland community including sphagnum moss, sundews, and orchids. Beaver Meadow Preserve features a large beaver pond, glacial kettle ponds, wetlands and wooded uplands. The preserve is open to visitors for hiking and educational tours.

Total acreage: 384 acres

Location (road crossing): Welch and Cattaraugus Rd, Java NY

Biodiversity Features: Wetlands/Aquatic and Woodland habitat - Mineral springs, peatlands, kettle ponds, shallow marshes, and wet meadows interspersed with forested knoll recharge areas. Significant floral and faunal diversity including 165 recorded bird species (21 avian Species in Greatest Conservation Need) and more than 278 plant species.



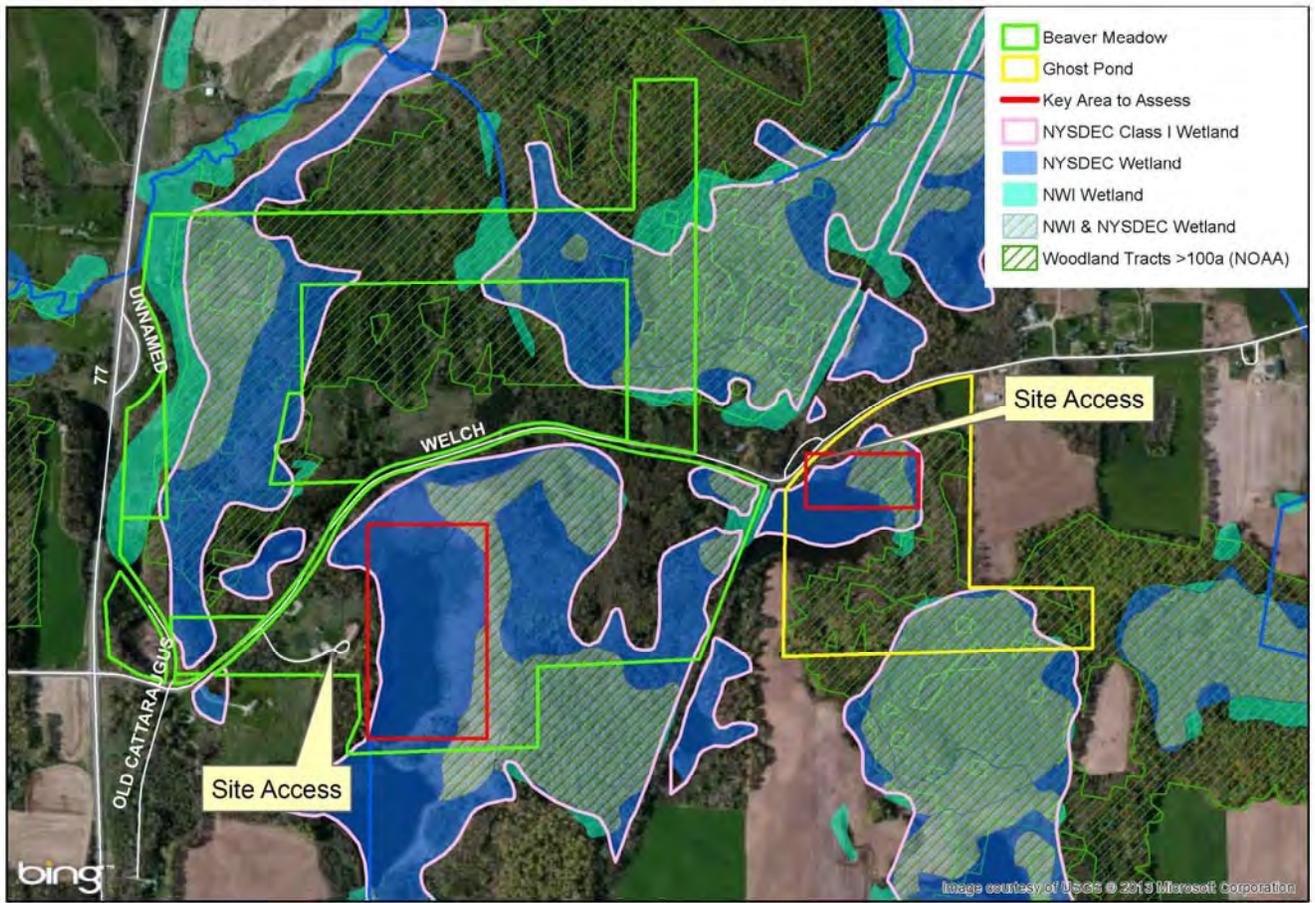
Ghost Pond at Beaver Meadow; Photo credit: AES

Proposed Action/Restoration Potential: Overall the Beaver Meadow complex is a good to excellent **reference area for headwater wetlands** due in part to limited agricultural and other human disturbances. Expand and extend stewardship education to other upland spring/source areas in the upper Tonawanda, Buffalo and Eighteenmile sub-basins. Ensure long-term protection of these properties and investigate acquisition of surrounding parcels on an ongoing basis. Manage invasives such as purple loosestrife.

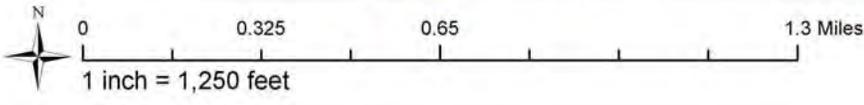
Potential Implementers/Partners: Buffalo Audubon Society, Town of Java, Wyoming County SWCD, DEC

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Freshwater Future Project Grant Program, National Environmental Education Foundation Capacity Building Grant

BUFC 01 & 02- E. HEAD



8/9/2013



BUFFALO NIAGARA RIVERKEEPER®

PROTECTION BOG - COUNTY FOREST LOTS 4 & 5 (BUFC 03 & 04)

Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: Identify high quality riparian wetlands for conservation

Conservation Opportunities: Invasive species management (Tartarian honeysuckle, multiflora rose, garlic mustard, Japanese knotweed) spreading from Wilkens and Wagner Rds; potential stream buffer reference site

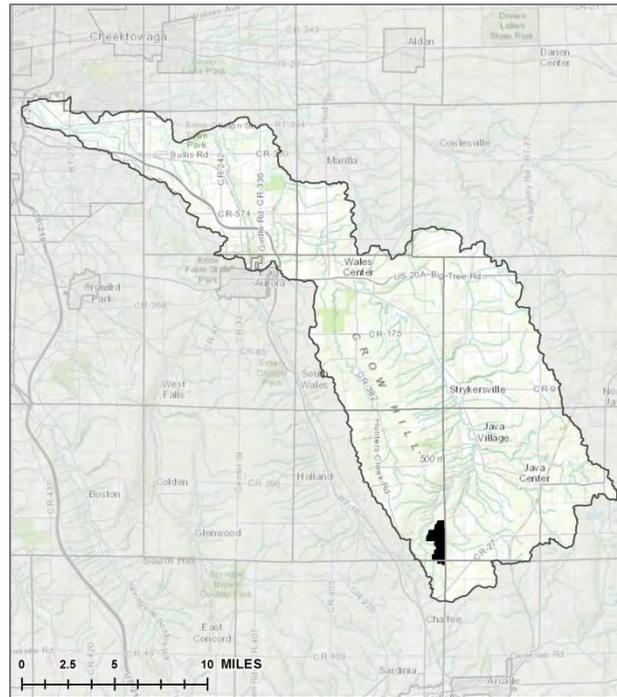
Site Description: County Forest lots 4 & 5 contain "Protection Bog," a DEC Class I wetland, and a high quality wet meadow community with patches of early successional trees and shrubs (75% native plants). The bog supports many uncommon plant species and is effectively buffered by an intact mature beech-maple-hemlock forest.

Acreage: 264 acres

Location (road crossing): Wilkins and Wagner Rd, Holland NY

Ownership: Erie County

Biodiversity Features: Wetlands/Woodlands - Bog, wetland and maple-beech-hemlock forest



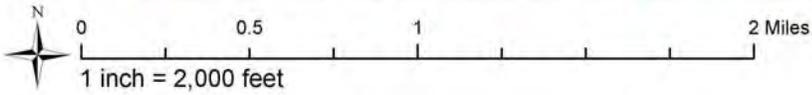
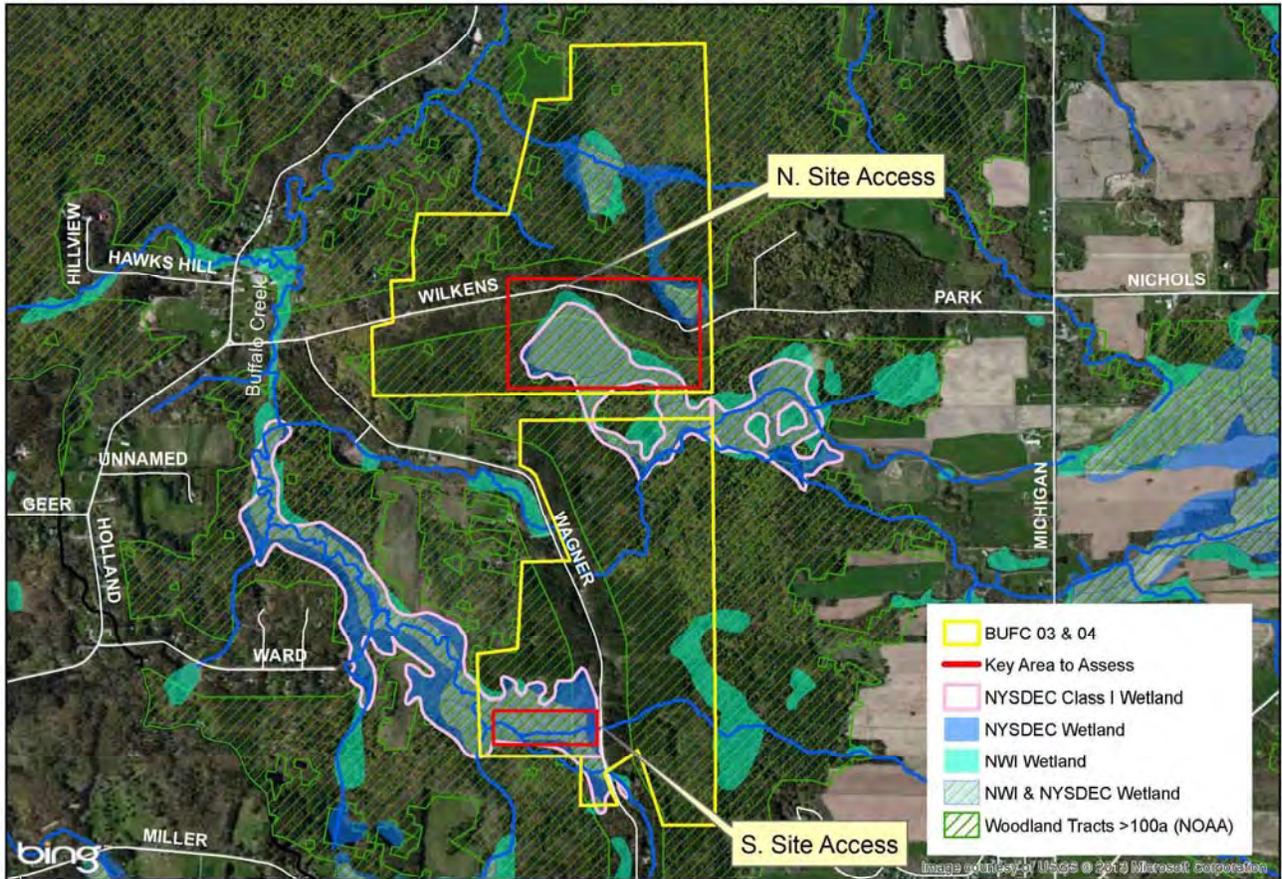
*Redback salamanders are common in the area;
Photo credit: AES*

Proposed Action/Restoration Potential: Enhance the County ecological master plan to ensure that selective harvesting is not recommended in the focus area or within 150 feet of wetlands. Wildlife surveys should be conducted prior to any land use changes, especially logging, even in a selective capacity, to identify both constraints and potential opportunities (for example, certain successional species, especially patch-opening interior-forest dwelling species, may directly benefit from a well-conceived selective harvest plan). Manage and monitor invasive plants to preserve the biodiversity and function of the wetland community, especially the Class I wetland. Consider this site as a **reference for a quality buffered stream** after invasive species are addressed.

Potential Implementers/Partners: Erie County Department of Parks; Recreation, and Forestry; Holland Boy/Girl Scout Groups (to help with invasive species removal); Town of Holland Environmental Commission and Highway Department

Potential Funding Sources: EPA Great Lakes Restoration Initiative, US Forest Service Northeastern Area State and Private Forestry Grant, EPA Region 2 Wetland Program Development Grant

BUFC 03 & 04- BOG



COUNTY FOREST LOT 6 (BUFC05)

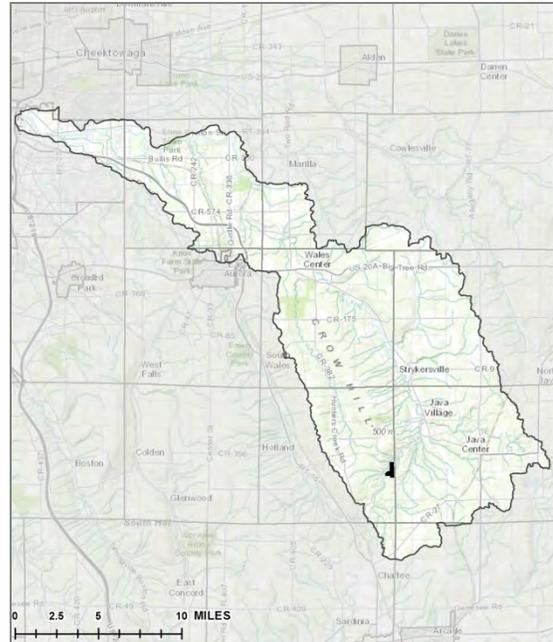
Cattaraugus Hills Ecoregion

PRIORITY: MEDIUM

Strategy: Conserve headwater forests for water quality, stream habitat and climate change resilience; Identify high quality riparian wetlands for conservation

Conservation Opportunities: Enhanced ecological management plans, invasive species management

Site Description: This county forest lot is likely to remain protected due to its location near the steep slope headwaters of the west branch of Buffalo Creek (a protected Class A stream). The middle aged-mature maple-beech-ash forest contains a diverse aquatic system with cobble substrate, intermittent riffles and up to 2-foot deep pools, woody debris, a calm backwater channel, and previous as well as current beaver activity manipulating hydrology and vegetation on site. Other notable observations include a small oxbow that provides still water and good salamander habitat.



Acreage: 100 acres

Location (road crossing): East Holland and Day Rd, Holland NY

Ownership: Erie County

Biodiversity Features: Natural Areas - Functional floodplain supports a rich herbaceous layer that is >75% native. Beaver activity diversifies age class of woods along stream improving habitat heterogeneity. Aquatic - NYS listed plant and amphibian (salamander) species.



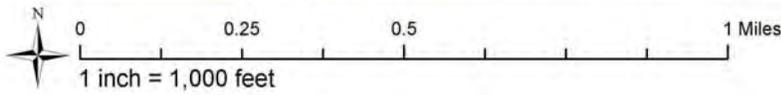
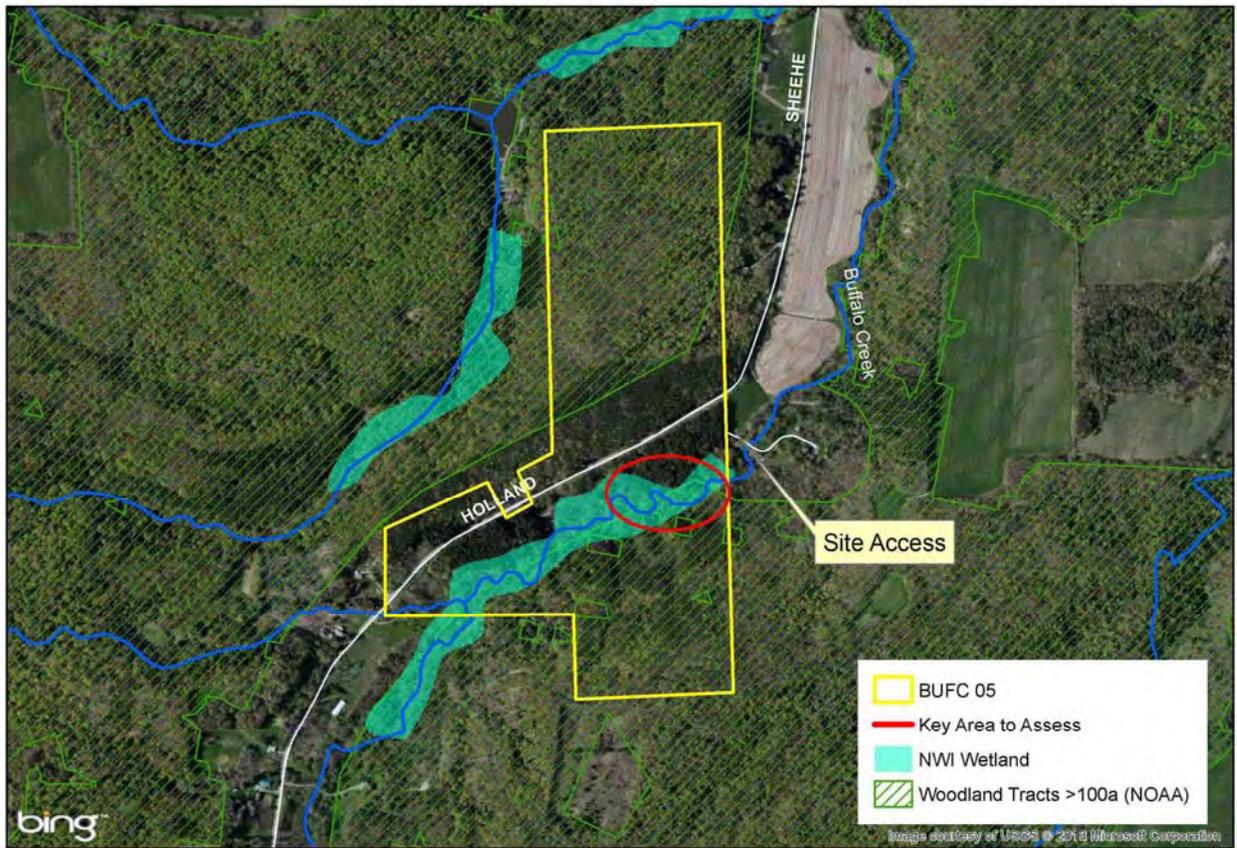
Beaver activity is frequent in this area of the creek; Photo credit: AES

Proposed Action/Restoration Potential: Clarify ecology management goals in County Master Plan. The presence of beaver is positive. However, the resulting open canopy may be encouraging invasive plant encroachment (Tartarian honeysuckle, multiflora rose) that should be removed. Planted conifers on the Northern slope in the focus area may provide valuable buffering and wildlife shelter if left intact. Wildlife surveys (herpetofaunal and avifaunal) should be conducted given the apparent richness of the site. An invasive species and silviculture study should also be conducted in order to determine which actions would best conserve the biodiversity of the lot.

Potential Implementers/Partners: Erie County Department of Parks; Recreation, and Forestry; Holland Boy/Girl Scout Groups (to help with invasive species removal); Town of Holland Environmental Commission; Erie County NRCS/SWCD

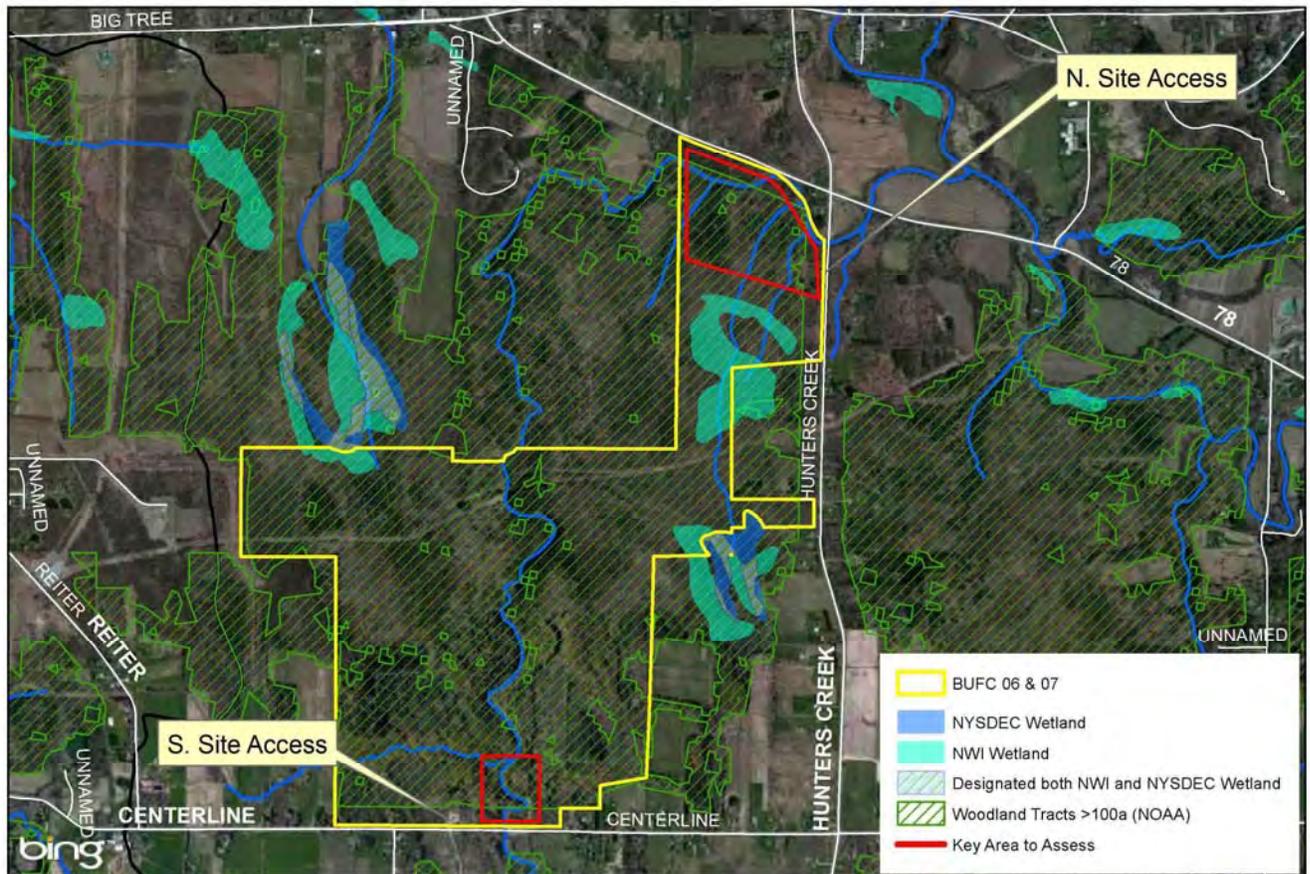
Potential Funding Sources: EPA Great Lakes Restoration Initiative, US Forest Service Northeastern Area State and Private Forestry Grant, Freshwater Future Project Grant Program

BUFC 05- W. HEAD



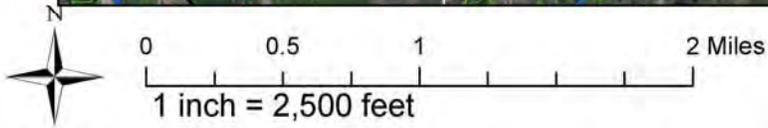
8/9/2013
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BUFC 06 & 07- HUNTER



8/9/2013

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ELMA TOWN PARK (BUFC08)

Cattaraugus Hills Ecoregion

PRIORITY: MEDIUM

Strategy: *Identify and protect areas with high ecological value; use as reference sites for restoration; Identify and protect areas with high ecological value and use as reference sites for restoration projects*

Conservation Opportunities: Erosion control, Riparian buffer installation to mitigate stormwater runoff; potential floodplain reference site

Site Description: This undeveloped town park includes a Buffalo Creek active floodplain populated by a good diversity of native plants. At least two creek terrace type communities are present: the ground layer is well vegetated and extends into a riparian forest comprised of cottonwoods and black walnuts; the second terrace contains a combination of meadow and scrub/shrub communities. The park is an important oasis along a fast-developing stream corridor.

Acreage: 53 acres

Location (road crossing): Handy and Knabb Rd, Elma NY

Ownership: Town of Elma

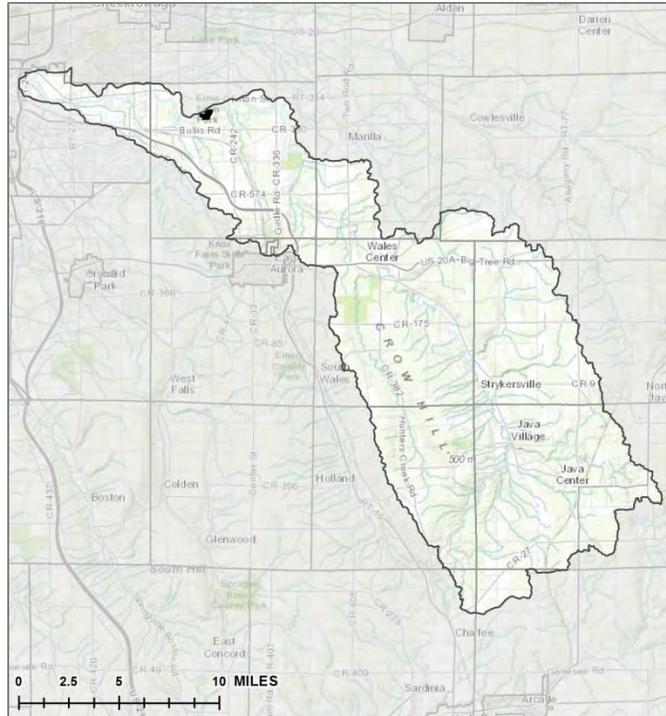
Biodiversity Features: Grassland/Shrubland - Active floodplain; a likely functional trophic web; listed herbaceous plant species (wild lupine, American gromwell, swamp lousewort, stiff goldenrod)

Proposed Action/Restoration Potential:

This park serves as an excellent natural (relatively unmanaged) **reference site for active floodplain conservation**. Invasive species such as Purple loosestrife, Knapweed, multi-flora rose and buckthorn should be addressed. Develop an Integrated Pest Management (IPM) program specifically addressing the invasive species of most concern that includes an acceptable level of management.

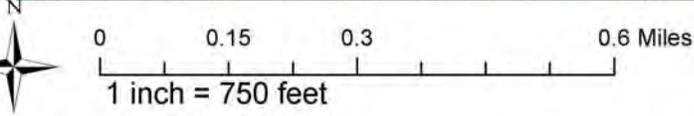
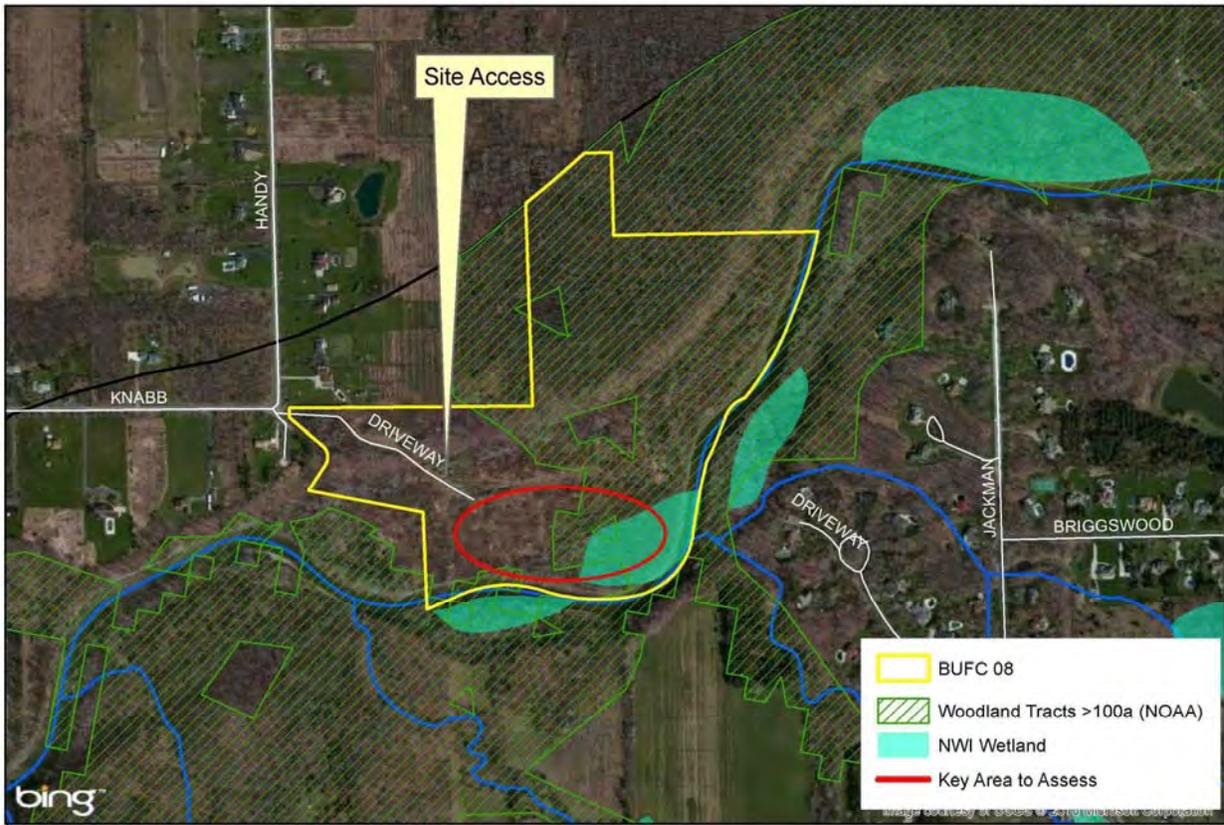
Potential Implementers/Partners: Erie County SWCD/NRCS; Erie County Department of Environment and Planning; Town of Elma Conservation Board

Potential Funding Sources: EPA Great Lakes Restoration Initiative, US Forest Service Northeastern Area State and Private Forestry Grant, National Fish and Wildlife Foundation Pulling Together Initiative



Wild lupine;
Photo credit: Kerrie Gallo

BUFC08- ELMA



8/9/2013
BUFFALO NIAGARA RIVERKEEPER®

COMO LAKE PARK (CAYU01)

Cattaraugus Hills Ecoregion

PRIORITY: HIGH

Strategy: Identify critical needs and opportunities for stream buffering

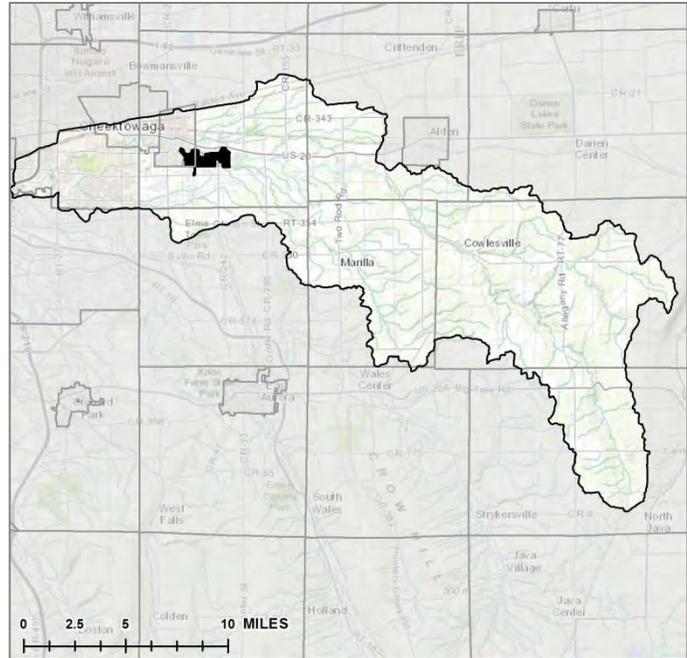
Conservation Opportunities: Riparian buffer installation; streambank stabilization, dam removal

Site Description: Como Lake Park is one of the four original parks acquired by Erie County in 1925-26. The park is situated along Cayuga Creek and is divided into two sections by Bowen Road including active recreation to the west of Bowen Road, and relatively undeveloped section to the east that includes the confluence of Cayuga with its major tributary, Little Buffalo Creek. The focus area between the two streams is wooded with invasives dominating the riparian area. A dam just downstream on Cayuga Creek forms Como Lake; another on Little Buffalo a mile upstream from the confluence may impact the hydrology and aquatic habitat quality at the site.

Acreage: 534 acres (10 parcels)

Location (road crossing): Como Park Rd and Lake Ave, Lancaster NY

Biodiversity Features: Aquatic habitat



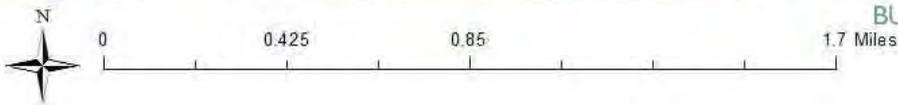
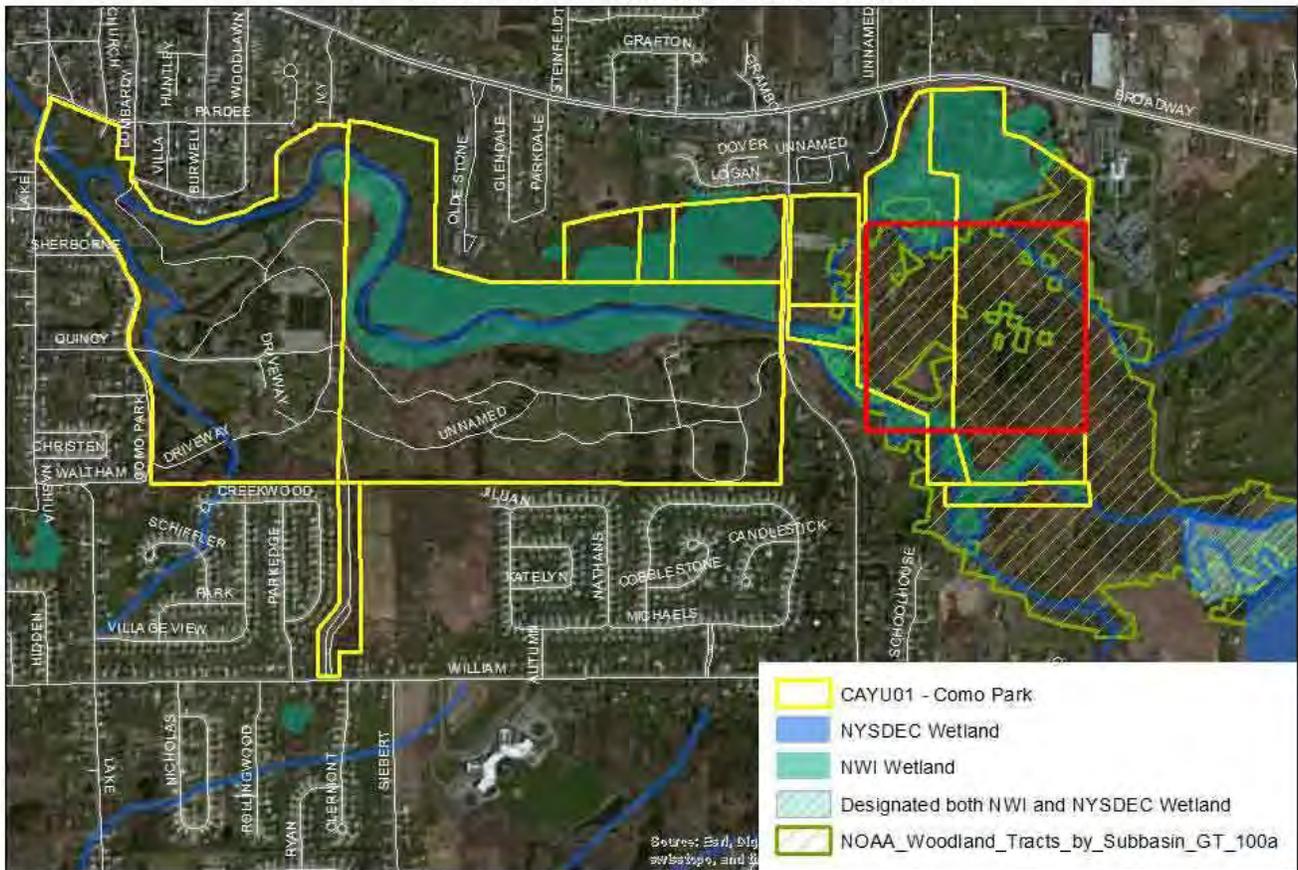
*The Como Lake Dam is 200 feet wide and 10 feet high;
Photo credit: Scott Siegfried*

Proposed Action/Restoration Potential: Restore the currently degraded conditions along the stream banks, upstream of Bowen Roads, beginning with a hydrological study to determine and sequence best options. Although the banks are undercut and eroded, the streambed offers good structure with riffles, pools, moderate flow and still water areas. Restoring the banks is important to maintaining the streambed and channel structure and includes managing invasive species in the riparian area. The dams' effects on sedimentation, aquatic habitat, and fish passage should be assessed, along with potential mitigation strategies (Siegfried, 2014).

Potential Implementers/Partners: Erie County SWCD/NRCS; Erie County Department of Environment and Planning

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Great Lakes Basin Program Soil Erosion and Sediment Control Grant, National Fish and Wildlife Foundation Environmental Solutions for Communities Grant

CAYU01 - Como Lake Park



ERIE CANAL CORRIDOR (LTON01)

Ontario Lowlands Ecoregion

PRIORITY: HIGH

Strategy: *Identify opportunities to mitigate the effects of channelization and altered flows.*

Conservation Opportunities: Riparian buffer installation/management; invasive species management

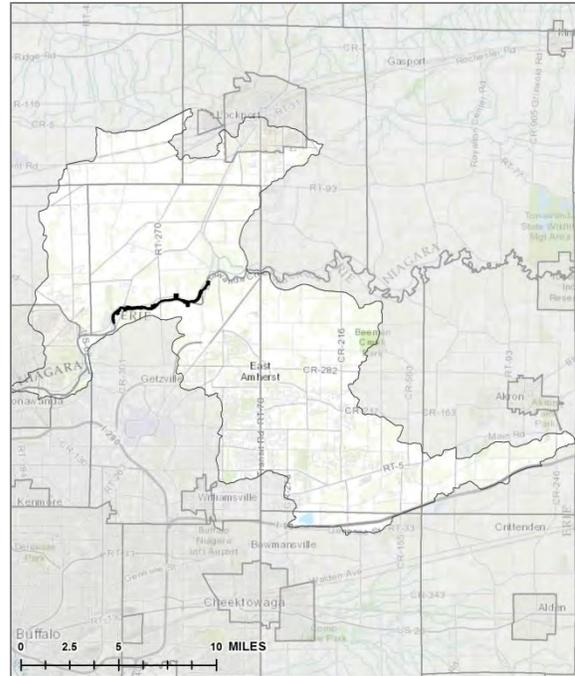
Site Description: This site includes NYS Canal Corps, Town of Amherst, and Town of Pendleton parcels located along an approximately 1-mile stretch of Tonawanda Creek. Veterans Park is also included in the area assessed. Channelization, poor riparian management, and presence of hydrilla are all factors occurring along this stretch that may be adding to Tonawanda Creek degradation.

Acreage: Roughly 1 mile of shoreline along each bank

Location (road crossing): Tonawanda Creek and Brenon Rd, Buffalo NY (Veterans Park)

Ownership: NYS Canal Corps, Town of Amherst, Town of Pendleton

Biodiversity Features: Aquatic-channelized riparian edge



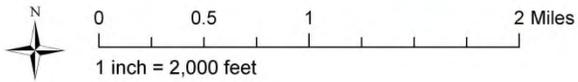
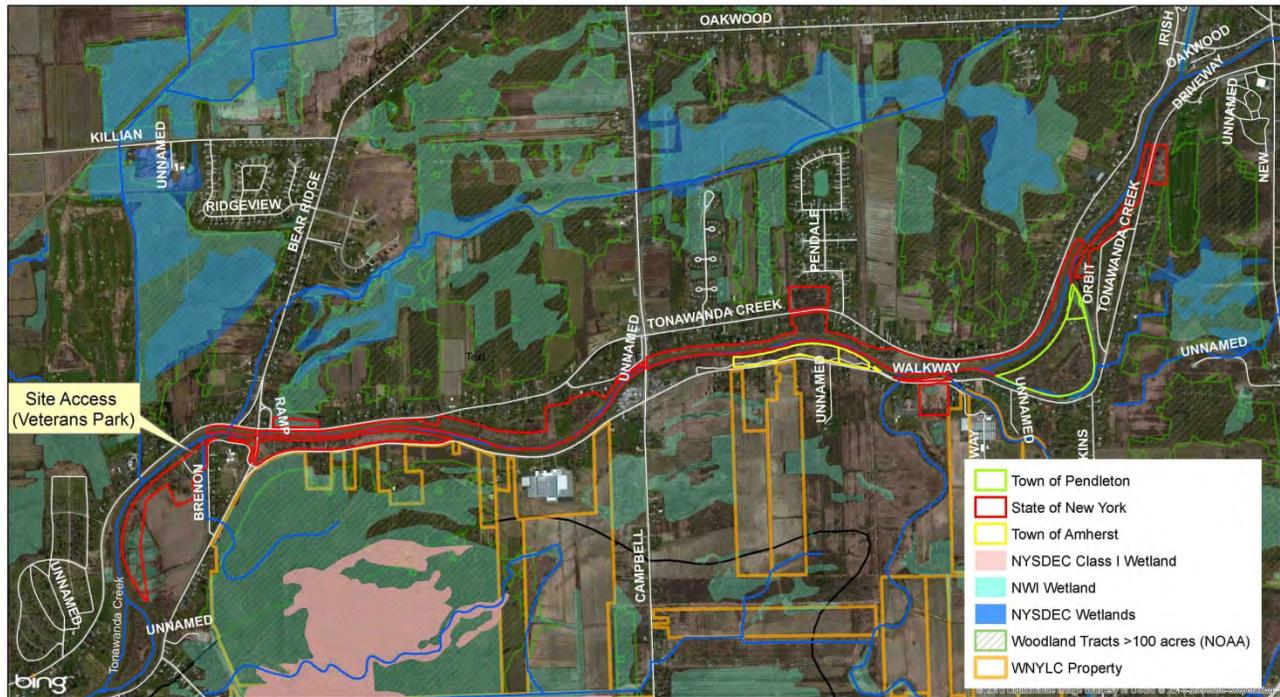
*Riparian management is poor in this area;
Photo credit: AES*

Proposed Action/Restoration Potential: This site presents a good opportunity to work with multiple partners to address the degrading quality of the stream. Suggested actions include removal of invasive species, a riparian/canalside overlay zone encouraging public and private landowners to install native grasses and herbaceous species to help improve habitat and scenic quality and stabilize banks. A small amount of hydrilla was observed and should be controlled while minimizing the negative impacts to native aquatic flora and fauna. Boater inspections, public education, and invasive plant disposal stations along the Canal are recommended.

Potential Implementers/Partners: NYS Canal Corps, Town of Pendleton, Town of Amherst, private landowners

Potential Funding Sources: EPA Great Lakes Restoration Initiative, NYS DEC Water Quality Improvement Project Program, National Fish and Wildlife Foundation Five Star Urban Waters Restoration Program, Fish and Wildlife Service State and Interstate Aquatic Nuisance Species Management Plan Program

LTON 01 & 02- CANAL



7/10/2013
 BUFFALO NIAGARA RIVERKEEPER®

TILLMAN SWAMP (LTON03)

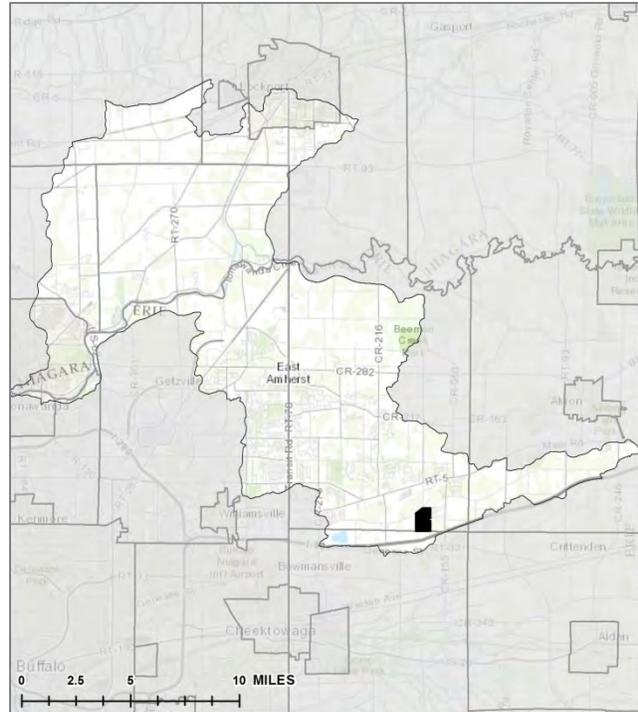
Ontario Lowlands Ecoregion

PRIORITY: MEDIUM

Strategy: *Identify and protect areas with high ecological value; use as reference sites for restoration.*

Conservation Opportunities: Invasive species management; potential reference site for wetlands

Site Description: Tillman Swamp, a DEC Wildlife Management Area, is also a Class 1 wetland due in part to its connection to the Onondaga Aquifer. Along with two nearby Class 1 wetlands, it is a source area to Ransom Creek. Two distinctive communities exist on either side of Tillman Rd. The north side consists of a button bush swamp with a small area of grassland habitat. The south side is mainly a cattail marsh and of overall lower habitat quality. The combination of both wetland habitats and the surrounding wet woods on the south side of the WMA provides a wide range of habitats and a diverse assemblage of native plants and habitats.



Acreage: 219 acres

Location (road crossing): Tillman and Shisler Rd, Clarence NY

Ownership: NYS DEC

Biodiversity Features: Wetlands; Button bush and cattail species



Tillman Swamp is a source area to Ransom Creek and a Class I wetland; Photo credit: AES

Proposed Action/Restoration Potential: Tillman Swamp was selected as a potential **reference site for wetland habitat and shallow quarry (sand-gravel pit) restoration**. Although quarries surround it, it is not clear that Tillman was ever mined. Because of its size, aquifer connection, and diverse assemblage of native habitats it should be further studied as a potential reference area for shallow water wetland restoration in the escarpment area, including plant, marsh bird and amphibian surveys. Invasives like purple loosestrife and reed canary grass should be managed to retain the diverse plant community.

Potential Implementers/Partners: NYS DEC, NFBS, Town of Clarence

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Natural Resource Conservation Service Conservation Innovation Grants, Fish and Wildlife Service Candidate Conservation Action Funds

BEEMAN TOWN PARK (LTON04)

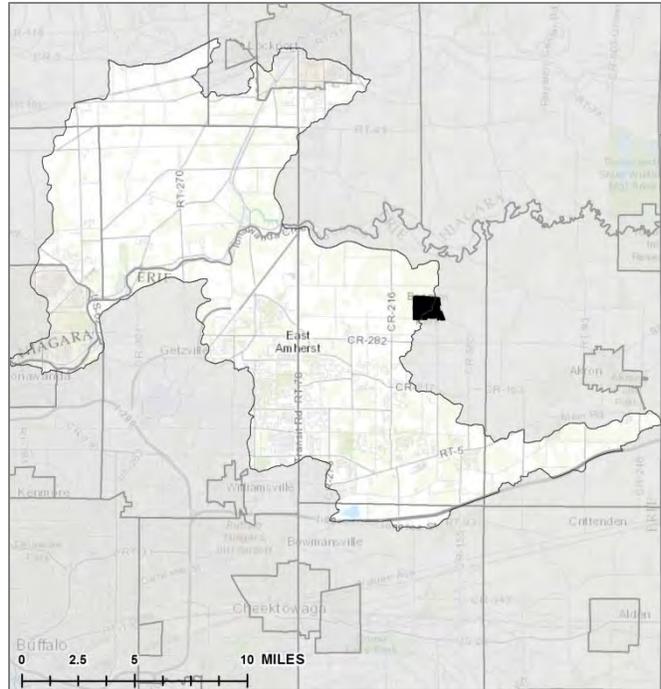
Ontario Lowlands Ecoregion

PRIORITY: HIGH

Strategy: Identify opportunities to protect and connect significant natural areas

Conservation Opportunities: Connectivity of wetlands, woodlands, grasslands; invasive species management

Site Description: Beeman Creek Town Park was historically farmland, then a county park, and is now an undeveloped town park. It is the heart of a large tract of almost impenetrable wooded wetlands along Beeman and Black Creeks that extends north to Tonawanda Creek. In recent history slumps and slides have occurred along Black Creek. Impacts from the agricultural history of the site are evident, as many areas consist of highly disturbed young-aged woods. Less impacted areas include sizable black walnut stands.



Acreage: 386 acres

Location (road crossing): Parker and Salt Rd, Clarence NY

Ownership: Town of Clarence

Biodiversity Features: Woodlands/Wetlands/Grasslands; vernal pools



*Priority site due to its size and ARA location;
Photo credit: AES*

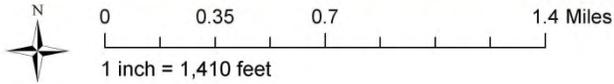
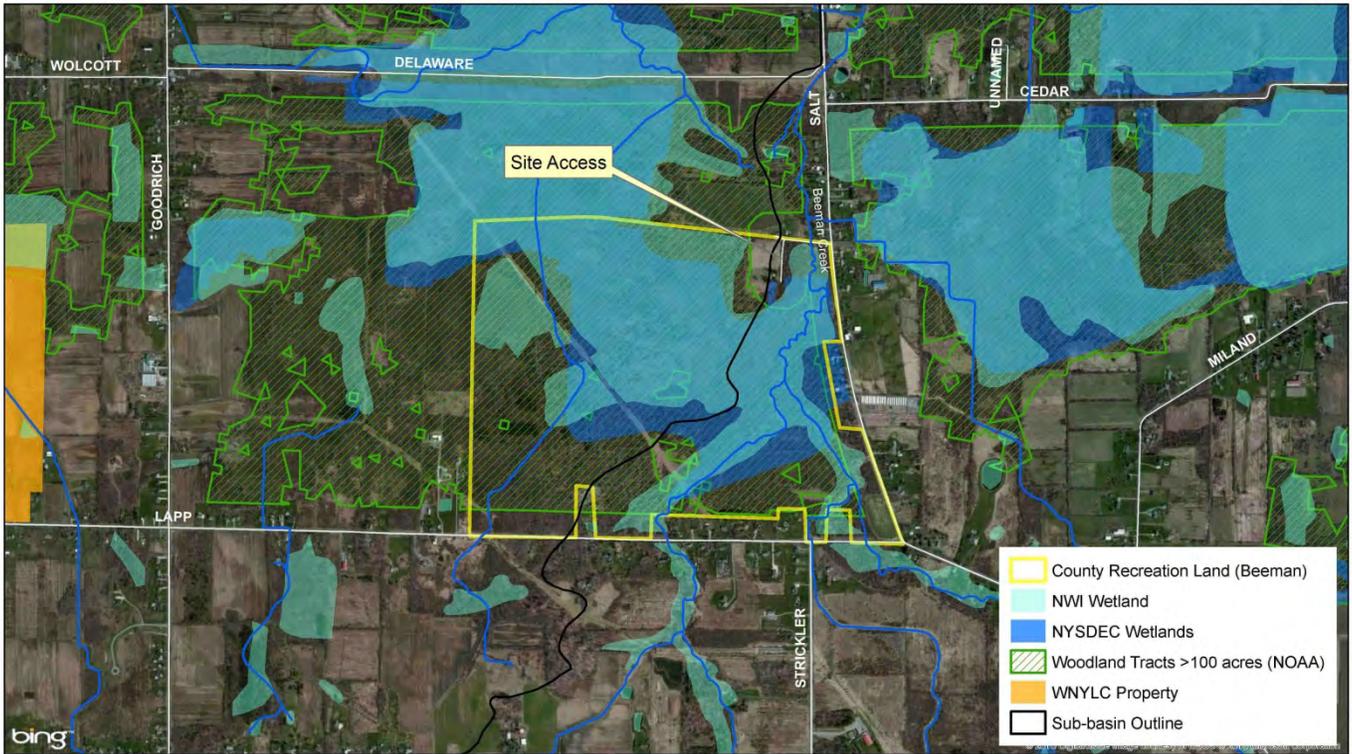
Proposed Action/Restoration Potential:

Development of a phased restoration and management plan is recommended in order to address the extensive amount of invasive species present (mainly honeysuckle species and multiflora rose). An internal boardwalk trail system could provide greater visitor access while protecting wildlife and habitats. This site is a priority for protection due to its size and Active River Area location within a developing area. The ecological and recreational values of the park would be enhanced by protecting and connecting adjacent natural areas along Beeman Creek north to its mouth at Tonawanda Creek where there is another undeveloped town park.

Potential Implementers/Partners: Town of Clarence, NRCS/ECSWCD, DEC

Potential Funding Sources: NYS DEC Urban Forestry Grant, NYS DEC Small Grants Program, National Fish and Wildlife Foundation Five Star Urban Waters Restoration Program, US Forest Service Community Forest and Open Space Program

LTON 04 - BEEMAN



COUNTERFEITER’S LEDGE (MURD01 & 02)

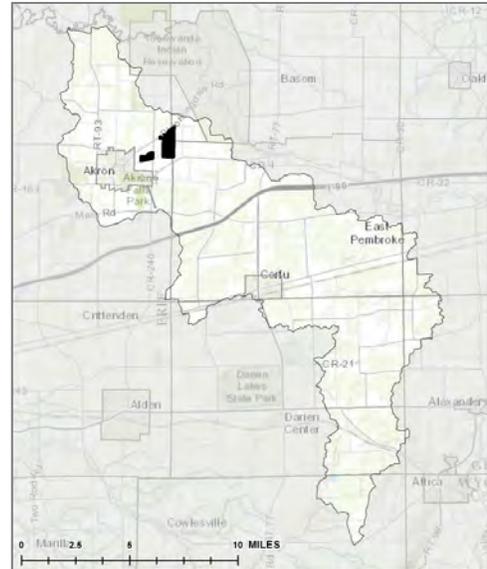
Ontario Lowlands Ecoregion

PRIORITY: HIGH

Strategy: Identify opportunities to connect and protect significant natural areas

Conservation Opportunities: Mitigate fragmentation of forest lands; preserve landscape connectivity; invasive species management in disturbed areas

Site Description: Purchased with NYS 1986 Environmental Bond funds, Counterfeiter’s Ledge is managed by The Nature Conservancy. Members of the Niagara Frontier Botanical Society (NFBS) serve as site stewards. One of just three protected areas on the Onondaga Escarpment in the watershed, it is accessed from a DEC parking area and trailhead on Scotland Rd to the west. The field team evaluated the site and escarpment habitat value and connectivity potential. The highest botanical richness lies in the herbaceous layer with 95% native vegetation, especially limestone-loving plants. The base of the escarpment contains a number of seepage wetlands that provide a direct connection to groundwater sources and serve as a valuable source area to Ledge Creek (classified C(t)). The scarp reaches a height of 100 feet at the eastern end with low bluffs and wooded terraces to the west.



Acreage: 300 acres (TNC-managed property only)

Location (road crossing): Bloomingdale and Wright Rds, Akron NY

Ownership: NYS DEC

Biodiversity Features: North-facing limestone scarp hardwood forest with 15 forest interior-dwelling bird species documented (6 SGCN), and 330 plant species including rare ferns and wildflowers. Potential critical habitat for listed salamander, snake and bat species.



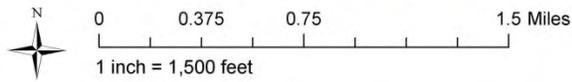
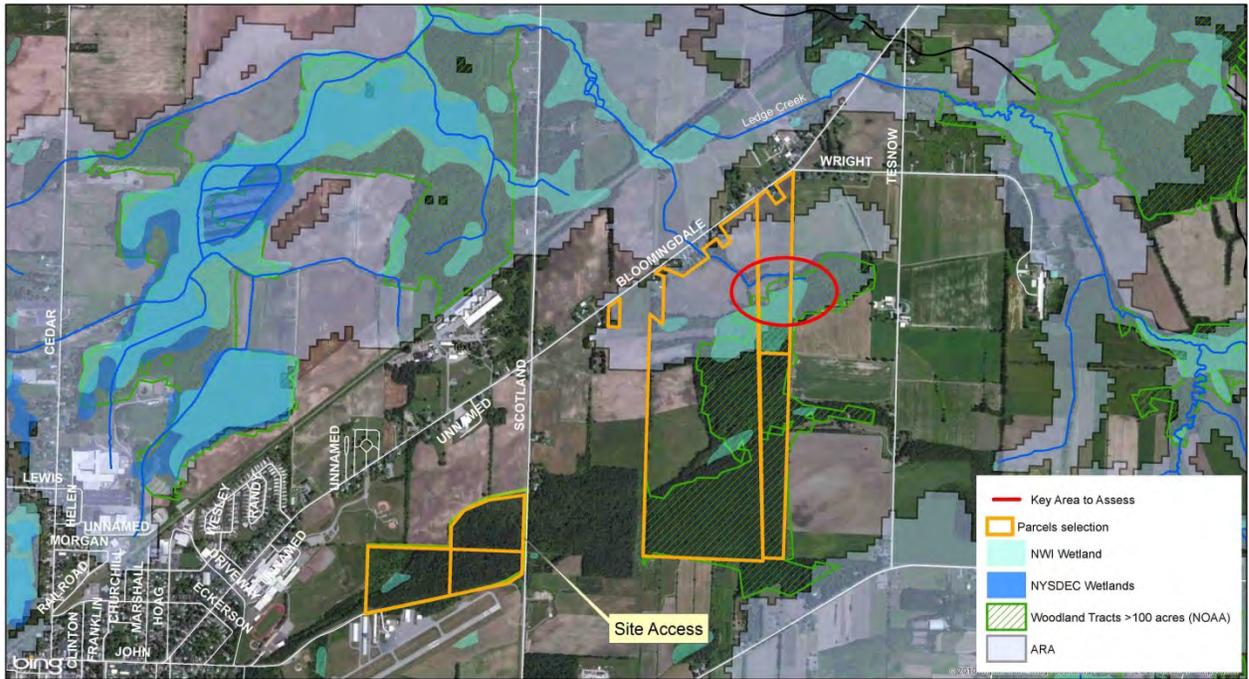
*Footpaths connect escarpment parcels;
Photo credit: AES*

Proposed Action/Restoration Potential: Protect and enhance the biodiversity of this high priority and highly threatened landscape feature by acquiring or otherwise protecting adjacent escarpment lands (e.g. town/village overlay district or CEA designation). Manage invasive species to maintain botanical richness and habitat value. Research headwater stream values. In the longer term, an Onondaga Escarpment inventory needs to be conducted similar to the 2014 WNY Land Conservancy Niagara Escarpment Legacy Project (2014) to further identify opportunities to protect and connect remnants with high biodiversity, and cultural values, such as the Divers Lake archaeological quarry site a few miles east.

Potential Implementers/Partners: The Nature Conservancy, Niagara Frontier Botanical Society, NYS DEC, NRCS Conservation Reserve Program, Village of Akron, Town of Newstead

Potential Funding Sources: National Fish and Wildlife Foundation Acres for America, Fish and Wildlife Service Candidate Conservation Action Funds, US Forest Service Community Forest and Open Space Program, Fields Pond Foundation Grant

MURD 01- LEDGE



DARIEN LAKES STATE PARK (ELLI01)

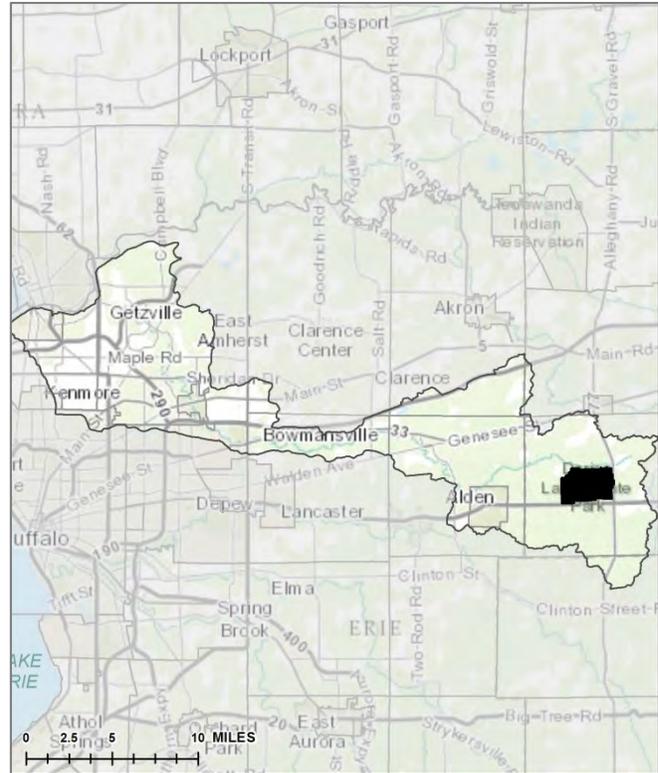
Ontario Lowlands Ecoregion

PRIORITY: MEDIUM

Strategy: *Increase grassland habitat values for breeding birds.*

Conservation Opportunities: Connectivity of large tracts; mitigate grassland fragmentation

Site Description: Darien Lakes State Park is managed for a wide variety of recreational values, though its potential ecological values are also high. *The Audubon Plan for Conserving Grassland Birds in NY* records several protected grassland birds as possible, probable, or confirmed breeders here. Site assessment found small-scale grassland habitat dominated by cool-season agricultural grasses, broken up by variable shrub cover, scattered trees and irregular timber blocks. Woodland patches within the grassland area provide some cover for wildlife, but were generally moderately to highly degraded due to the presence of exotic species. Some areas of low-lying forest provide important herpetofauna habitat.



Acreage: 1,800 acres (163 assessed)

Location (road crossing): Harlow and Broadway Rd, Darien NY

Ownership: NYS Office of Parks, Recreation and Historic Preservation

Biodiversity Features: Grassland; large mixed natural areas



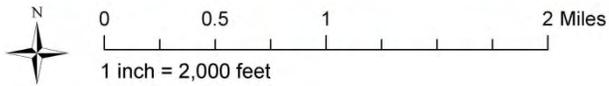
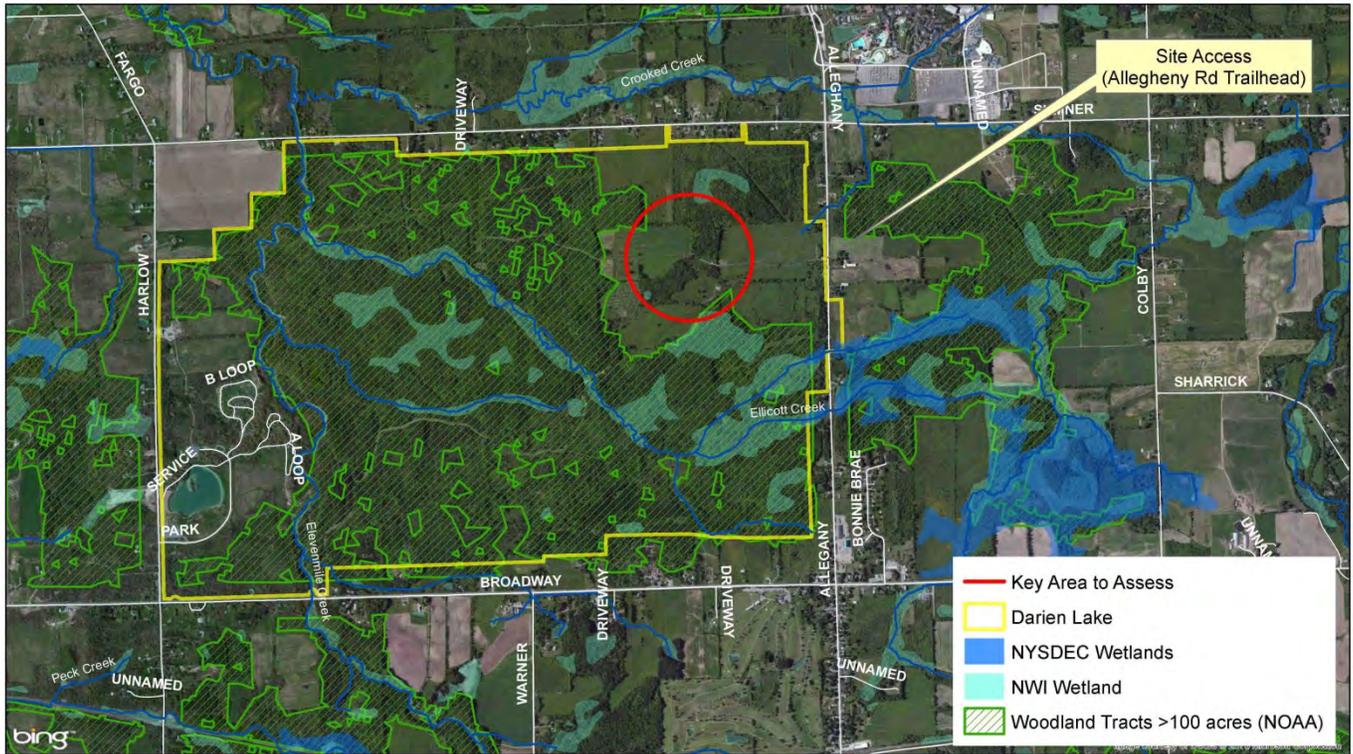
*Grassland habitats dominate the area;
Photo credit: AES*

Proposed Action/Restoration Potential: The existing management plan should be revised to focus on State listed grassland breeding birds at this site, and consider a grassland-savanna-woodland complex in the northeast sector of the park. Specific actions will depend on management goals, but should take advantage of the park's size to include restoration of large mixed natural covers. A more extensive wildlife survey should be conducted to see what species historically used or could potentially use park habitats to guide restoration efforts. Invasives should be addressed.

Potential Implementers/Partners: US Fish and Wildlife Service Partners for Wildlife Program, Genesee County Soil and Water Conservation District, Buffalo Audubon Society, Town of Darien

Potential Funding Sources: EPA Great Lakes Restoration Initiative, Freshwater Future Project Grant Program, Fish and Wildlife Service Joint Venture Habitat Restoration and Protection Grant

ELLI 01- DARIEN



Niagara River Habitat Conservation Strategy

NATURE VIEW PARK (ELLI02)

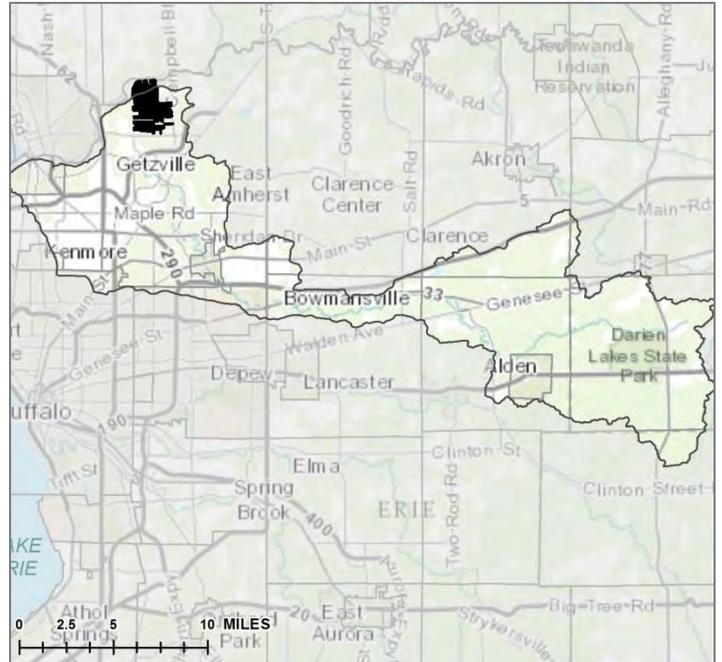
Erie/Ontario Lake Plain Ecoregion

PRIORITY: MEDIUM

Strategy: *Identify opportunities to mitigate the effects of channelization and altered flows*

Conservation Opportunities: Mitigate woodland and wetland fragmentation; reduce human disturbance; invasive species management

Site Description: Nature View Park is a Town of Amherst undeveloped park with a conservation easement held in perpetuity by the Western New York Land Conservancy. It is separated from Tonawanda Creek by Tonawanda Creek Road. The park is largely wooded wetlands with a network of trails and drainage ditches. The ditches have dewatered some portion of the historic hydric soils. Exotic woody and herbaceous invasive species are common to widespread with off-road ATV and dirt bike use one likely vector. Flooding is a concern in the surrounding residential areas.



Acreage: 1,254 acres

Location: Parking area and kiosk on Tonawanda Creek Rd across from Brenon Rd.

Ownership: Town of Amherst

Biodiversity Features: Woodland/Wetlands; functional stormwater storage area



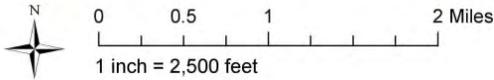
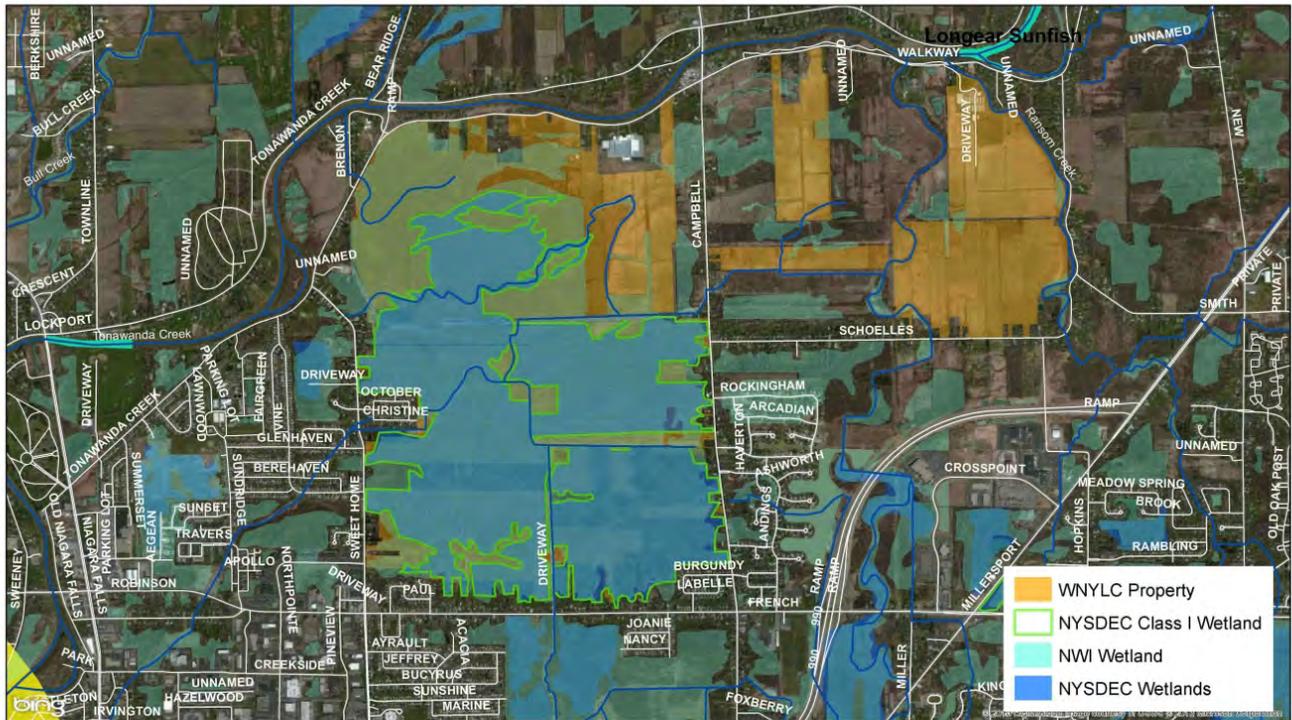
This site needs long-term monitoring and management; Photo credit: AES

Proposed Action/Restoration Potential: Restoring the hydrology of the site is not likely due to surrounding roads and residential properties. Potential exists to improve habitat value by reducing understory shade suppression caused by the dense invasive shrub cover. This should be done gradually and carefully to avoid creating opportunities for invasives to reseed. The site needs a long-term monitoring and management plan for invasive plants, signage prohibiting ATV use and a study quantifying its “living infrastructure” values for Town residents.

Potential Implementers/Partners: WNY Land Conservancy, Town of Amherst, NRCS/ECSWCD

Potential Funding Sources: NYS DEC Urban Forestry Grant, NYS DEC Small Grants Program, US Forest Service Community Forest and Open Space Program

ELLI 02 - NATURE



Niagara River Habitat Conservation Strategy

BRUSH MOUNTAIN (SMOK01)

Erie/Ontario Lake Plain Ecoregion

PRIORITY: MEDIUM

Strategy: *Identify and protect areas with high ecological value; identify reference sites for restoration*

Conservation Opportunities: Enhanced protection of woodlands and wetlands

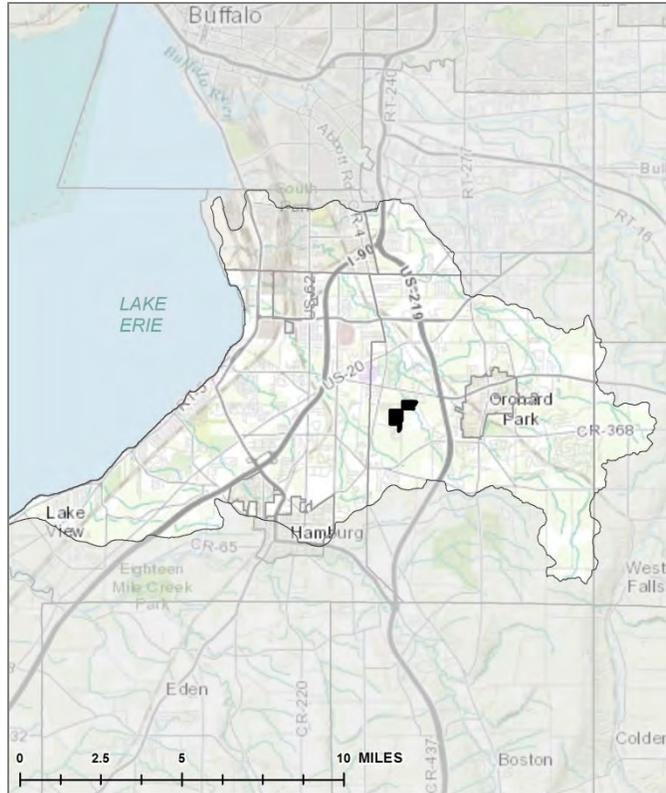
Site Description: This site includes three town owned parcels around Brush Mountain Municipal Park. The parcels contain NWI and DEC wetlands, along with tributaries to Smokes Creek. The areas investigated contain high quality hardwood swamp species and conditions that consist of hummock and hollow type features. The stream contains riffles and cobbles with some erosion and undercutting observed.

Acreage: 80.6 acres

Location (road crossing): Big Tree and California Rd, Orchard Park NY

Ownership: Town of Orchard Park

Biodiversity Features: Wetlands; red maple-sugar maple-green ash wooded wetland; State-listed plant and bird species



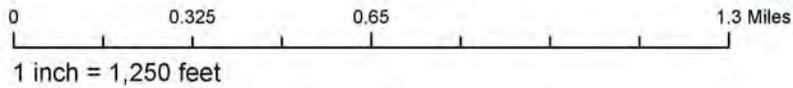
*Some areas of the woods would benefit from invasive species removal;
Photo credit: AES*

Proposed Action/Restoration Potential: This site could serve as a **reference for native wooded wetland communities in the Lake Erie Plain Ecoregion**; however some of the woodland areas would benefit from invasive species removal. The two parcels west of Brush Mountain contain high quality hardwood swamp with hummock and hollow (vernal pool) features providing good surface and ground headwater conditions to Smoke's Creek. Invasive species should be managed and monitored.

Potential Implementers/Partners: Town of Orchard Park, Erie County NRCS/SWCD

Potential Funding Sources: EPA Great Lakes Restoration Initiative, National Fish and Wildlife Foundation Pulling Together Initiative, NYS DEC Urban Forestry Grants

SMOK01



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8/9/2013

BIRDSONG PARKLANDS (SMOK02)

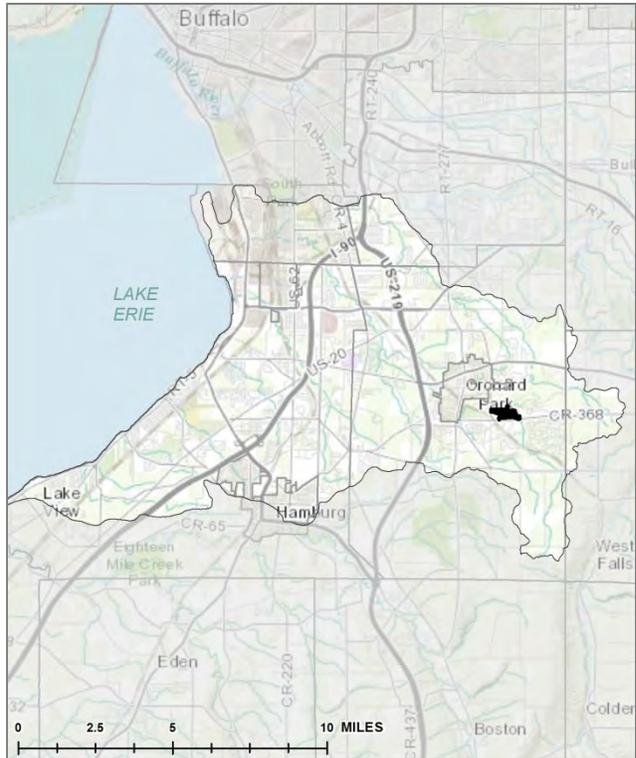
Erie/Ontario Lake Plain Ecoregion

PRIORITY: HIGH

Strategy: Identify opportunities to connect and protect significant natural areas

Conservation Opportunities: Enhanced public land management; mitigate barriers to fish movement; invasive species management

Site Description: This municipal park, referred to as Birdsong Parklands, is part of a 500+ acre woodland in the headwaters of Smoke’s Creek. The stream bisects the parcel and both NWI and DEC wetlands can be found along the riparian area. A large portion of the front of the park is mowed lawn used for recreation and has little ecological value. The southern section is forested wetland. The heterogeneity of the site allows for high wildlife potential, especially for marsh and wetland associated birds. Outside of the park, large expanses of wetlands and woodlands connect to the riparian corridor within the park, providing connectivity to larger ecological communities.



Acreage: 68 acres

Location (road crossing): Birdsong Pkwy and Jewett Holmwood Rd, Orchard Park NY

Ownership: Town of Orchard Park

Biodiversity Features: Grassland, wetlands; artificial but native-vegetated ponds



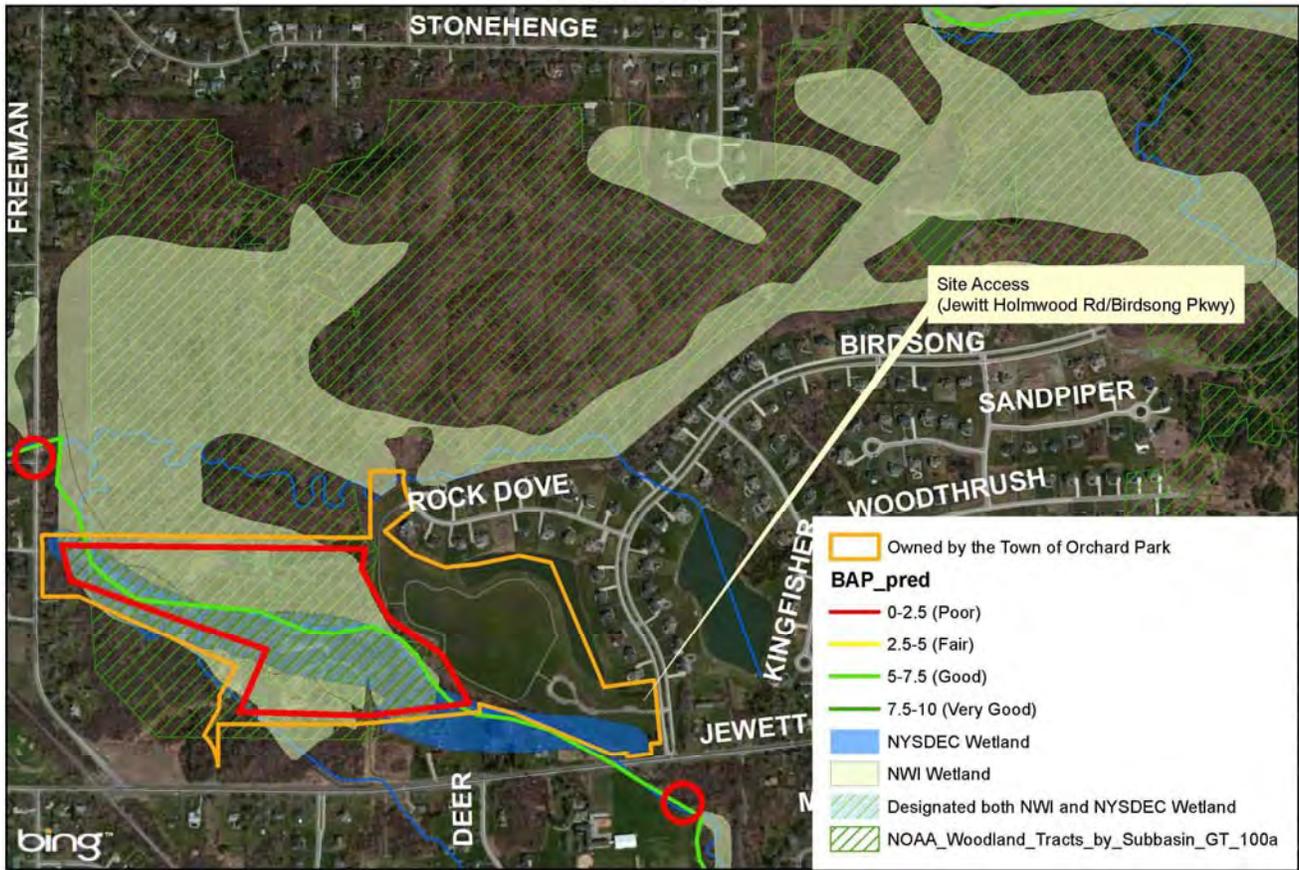
Artificial native-vegetated ponds increase the area’s biodiversity; Photo credit: AES

Proposed Action/Restoration Potential: Limiting the mowed grass expanse and strips to allow restoration of a native grassland or meadow could provide significant grassland bird habitat. No mowing should occur in those areas from April to September to encourage bird nesting. Sediment build up in the culvert under Jewett Road should be removed and monitored over time to ensure fish passage. Invasive species also need to be managed and monitored over time—including glossy buckthorn, multiflora rose, garlic mustard, purple loosestrife, and honeysuckle species.

Potential Implementers/Partners: Town of Orchard Park, Erie County NRCS/SWCD

Potential Funding Sources: EPA Great Lakes Restoration Initiative, National Fish and Wildlife Foundation Pulling Together Initiative, NYS DEC Urban Forestry Grant

SMOK02



0 0.275 0.55 1.1 Miles

1 inch = 1,041.67 feet

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8/9/2013

4.3 AOC Findings and Delisting Priorities: Ontario Lowlands Ecoregion

Strategy: Provide support for delisting habitat-related impairments in the Niagara River Area of Concern

As one of the Great Lakes Areas of Concern (AOC), the Niagara River has been the subject of Remedial Action Planning and implementation efforts for over 20 years—since the RAP Stage 1 baseline report was completed in 1994. Beneficial Use Impairments relate to contaminated sediments, fish advisories and other toxic contaminant issues, but also include physical and biological impairments such as loss of fish and wildlife habitat and degradation of fish and wildlife populations. The Conservation Action Planning process provides a timely framework for addressing these physical and biological impairments.

Much work has been completed or is underway that addresses these impairments, including:

- Eight Niagara River Habitat Improvement Projects funded by the NY Power Authority
- Habitat enhancements incorporated into selected hazardous waste site remediations such as Gratwick Park, Cherry Farm and the 102nd Street landfill
- State acquisition of Motor Island, which hosts a large heron rookery and anchors valuable shallow water habitat for muskellunge and other native fish
- Creation of wetlands like the East River Marsh on Grand Island
- Scientific research on keystone and sentinel native species like emerald shiner, lake sturgeon, muskellunge, longear sunfish, map turtle and native mussel species to provide the information that managers need to protect and enhance their habitats.

However, measuring success, including defining and satisfying the criteria for when an impairment can be delisted, has proven difficult, given the limits of the data on historic conditions and current trends for particular habitats and species. The Habitat Strategy project team has been part of ongoing discussions with the DEC and others on the Remedial Action Committee, and makes the following recommendations related to three of the habitat-related impairments: “Degradation of Benthos,” “Loss of Fish and Wildlife Habitat,” and “Degradation of Fish and Wildlife Populations.” For degradation of fish and wildlife population, delisting is conditional on progress towards delisting the other two.

DEGRADATION OF BENTHOS

Delisting criteria address three indicators of benthic community health:

1. *The benthic macroinvertebrate community structure is non-impacted or slightly impacted according to NYSDEC indices (Bode et al., 1996) at selected sediment depositional zones.*
2. *All known AOC areas of sediment contamination at concentrations exceeding NYS Class A sediment quality thresholds (indicating chronic toxicity to aquatic life) have been remediated or scheduled for remediation.*
3. *Priority contaminants in sediments show no statistically significant bioaccumulation in fish inhabiting selected sediment depositional zones.*

For indicator 1, the Strategy project team analyzed three rounds of Biological Assessment Profiles (BAPs) in the Niagara River AOC and tributary segments based on the NYS DEC Stream Biomonitoring Program (Bode, et al). Every 5 years the Division of Water publishes the *Priority Waterbodies List*, which includes data from the Stream Biomonitoring Program assessment of macroinvertebrate communities, based on a selection of the following indices:

1. SPP or Species Richness: total number of species or taxa found in sample
2. EPT Richness: number of species of Ephemeroptera/mayfly, Plecoptera/stonefly, and Trichoptera/caddisfly found in sample
3. HBI or Hilsenhoff’s Biotic Index: based on number of individuals multiplied by their pollution tolerance value
4. PMA or percent model affinity: percent similarity to a non-impacted stream
5. DIV or Species diversity: combines species richness and community balance
6. Dominance: measure of community balance; high dominance values indicate unbalance
7. NCO Richness: total number of species other than pollution-tolerant Chironomidae and Oligochaeta

BAP values from these indices are converted to a common 0-10 scale and the mean value determines overall score or impact level, with scores above 5 indicating “slight impact” and above 7.5, “no impact” as per the delisting goals. Riverkeeper compiled the following table of BAP scores for the three most recent sampling periods: 2000, 2005, and 2010.

Table 1: Niagara River AOC BAP Scores by Sampling Period

Note: 2000 = *italics* 2005 = plain 2010 = bold NA = Not Assessed

NIAGARA RIVER AOC BY SUB-BASIN ↓	CAP RATING SCALE→	Poor	Fair	Good	V. Good
	LEVEL OF IMPACT→	Severe	Moderate	Slight	Non
		0 - 2.5	2.5 – 5	5 - 7.5	7.5 - 10
Gill Creek	GILL O1 – Gill Creek, NF		<i>mod</i>		
Cayuga Creek	CYGA 01 - Cayuga Creek, NF		<i>mod/3.12/ 3.81</i>		
Grand Island tribs	N/A				
Niagara River	NIAG O1 - Niagara River, Bflo.			5.21	
Scajaquada Creek	SCAJ 01 - Scajaquada Creek, Bflo.	1.59	<i>Mod</i>		
Twomile Creek	TWOM O1 - Twomile Creek, Tona.		<i>mod/3.53</i>		

Of the nine BAP sampling points within the AOC and tributary streams, one (NIAG 01) satisfies the delisting criteria. The rest are either “moderately impacted” or, in the case of Scajaquada Creek, “severely impacted.” Only one sampling event occurred in 2010 on Cayuga Creek and provides trend data over three sampling cycles. **Predicted** BAP rankings of moderately impacted for most AOC river and tributary segments correlate with sampling data. However, several Grand Island streams (none sampled) are predicted to be slightly impacted (Map 4.6).

Niagara River Habitat Conservation Strategy

Action: To satisfy the first delisting criterion, more benthic sampling needs to be done at “selected sediment depositional zones.” It is not clear whether any existing sampling sites would qualify, but ideally the sampling sites would become part of the RIBS program to assure future monitoring. In addition, benthic sampling on Grand Island streams may identify good reference areas for stream restorations in AOC tributaries where contaminants are not the major issue.

For indicators 2 and 3, the Strategy project team reviewed the data collected by the Ontario Ministry of Environment (OMOE) and the NYS DEC using caged mussels and young-of-year fish, respectively. Sampling sites were generally at or just downstream from known contaminated sites where remediation programs were ongoing or completed. In 2011, both agencies published summaries of almost three decades worth of data. Both reports conclude that remedial actions have been effective in decreasing contaminant levels in Niagara River biota. However, the most recent data show that relatively high concentrations of priority toxic substances continue to be found at certain locations, mainly in the upper Niagara River and near the mouth of Bloody Run Creek in the lower river/Niagara Gorge (Map 4.7).

The Niagara River Mussel Biomonitoring Program: 1983-2009 (Richman, 2011) indicates five areas on the US side of the Niagara River where caged mussels still showed levels of priority contaminants above safe levels for sensitive fish-consuming wildlife as of 2009. Contaminants include Mirex, PCBs, dioxins and furans, and other organochlorine compounds. These waterbodies are:

- Bloody Run Creek at Niagara Gorge
- Gill Creek
- Little Niagara River below 102nd Street landfill
- Niagara River just upstream from Gill Creek
- Petit Flume Cove

The young of year fish study, *PCBs and Organochlorine Pesticide Residues in YOY Fish from New and Traditional Near-shore Sampling Areas in the Western Portion of NYS's Great Lakes Basin, 2009* (Preddice et al, 2011) summarizes temporal trends (1994-2009) for PCB and OC pesticides in young-of-year fish caught at Niagara River and tributary locations. 2009 data showed unsafe levels for fish-consuming wildlife at the following five sites:

- Two-mile Creek
- Gill Creek at Buffalo Avenue
- Cayuga Creek at Porter Road
- Upstream Bergholtz Creek
- Gratwick-Riverside Park

Action: The above referenced programs and the wealth of data they provide should continue to be built upon in addressing this delisting criterion. The planned NOAA Mussel Watch Program sampling and the DEC planned surface sediment sampling should be integrated with this body of data.

LOSS OF FISH AND WILDLIFE HABITAT

Selected delisting criteria:

- The eight habitat improvement projects that the New York Power Authority funded through the 2007 relicensing settlement for the Niagara Power Project are implemented.
- Priority Niagara River AOC habitats are protected through available land-use controls; and conservation measures are implemented where achievable (e.g., land acquisition, regulatory protections, and long-term strategies).
- For the priority habitats, existing communities of invasive species have been mapped and invasives control strategies have been adopted.

These delisting criteria focus on “priority Niagara River AOC habitats” that were identified in the 1994 Stage 1 RAP document. This list includes 11 DEC-regulated wetlands, 11 Department of State Significant Coastal Habitats, and 13 other priority habitats identified then by DEC fish and wildlife biologists. The eight Habitat Improvement Projects funded through the 2007 NY Power Authority re-licensing agreement overlap with many of these sites. In addition, the *Remedial Action Plan Stage 2 Addendum for the Niagara River AOC* (DEC, 2012) includes a list of “potential Niagara River AOC Habitat Creation and Conservation Projects (p.17) based on more current field assessments.

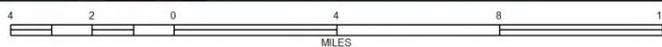
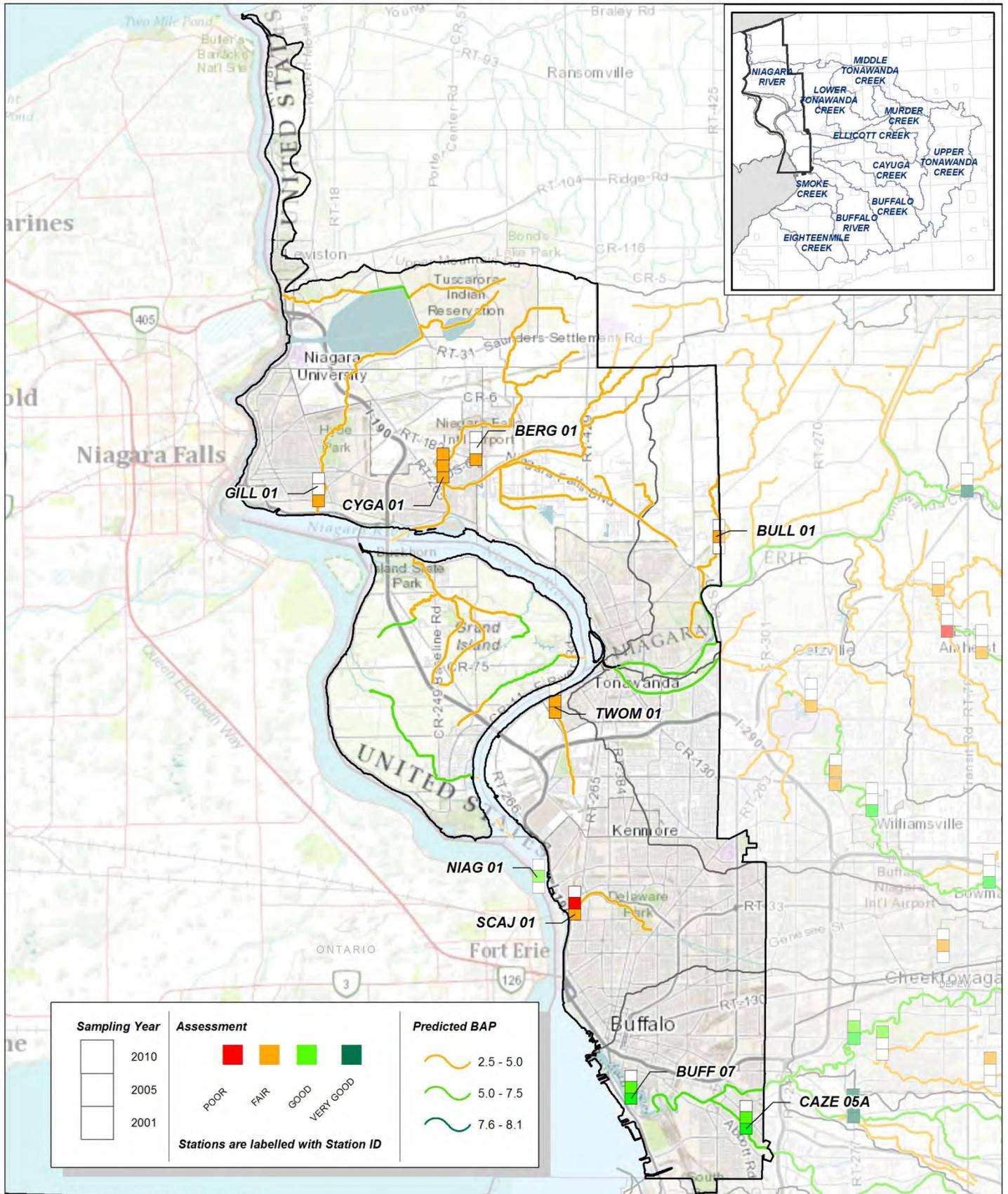
Action: Complete baseline assessments for all waterways within the AOC to benefit restoration planning and AOC delisting

While touched upon in Chapter 3, Niagara River sub-basin report, this action is expected to be highlighted within the Niagara River Greenway Habitat Conservation Strategy, currently underway by Buffalo Niagara Riverkeeper. However, it deserves mention here in reference to the Scajaquada Creek corridor as a symbol within the realm of AOC delisting planning. Listed as either “impaired” or “precluded” for aquatic life and buried for much of its journey to the Niagara, Scajaquada Creek’s water quality is degraded due to point and non-point source pollution. Most notably, urban storm and waste water inputs from both the upper and lower portions of the sub-basin result in frequent sewage overflows, intense sediment loads and decreased aquatic habitat availability. Offering one of the most impactful opportunities for urban stream restoration, community revitalization and contribution to AOC delisting, vast portions of the creek remain unassessed in regard to baseflow inputs, including point and non-point sources, and overall habitat quality. Comprehensive, watershed-wide baseline data gathering is needed in both upstream and downstream segments of local waterways to ensure the region’s practical ability to restore the downstream AOCs.

Action: Use the CAP analysis to further identify “best bet” habitat conservation goals and delisting criteria in the Niagara River AOC

By reviewing the many identified priority habitats through the CAP viability indicators of size, condition, landscape context and species assemblages, some habitats will emerge as higher priority. The ranking scale can further identify “very good” habitats for protection and “fair to good” habitats where intervention could help set the trajectory towards long-term viability. Specific indicators for aquatic, wetland, woodland, grassland and mixed natural areas such as those used in this Strategy will also help identify good reference sites within the AOC for habitat restoration projects. The threats analysis portion of the CAP will help further refine the list of projects that the RAP should include in its fish and wildlife habitat delisting criteria.

Buffalo Niagara Riverkeeper is currently working on a Niagara River Greenway Habitat Conservation Strategy that will support the above CAP action recommendation for Niagara River AOC delisting.

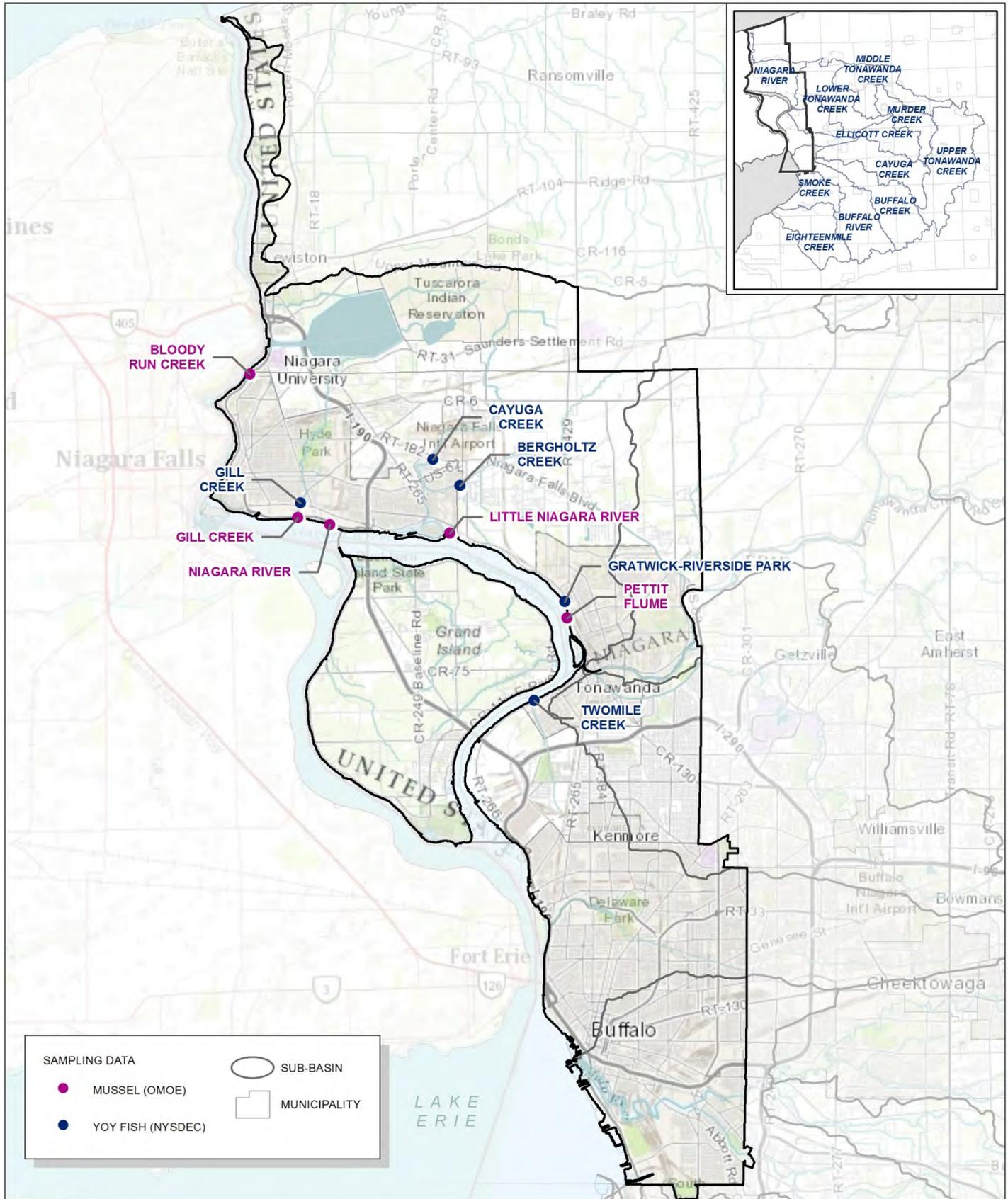


Map Notes:
 Station scores from Biological Assessment Profiles (BAP) and Rotating Integrated Basin Studies (RIBS) Water Quality Assessment through the NYS Waters Monitoring Program. Predicted scores were derived by NYS Freshwater Conservation Blueprint Project, Phases I and II: Freshwater Systems, Species, and Viability Metrics (NYSDEC, Dec 2011).

**Biological Assessment Profiles (BAP)
 Observed and Predicted**
 SAMPLING YEARS: 2010, 2005, & 2001
NIAGARA RIVER GREENWAY

Map 4.7 Local Source Areas of Priority Contaminants In Fish and/or Mussel Tissue Niagara River Greenway

21.REV01.2014-0311



SAMPLING DATA		SUB-BASIN	
●	MUSSEL (OMOE)		SUB-BASIN
●	YOY FISH (NYSDEC)		MUNICIPALITY



Map Notes:
 Mussel studies: Ontario Ministry of Environment: The Niagara River Mussel Biomonitoring Program: 1983-2009
 YOY Fish data: NYSDEC: PCBs and Organochlorine Pesticide Residues in YOY fish from New and Traditional Near-shore Sampling Areas, 2009

**Local Source Areas of Priority Contaminants
 in Fish and/or Mussel Tissue
 NIAGARA RIVER GREENWAY**

4.4 Threat-Based Desk Top Analysis: All Ecoregions

Analyzing the scope, severity, and irreversibility of threats within the watershed is an important component of the CAP process. Described in Chapter 2, the threat analysis identified critical threats occurring across each of the biodiversity features examined in the Strategy. Using Arc-Map software, extensive Geographic Information Systems (GIS) analysis was conducted to identify opportunities to mitigate specific threats. The complete list of GIS-based threats analyses completed is included below.

Of all results, potential best-bet opportunities for conservation were selected for inclusion in the Strategy report. Detailed descriptions for those selections are provided within Chapter 4 sections. Results not selected are included in the Technical Report.

- **Agricultural Best Management Practice (BMP) Opportunities:** Identify tracts where wetlands and forests adjacent to agricultural lands present opportunities for BMP implementation to mitigate further landscape fragmentation.
- **Abandoned Industrial Lands and Quarry Tracts:** Identify opportunities for quarry reclamation and habitat restoration where hydric soils, wetlands, and aquifers intersect with abandoned industrial lands and quarries.
- **Forest Fragmentation:** Determine woodland areas that are likely to degrade due to proximity to development for each sub-basin in the Niagara River Watershed.
- **Riparian Woodlands:** Identify large, elongated areas of undisturbed woodlands along waterways important for riparian species and water quality support.
- **Critical Headwater Forests:** Identify tracts of forest that are classified as both riparian woodland and headwater stream material contribution zones to protect downstream channel structure and biologic integrity.
- **Grassland/Wetlands Complex Restoration:** Identify opportunities to restore connectivity between wetlands and grasslands to benefit heretofauna and breeding birds.
- **Impervious Surface Area Hotspots:** Identify urban areas that are likely to degrade adjacent natural areas based on future build-out potential and land classification codes.
- **Riparian Connectivity:** Identify areas in Upper, Middle, Lower Tonawanda Creeks, Murder Creek, and Ellicott Creek Sub-basins that could connect >250 acre tracts of riparian forest (Technical Report).
- **Opportunities for Conservation Easements in the Towns of Attica or Alexander:** Identify opportunities (based in part on size and ownership) to acquire easements on active floodplain areas, historic wetland communities (NHP) and/or aquifer protection areas (Technical Report).
- **Tonawanda Floodplain Complex Infill Opportunities:** Identify opportunities to conserve wetland and grassland communities within the Tonawanda Creek Floodplain complex (Technical Report).

Action: Identify patterns of development impacting landscape continuity and overall water quality

Threats Addressed: Stormwater Runoff, Fragmentation by Roads and Utilities, Loss of Acreage

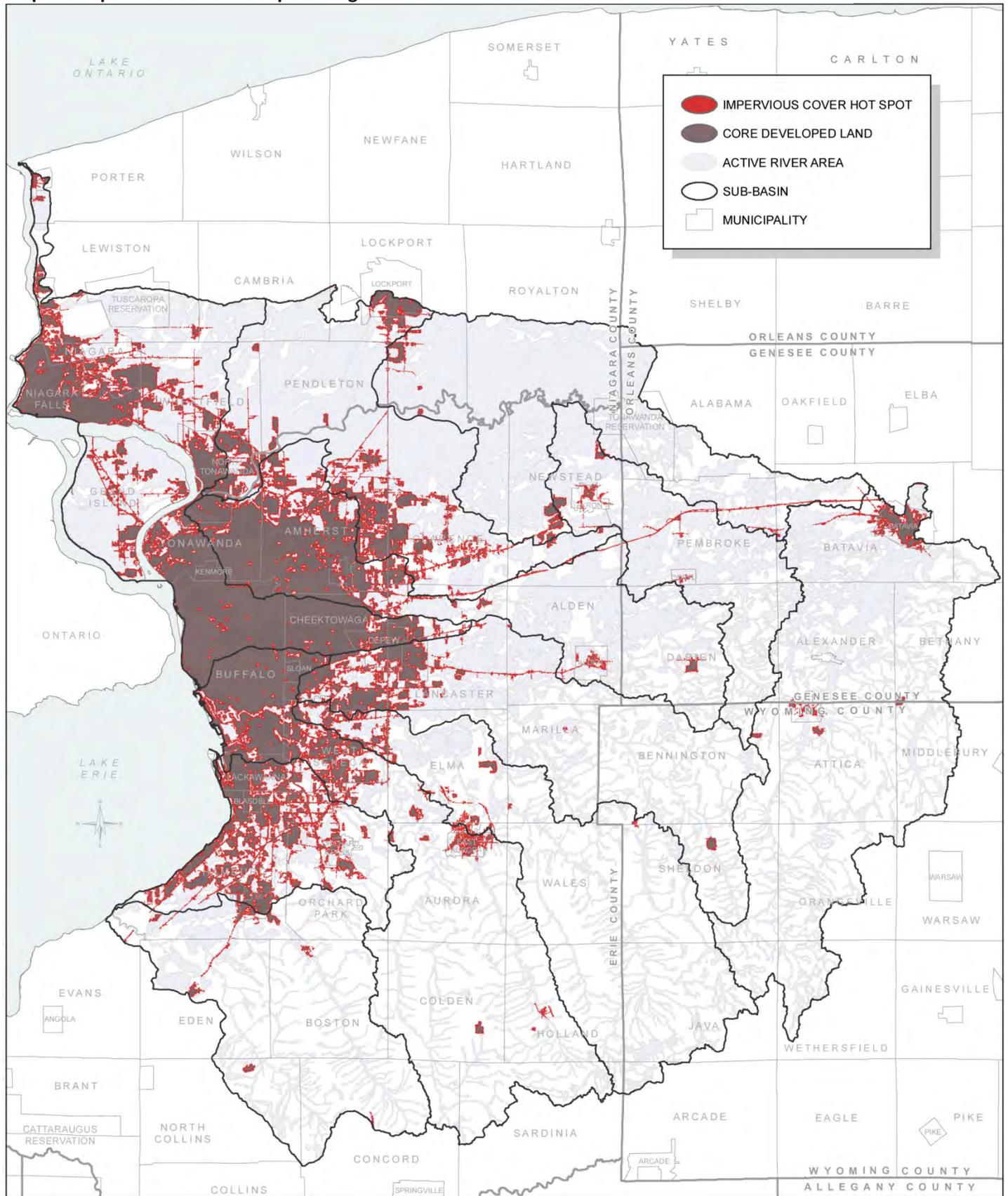
In many sub-basins, landscape fragmentation and stormwater runoff as related to residential sprawl were identified as critical threats. One way to measure impacts from these threats is to assess current and future impervious surface area coverage. By analyzing existing impervious areas, land use cover types, and property class codes, results demonstrate those natural areas at greatest risk for future development (hotspots) as well as predict future impervious surface area percentages. When compared to research indicating that even small amounts of impervious cover (<10%) adversely affect a stream's geomorphology, biodiversity and water quality, this analysis presents a suite of opportunities to proactively abate future sprawl impacts. Practitioners can utilize the maps and predicted impervious cover percentages to identify specific lands in greatest need of conservation for the preservation of water quality.

Opportunities:

Observed trends are consistent with expected development patterns of major population centers like Buffalo, Amherst, Niagara Falls, and Tonawanda. Here, large areas of core developed land are present with predictions for future impervious cover hotspots around the edges of urban centers. First and second-ring suburbs such as West Seneca, Hamburg, Clarence and Lockport have limited core developed land but have a high potential for future impervious cover if sprawl patterns continue.

The Niagara River sub-basin currently has 23.3% impervious cover, close to the tipping point for a severely degraded watershed, placing it at high risk for further degradation of water quality. Smokes Creek sub-basin has the second highest current impervious cover with the greatest risk of future impervious cover at 49%, making the large tracts of headwater forest, with hotspots around them, extremely important to protect in conjunction with other efforts to minimize or decrease impervious surface. Lower Tonawanda Creek is another priority sub-basin for impervious area reduction with a current impervious cover percentage of 8.4% and a predicted future impervious cover of 35%. Additional maps and impervious surface coverage information can be found within the technical report. Maps 4.8-4.14 show predicted impervious surface area hotspots in selected sub-basins. Additional sub-basin maps can be found in the technical report.

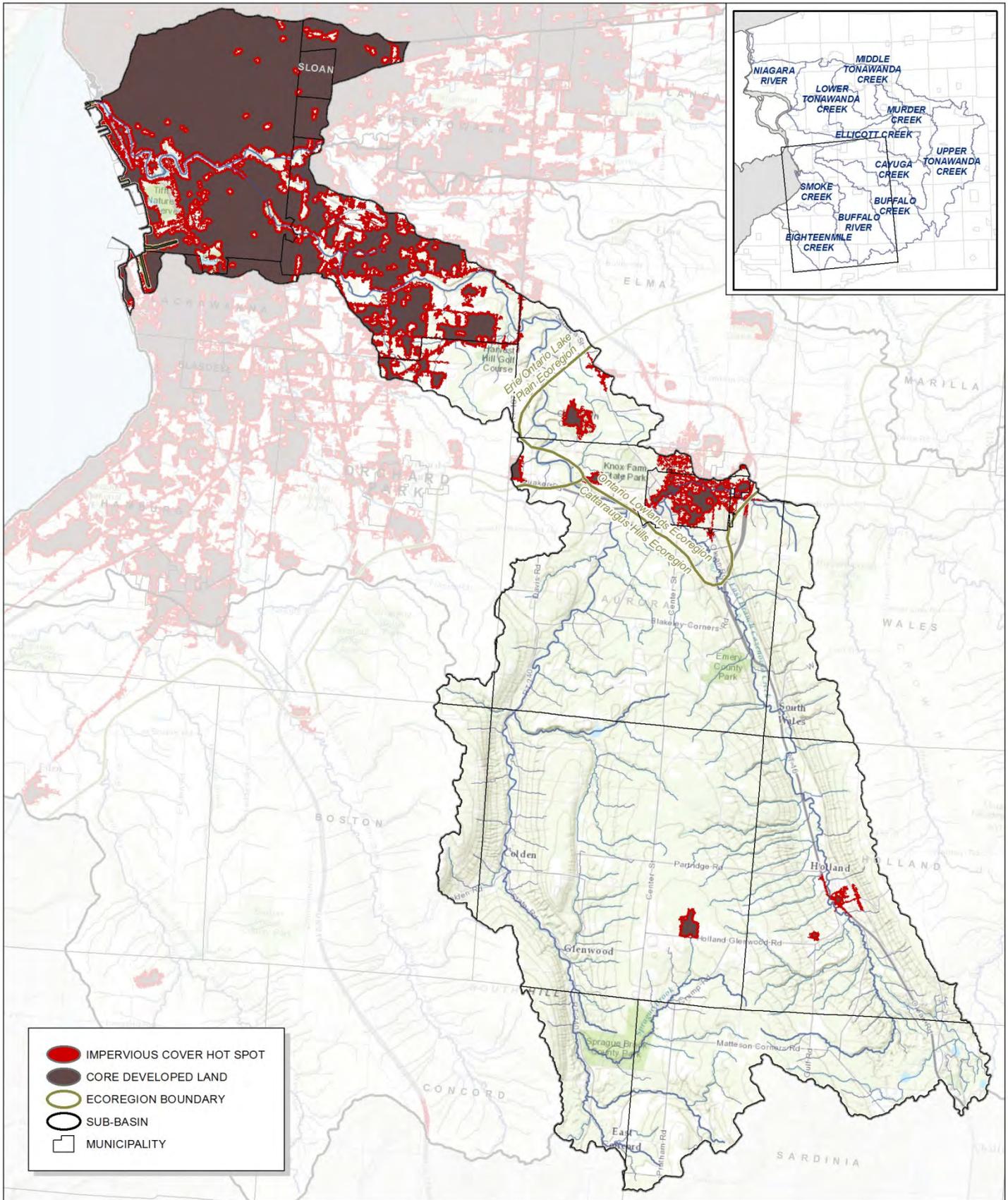
Map 4.8 Impervious Cover Hot Spots Niagara River Watershed



Map Notes:
 Impervious Cover Hot Spots are areas of peripheral development adjacent to Natural Areas.
 Procedure documented in the Future Impervious Hot Spot Mapping SOP, July 7, 2013

**Impervious Cover Hot Spots
 NIAGARA RIVER WATERSHED**

Map 4.9 Impervious Cover Hot Spots Buffalo River Sub-Basin



- IMPERVIOUS COVER HOT SPOT
- CORE DEVELOPED LAND
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY

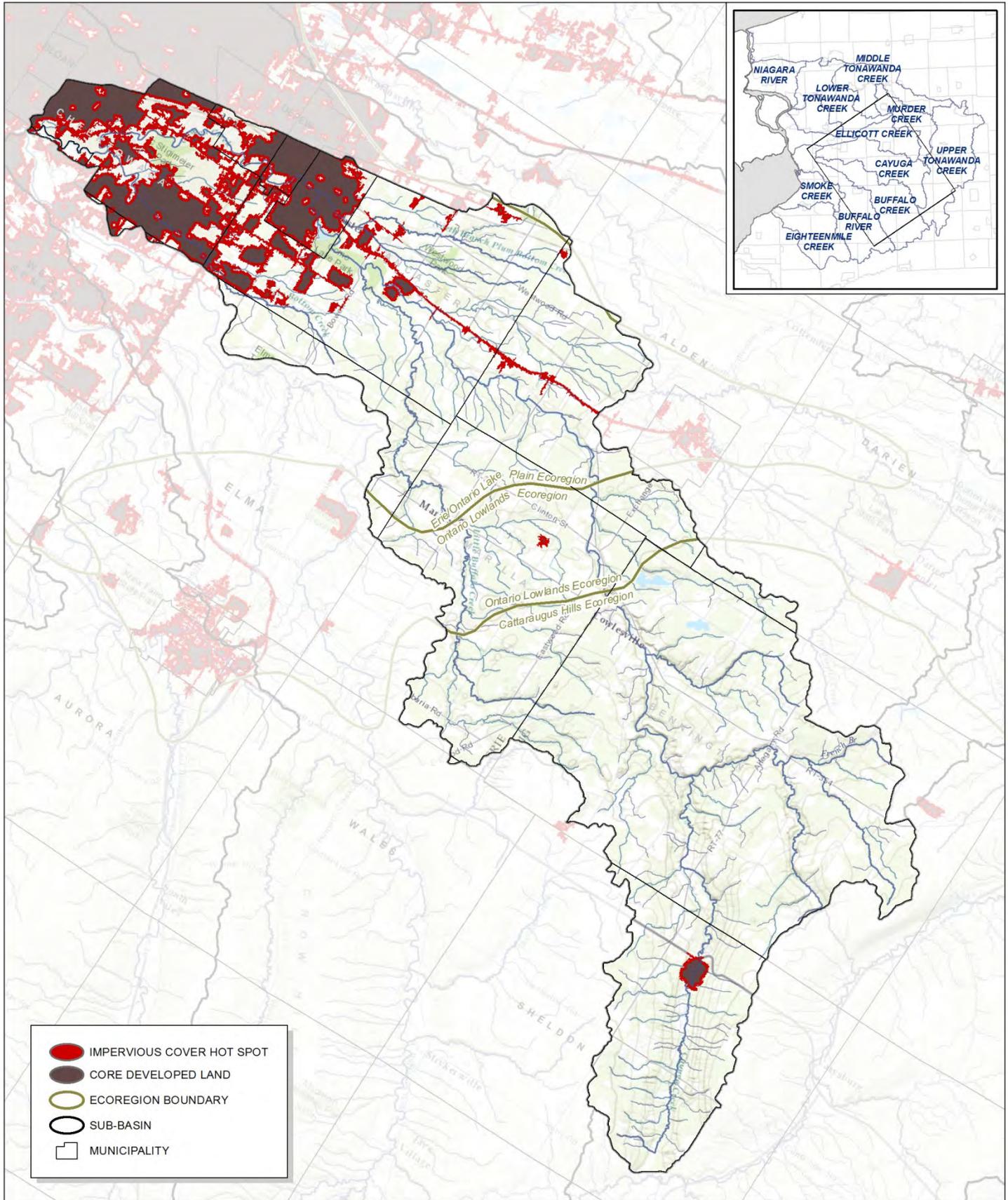


Map Notes:
 Impervious Cover Hot Spots are areas of peripheral development adjacent to Natural Areas.
 Procedure documented in the Future Impervious Hot Spot Mapping SOP, July 7, 2013

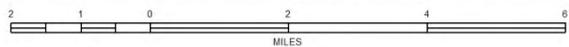
Impervious Cover Hot Spots
BUFFALO RIVER SUB-BASIN

Map 4.10 Impervious Cover Hot Spots Cayuga Creek Sub-Basin

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- IMPERVIOUS COVER HOT SPOT
- CORE DEVELOPED LAND
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY

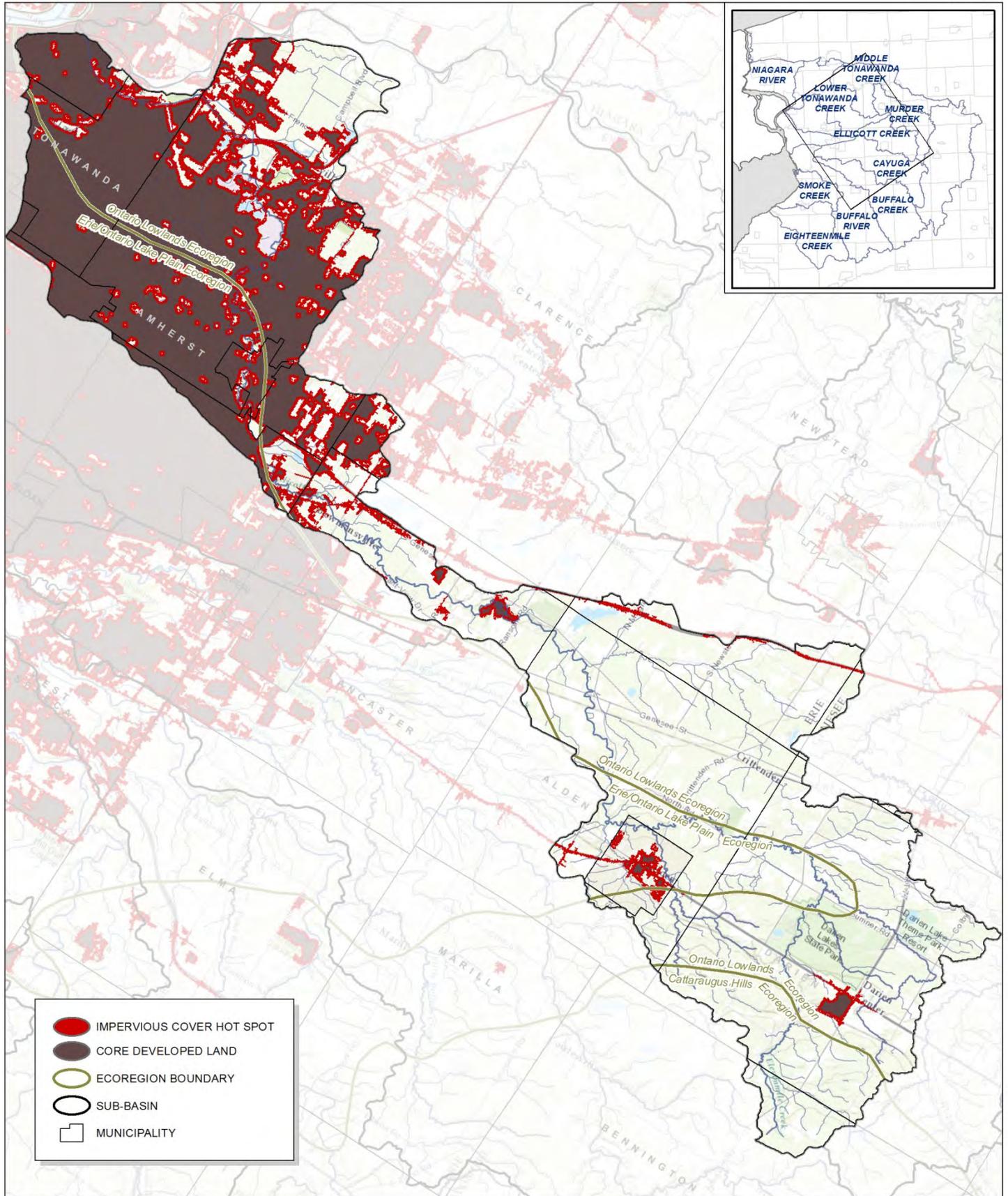


Map Notes:
Impervious Cover Hot Spots are areas of peripheral development adjacent to Natural Areas.
Procedure documented in the Future Impervious Hot Spot Mapping SOP, July 7, 2013

Impervious Cover Hot Spots
CAYUGA CREEK SUB-BASIN

Map 4.11 Impervious Cover Hot Spots Ellicott Creek Sub-Basin

30E.REV01.2014-0311



- IMPERVIOUS COVER HOT SPOT
- CORE DEVELOPED LAND
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY

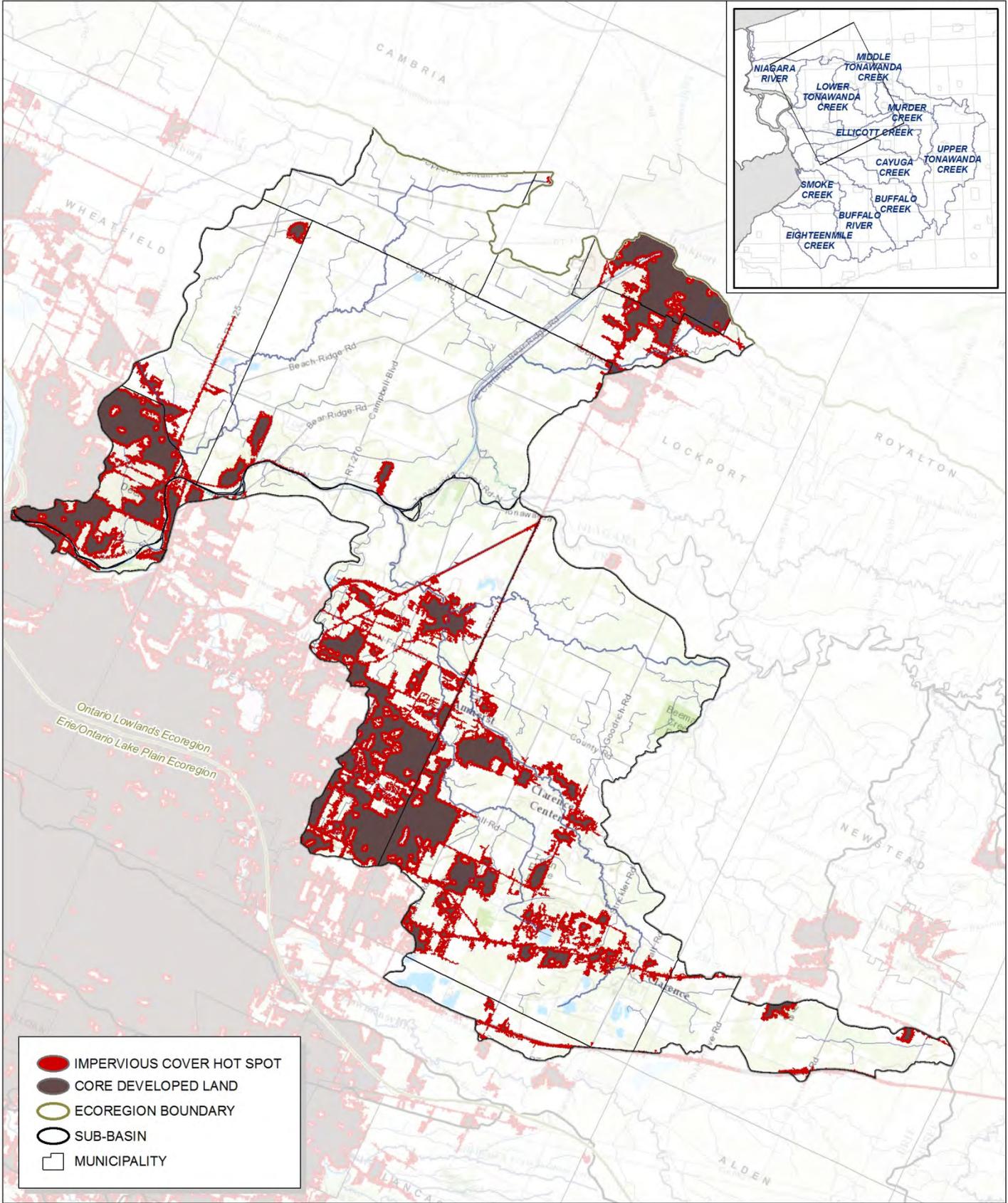


Map Notes:
 Impervious Cover Hot Spots are areas of peripheral development adjacent to Natural Areas.
 Procedure documented in the Future Impervious Hot Spot Mapping SOP, July 7, 2013

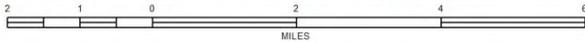
**Impervious Cover Hot Spots
 ELLICOTT CREEK SUB-BASIN**

Map 4.12 Impervious Cover Hot Spots Lower Tonawanda Creek Sub-Basin

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- IMPERVIOUS COVER HOT SPOT
- CORE DEVELOPED LAND
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY

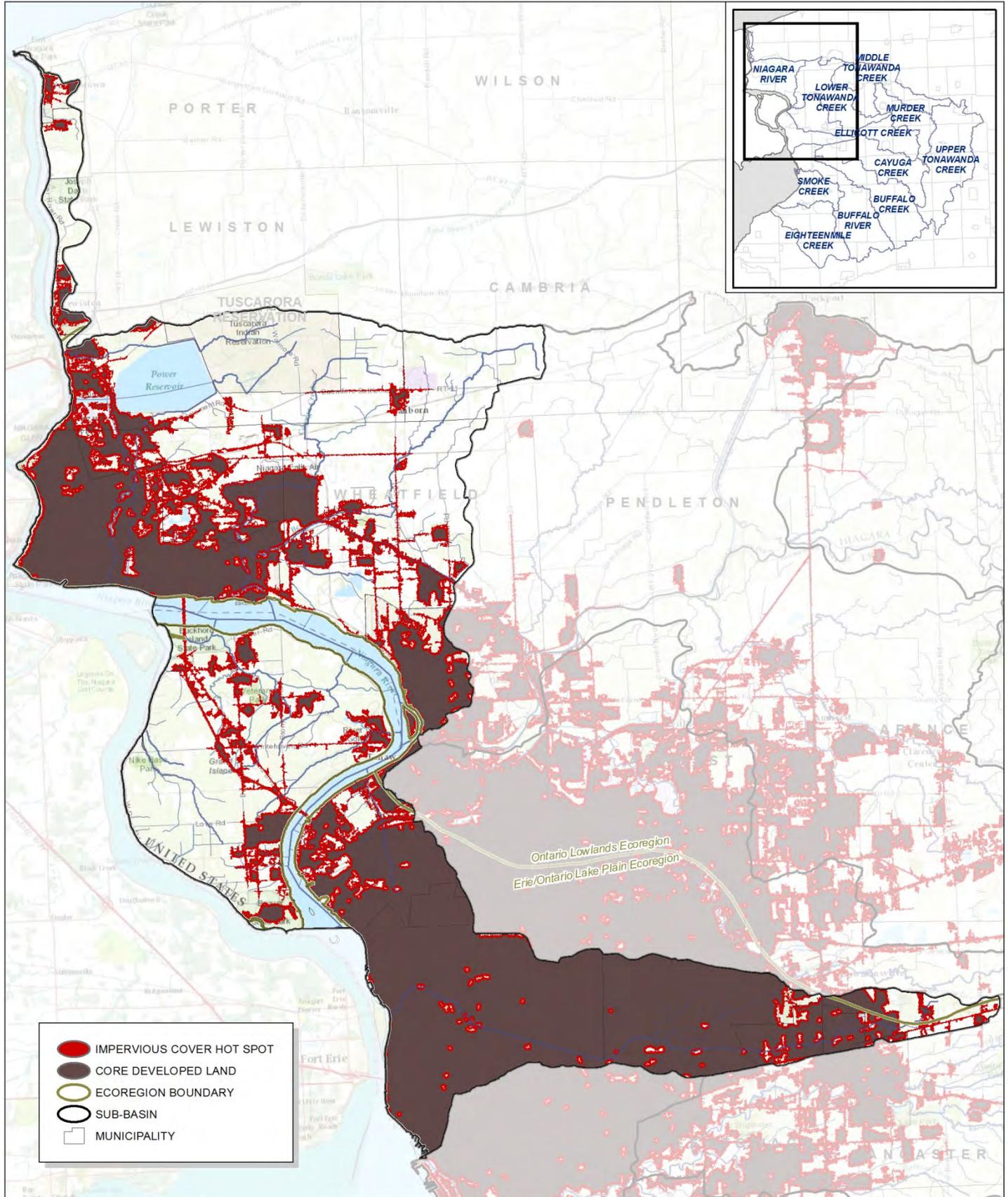


Map Notes:
 Impervious Cover Hot Spots are areas of peripheral development adjacent to Natural Areas.
 Procedure documented in the Future Impervious Hot Spot Mapping SOP, July 7, 2013

Impervious Cover Hot Spots
LOWER TONAWANDA CREEK SUB-BASIN

Map 4.13 Impervious Cover Hot Spots Niagara River Sub-Basin

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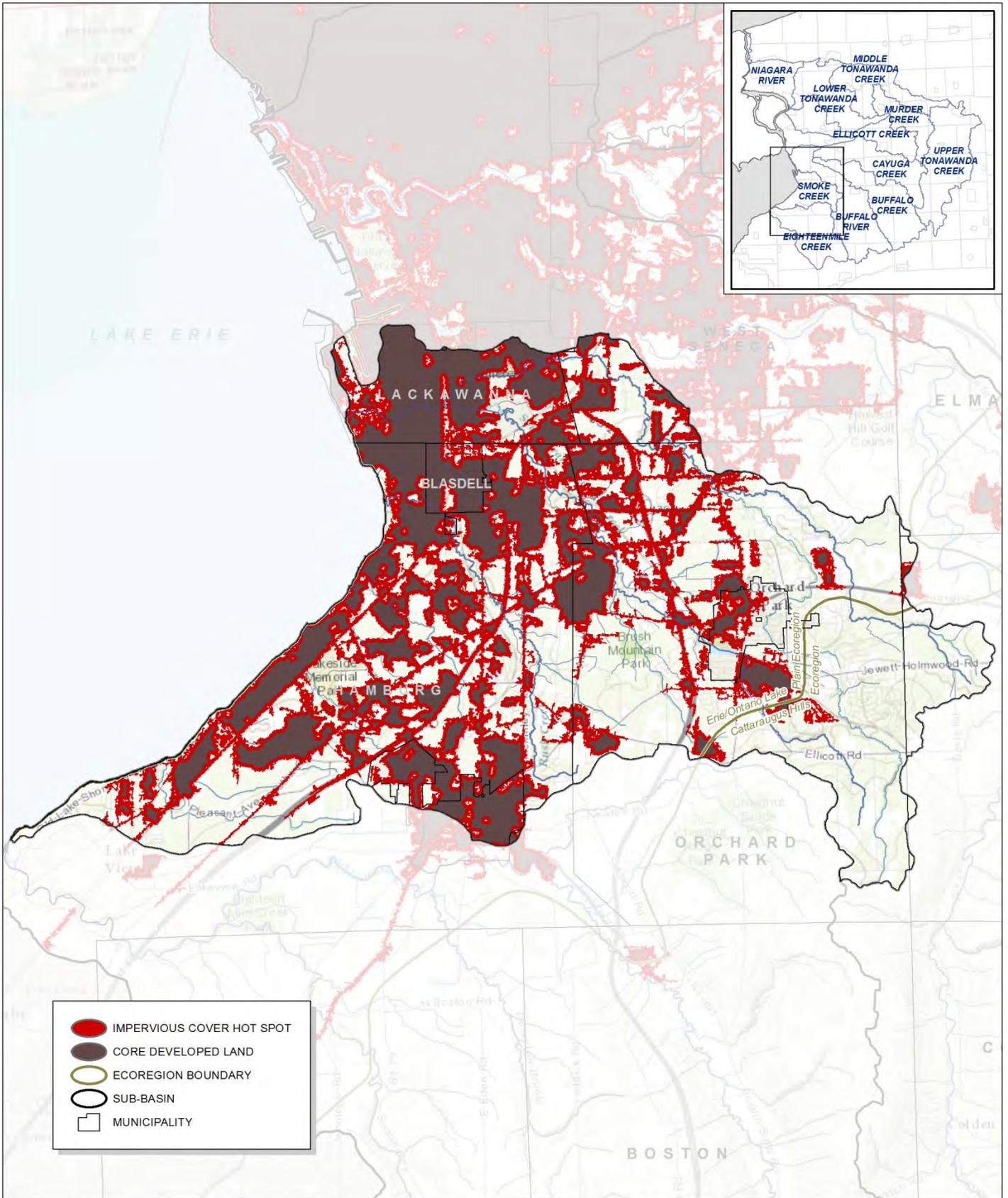
- IMPERVIOUS COVER HOT SPOT
- CORE DEVELOPED LAND
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 Impervious Cover Hot Spots are areas of peripheral development adjacent to Natural Areas.
 Procedure documented in the Future Impervious Hot Spot Mapping SOP, July 7, 2013

**Impervious Cover Hot Spots
 NIAGARA RIVER SUB-BASIN**

Map 4.14 Impervious Cover Hot Spots Smoke Creek Sub-Basin



- IMPERVIOUS COVER HOT SPOT
- CORE DEVELOPED LAND
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 Impervious Cover Hot Spots are areas of peripheral development adjacent to Natural Areas.
 Procedure documented in the Future Impervious Hot Spot Mapping SOP, July 7, 2013

**Impervious Cover Hot Spots
 SMOKE CREEK SUB-BASIN**

Action: Identify forested areas at greatest risk of fragmentation due to development pressures.

Threats Addressed: Fragmentation, Lack of Riparian Buffers, Loss of Acreage, Lack of Protection

The purpose of this assessment is to identify forested areas (>100 acres, >100 meters from a road and not intersected by a right-of-way) which are currently *undeveloped* and *unprotected* (sensitive woodlands) and which lie adjacent to developed land covers having residential and agricultural uses. These sensitive forests are areas of forested cover at greatest risk for future development based on their proximity to developed lands. By viewing the resulting maps from this query against maps 4.1-4.16, it is easy to compare forests in the watershed containing the greatest value for species and water quality protection to those at greatest risk for future development. As a planning tool, the resulting maps can assist municipalities in identifying key areas for protection or intervention. In all cases, property ownership limitations must be considered at the site selection stage and are often a limitation in realizing desired protection efforts.

Opportunities:

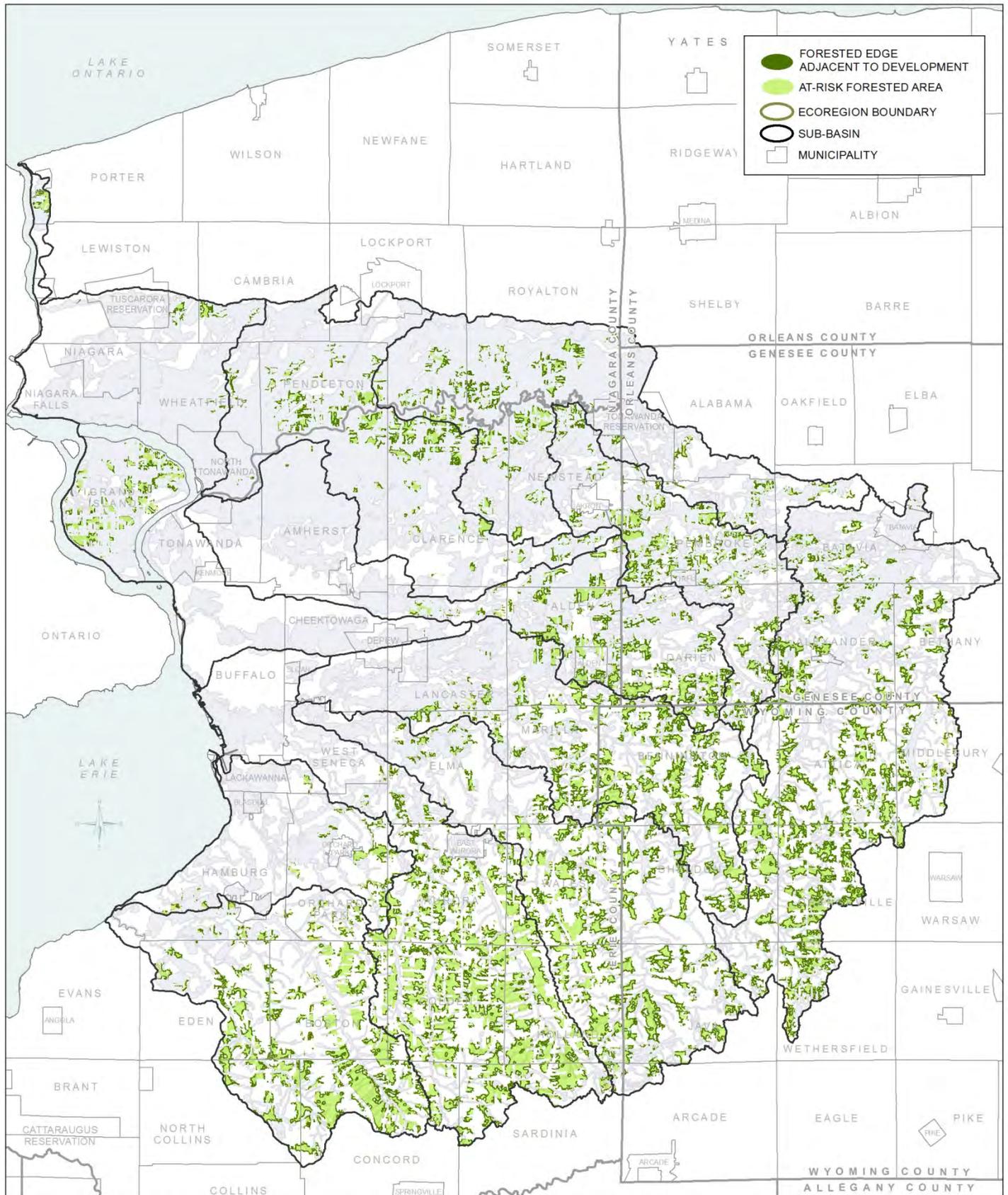
The analysis shows that the headwater areas of the sub-basins generally contain the majority of sensitive forested areas. In all sub-basins, highly sensitive forests are predominately located either directly adjacent to or within close proximity to a stream. This again reinforces the need to protect riparian forested tracts in the headwater areas from future development.

The Niagara River sub-basin presents several unique opportunities because it is heavily developed with the cities of Niagara Falls and Buffalo, each containing very little forested area. Thus, the forested areas remaining within Niagara Falls and Buffalo are almost exclusively found in parks and should be protected from future development and habitat loss, at all costs. Where possible, the re-establishment of forested tracts through either the addition of park land or the planting of existing lands should be achieved.

Grand Island, also located in the Niagara River sub-basin, contains unique island geography. The Island has many areas of remaining forested cover located within its interior, but also is experiencing some of the greatest pressures from residential development in these same locations. Accordingly, large concentrations of forested hotspots are found across the Island's interior. For Grand Island, this analysis can help reinforce the need for enhanced environmental zoning protections in focused areas. Maps 4.15-4.21 show results for selected sub-basins. Additional maps can be found within the technical report.

Map 4.15 Forested Areas At-Risk for Future Fragmentation Niagara River Watershed

32.REV02.2014-0311



Map Notes:

Woodland Cover study developed by Buffalo Niagara Riverkeeper. Procedure documented in June 30, 2013 SOP. Forested Areas At-Risk for Future Fragmentation are areas where development (including residential and agriculture) encroaches on undisturbed and unprotected forests. Layer creation documented in a forest fragmentation analysis SOP, July 7, 2013.

BUFFALO NIAGARA RIVERKEEPER®

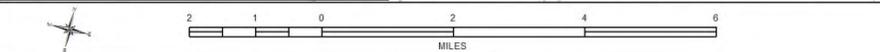
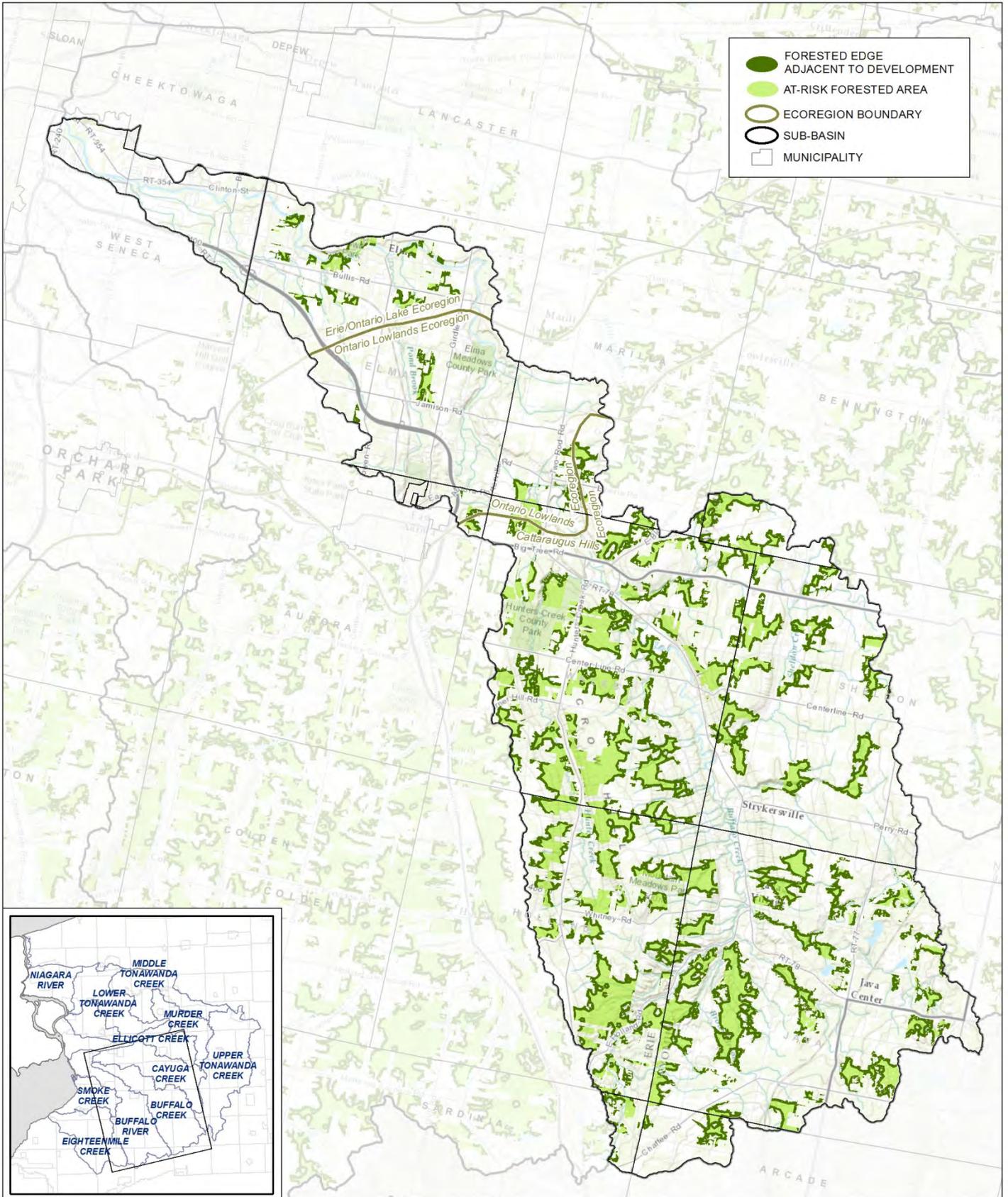
MAP CREATED BY BUFFALO NIAGARA RIVERKEEPER THROUGH FUNDING FROM THE US ENVIRONMENTAL PROTECTION AGENCY'S GREAT LAKES RESTORATION INITIATIVE.

**Forested Areas At-Risk
for Future Fragmentation
NIAGARA RIVER WATERSHED**

NIAGARA RIVER HABITAT CONSERVATION STRATEGY

MARCH, 2014

Map 4.16 Forested Areas At-Risk for Future Fragmentation Buffalo Creek Sub-Basin

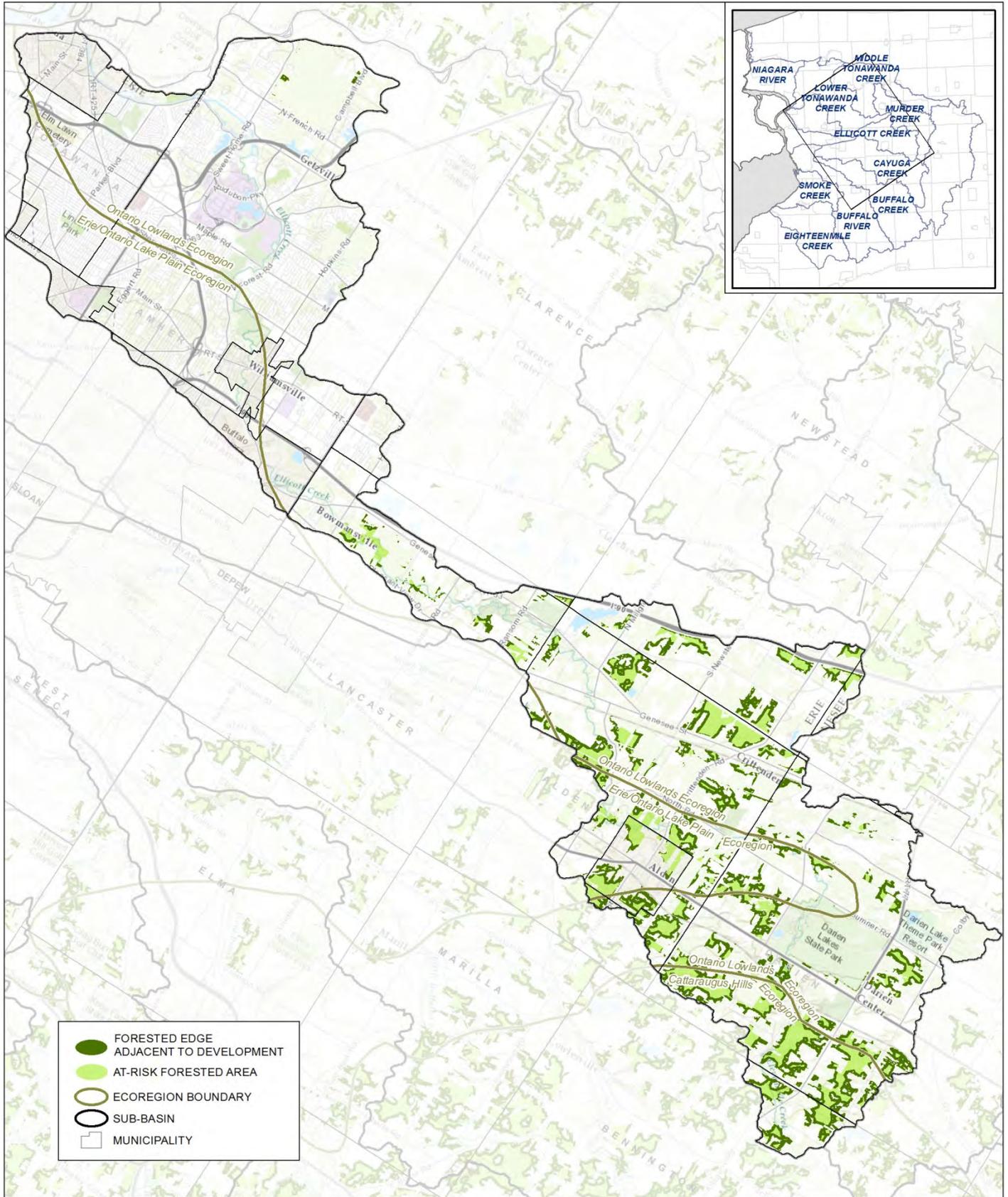


Map Notes:
 Woodland Cover study developed by Buffalo Niagara Riverkeeper. Procedure documented in June 30, 2013 SOP. Forested Areas At-Risk for Future Fragmentation are areas where development (including residential and agriculture) encroaches on undisturbed and unprotected forests. Layer creation documented in a forest fragmentation analysis SOP, July 7, 2013.

**Forested Areas At-Risk
 for Future Fragmentation
 BUFFALO CREEK SUB-BASIN**

Map 4.17 Forested Areas At-Risk for Future Fragmentation Ellicott Creek Sub-Basin

32E.REV02.2014-0311



- FORESTED EDGE ADJACENT TO DEVELOPMENT
- AT-RISK FORESTED AREA
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY

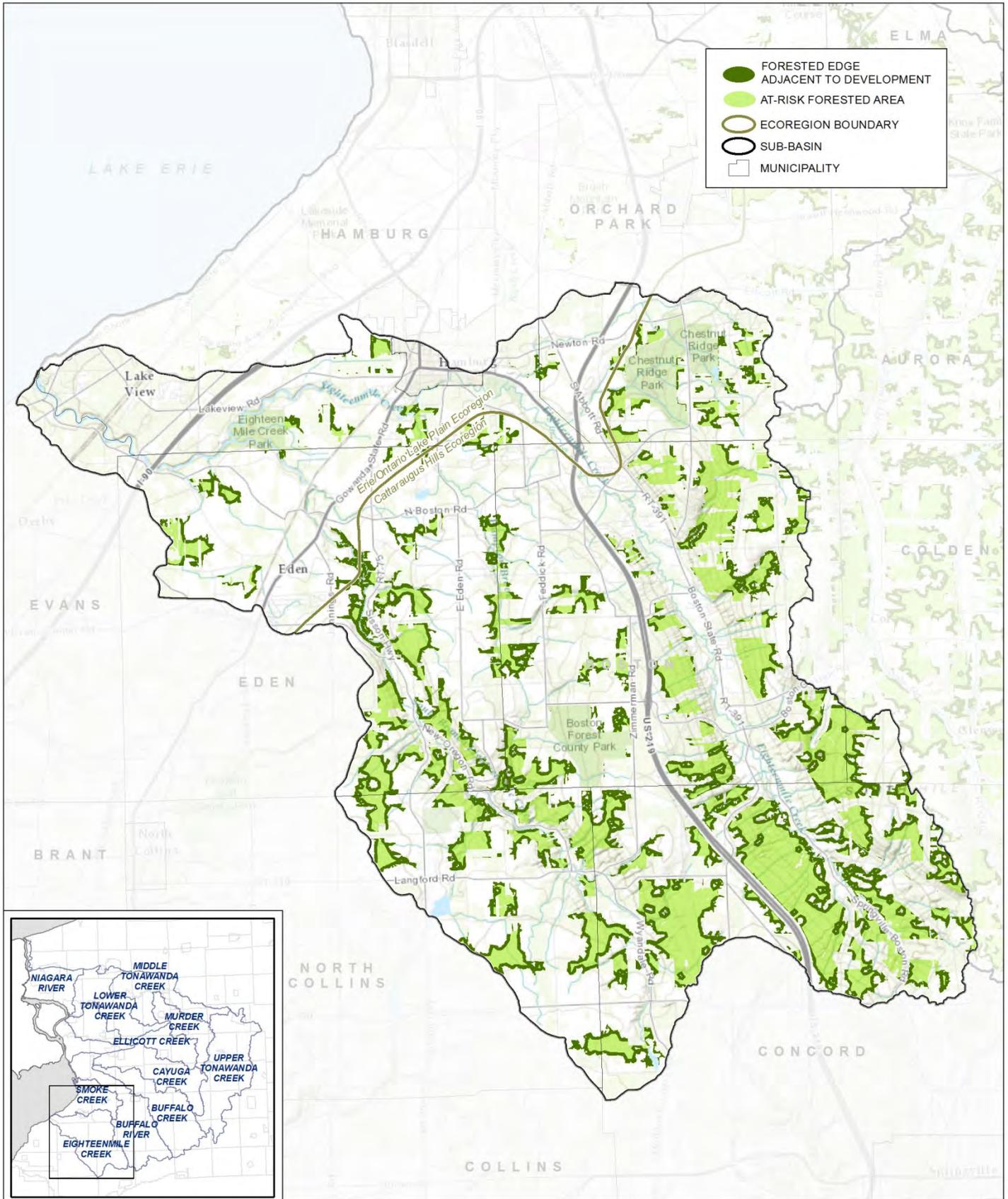


Map Notes:
 Woodland Cover study developed by Buffalo Niagara Riverkeeper. Procedure documented in June 30, 2013 SOP. Forested Areas At-Risk for Future Fragmentation are areas where development (including residential and agriculture) encroaches on undisturbed and unprotected forests. Layer creation documented in a forest fragmentation analysis SOP, July 7, 2013.

**Forested Areas At-Risk
 for Future Fragmentation
 ELLICOTT CREEK SUB-BASIN**

Map 4.18 Forested Areas At-Risk for Future Fragmentation Eighteenmile Creek Sub-Basin

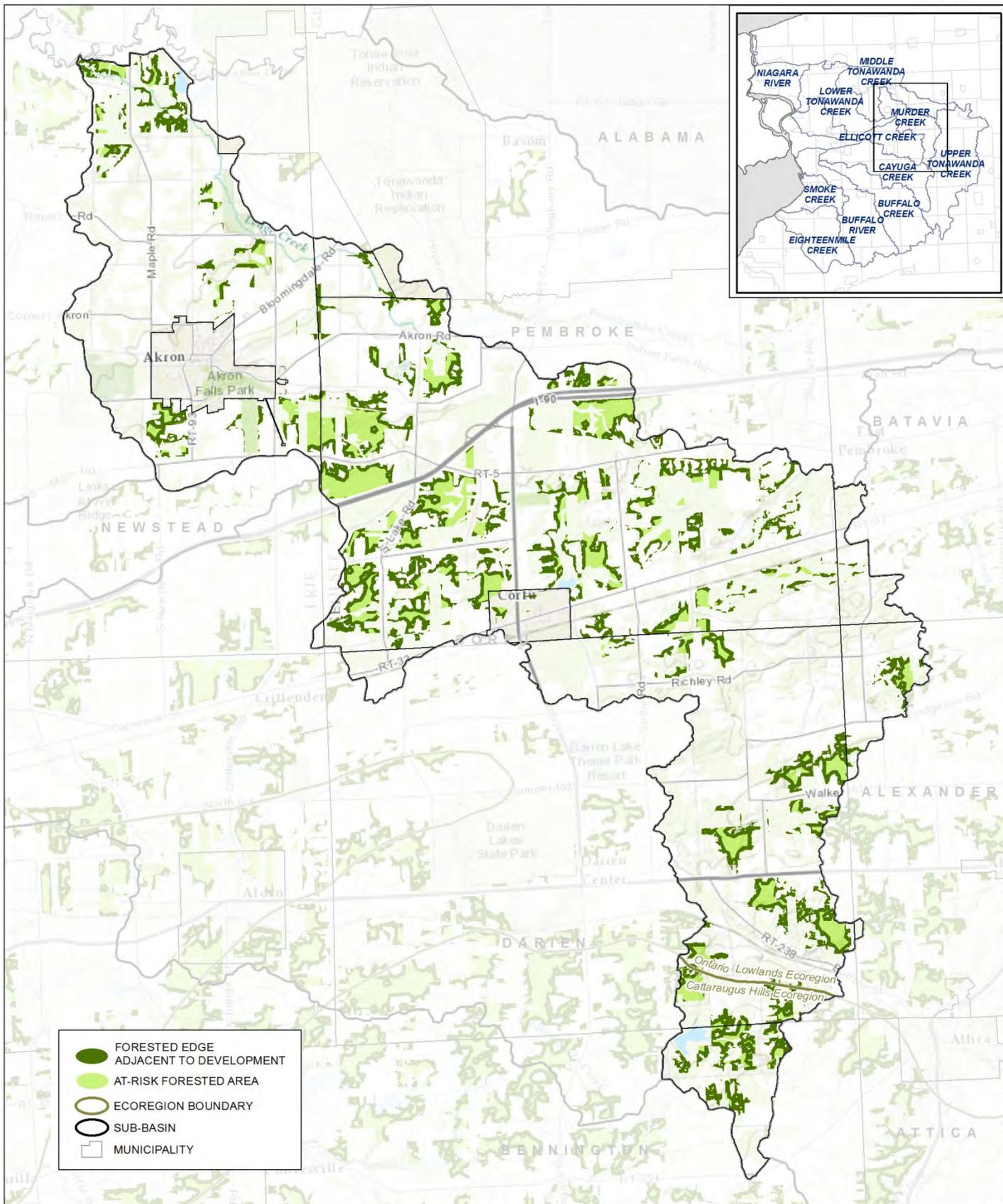
32A.REV02.2014-0311



Map Notes:
 Woodland Cover study developed by Buffalo Niagara Riverkeeper. Procedure documented in June 30, 2013 SOP. Forested Areas At-Risk for Future Fragmentation are areas where development (including residential and agriculture) encroaches on undisturbed and unprotected forests. Layer creation documented in a forest fragmentation analysis SOP, July 7, 2013.

**Forested Areas At-Risk
 for Future Fragmentation
 EIGHTEENMILE CREEK SUB-BASIN**

Map 4.19 Forested Areas At-Risk for Future Fragmentation Murder Creek Sub-Basin



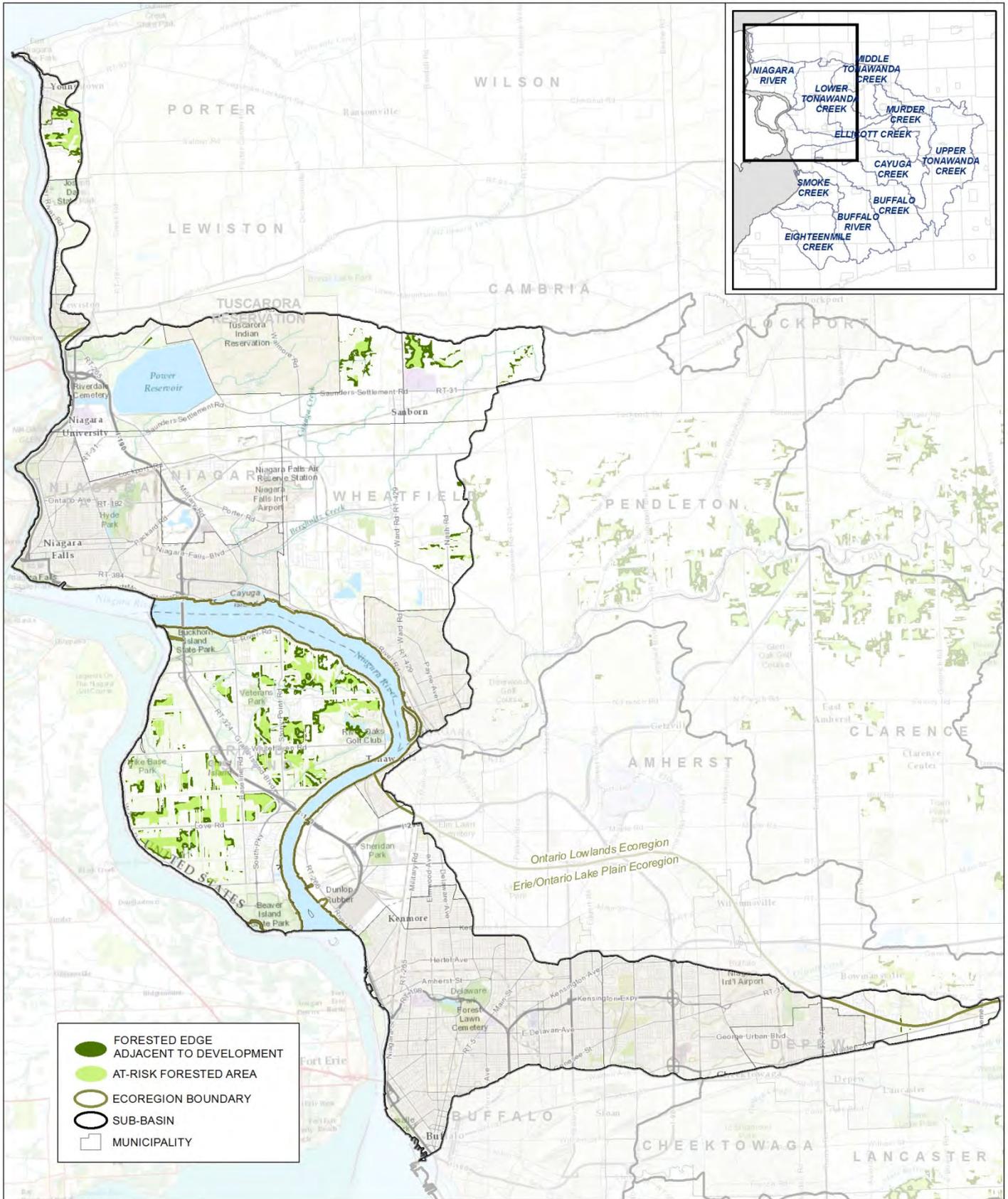
- FORESTED EDGE ADJACENT TO DEVELOPMENT
- AT-RISK FORESTED AREA
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 Woodland Cover study developed by Buffalo Niagara Riverkeeper. Procedure documented in June 30, 2013 SOP. Forested Areas At-Risk for Future Fragmentation are areas where development (including residential and agriculture) encroaches on undisturbed and unprotected forests. Layer creation documented in a forest fragmentation analysis SOP, July 7, 2013.

**Forested Areas At-Risk
 for Future Fragmentation
 MURDER CREEK SUB-BASIN**

Map 4.20 Forested Areas At-Risk for Future Fragmentation Niagara River Sub-Basin



- FORESTED EDGE ADJACENT TO DEVELOPMENT
- AT-RISK FORESTED AREA
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY

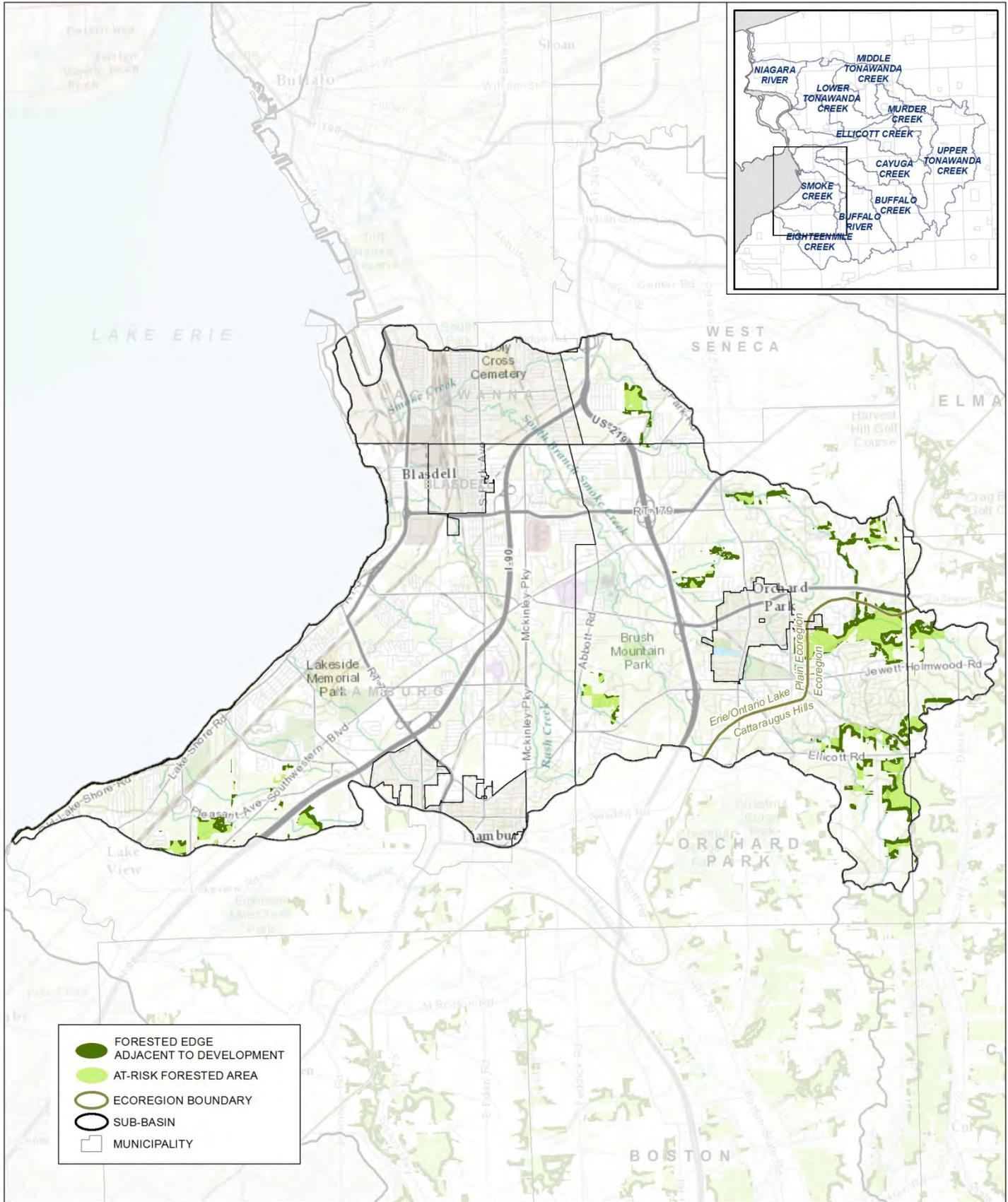


Map Notes:
 Woodland Cover study developed by Buffalo Niagara Riverkeeper. Procedure documented in June 30, 2013 SOP. Forested Areas At-Risk for Future Fragmentation are areas where development (including residential and agriculture) encroaches on undisturbed and unprotected forests. Layer creation documented in a forest fragmentation analysis SOP, July 7, 2013.

**Forested Areas At-Risk for Future Fragmentation
 NIAGARA RIVER SUB-BASIN**

Map 4.21 Forested Areas At-Risk for Future Fragmentation Smoke Creek Sub-Basin

32J.REV02.2014-0311



- FORESTED EDGE ADJACENT TO DEVELOPMENT
- AT-RISK FORESTED AREA
- ECOREGION BOUNDARY
- SUB-BASIN
- MUNICIPALITY



Map Notes:
 Woodland Cover study developed by Buffalo Niagara Riverkeeper. Procedure documented in June 30, 2013 SOP. Forested Areas At-Risk for Future Fragmentation are areas where development (including residential and agriculture) encroaches on undisturbed and unprotected forests. Layer creation documented in a forest fragmentation analysis SOP, July 7, 2013.

**Forested Areas At-Risk for Future Fragmentation
 SMOKE CREEK SUB-BASIN**

Action: Identify opportunities to work with landowners in implementing agricultural best management practices

Threats Addressed: Lack of Riparian Buffers, Fragmentation, Mowing Regimes on Farmland, Invasive Species

Identified as a critical threat within several sub-basins, medium and large-scale farming operations sometimes fragment wetland and forest systems, as well as the continuity between wetland and woodland ecosystems. This fragmentation in turn threatens the life cycle of species that depend on the presence of forested wetland tracts and/or wetland and forest community connectivity to breed. By identifying the areas in the watershed where these “edge” fragmentation conditions are occurring, practitioners can identify opportunities to work with landowners in implementing agricultural best management practices and conservation incentive programs to achieve a benefit to species and water quality.

Opportunities:

The results of the analysis show nine specific opportunities to abate the threat of forest and wetland fragmentation on agricultural lands. For wetland protection and enhancement, area #s 1, 2, 7, and 9 have either protected wetlands within or adjacent to the agricultural parcel, and appear to be well suited for wetland expansion. Area #s 3, 4, and 6 represent good opportunities for protection of existing woodland habitats. Specific best management practices at these locations include expanded buffers around wetlands and streams and planting of areas not in active agricultural use to increase the acreage and connectivity of woodland areas. Opportunities for establishment of grassland areas are also a consideration for converting former agricultural lands into valuable habitat areas. Particularly where adjacent to wetlands, grassland habitat establishment is a desired outcome within the entire Niagara River Watershed. In addition to restoration efforts, landowner education is a critical best management practice that can be used more widely to promote conservation and stewardship as well as further degradation of woodland and wetland habitats.

Existing programs such as the USDA/NRCS Conservation Reserve Enhancement Program (CREP) and the Grassland Reserve Program offer immediate opportunities to assist landowners in implementing BMPs to enhance conservation values. The implementation of these programs should be supported by State and municipal entities to encourage growth of landowner participation (See Maps 4.22 – 4.29).

Map 4.22 Agricultural Best Management Practice (BMP) Opportunities Niagara River Watershed

31.REV01.2014-0311

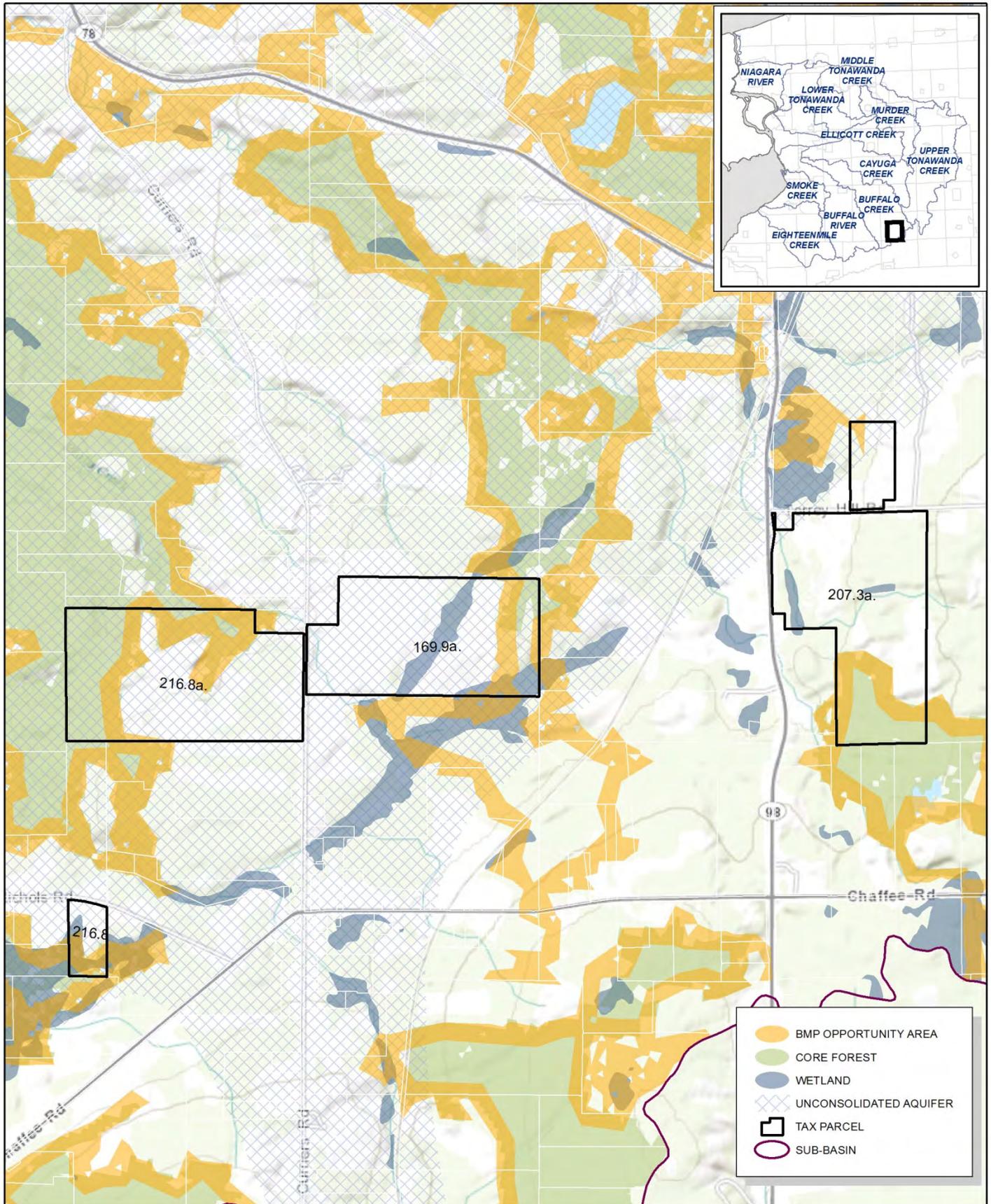


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

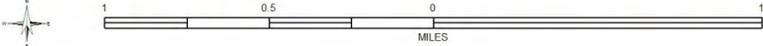
**Agricultural Best Management Practice (BMP) Opportunities
 NIAGARA RIVER WATERSHED**

Map 4.23 Area 1 Agricultural Best Management Practice (BMP) Opportunities Niagara River Watershed

31A.REV01.2014-0311



- BMP OPPORTUNITY AREA
- CORE FOREST
- WETLAND
- UNCONSOLIDATED AQUIFER
- TAX PARCEL
- SUB-BASIN

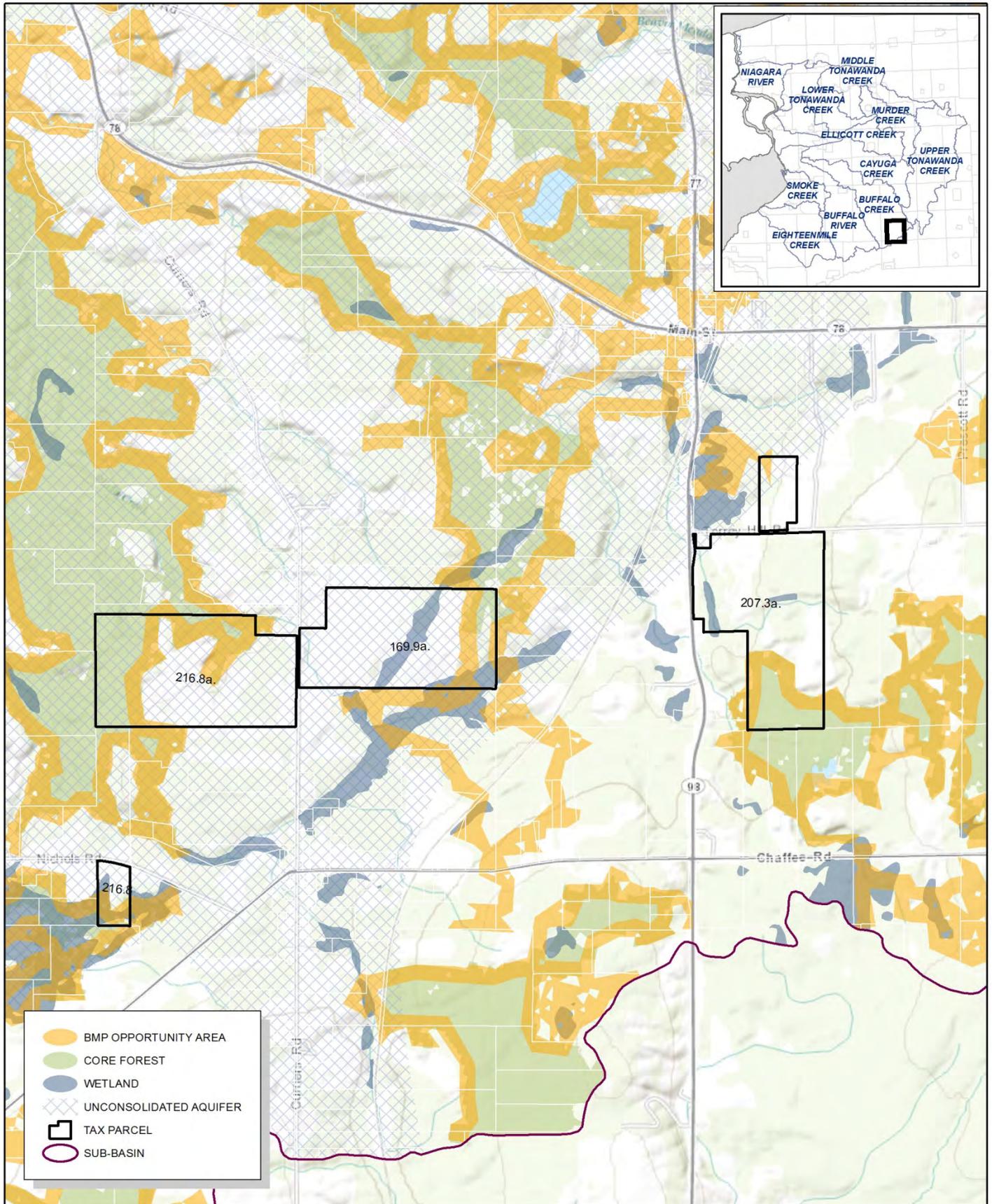


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

Area 1
Agricultural Best Management Practice
(BMP) Opportunities
NIAGARA RIVER WATERSHED

Map 4.24 Area 2 Agricultural Best Management Practice (BMP) Opportunities Niagara River Watershed

31B.REV01.2014-0311



- BMP OPPORTUNITY AREA
- CORE FOREST
- WETLAND
- UNCONSOLIDATED AQUIFER
- TAX PARCEL
- SUB-BASIN

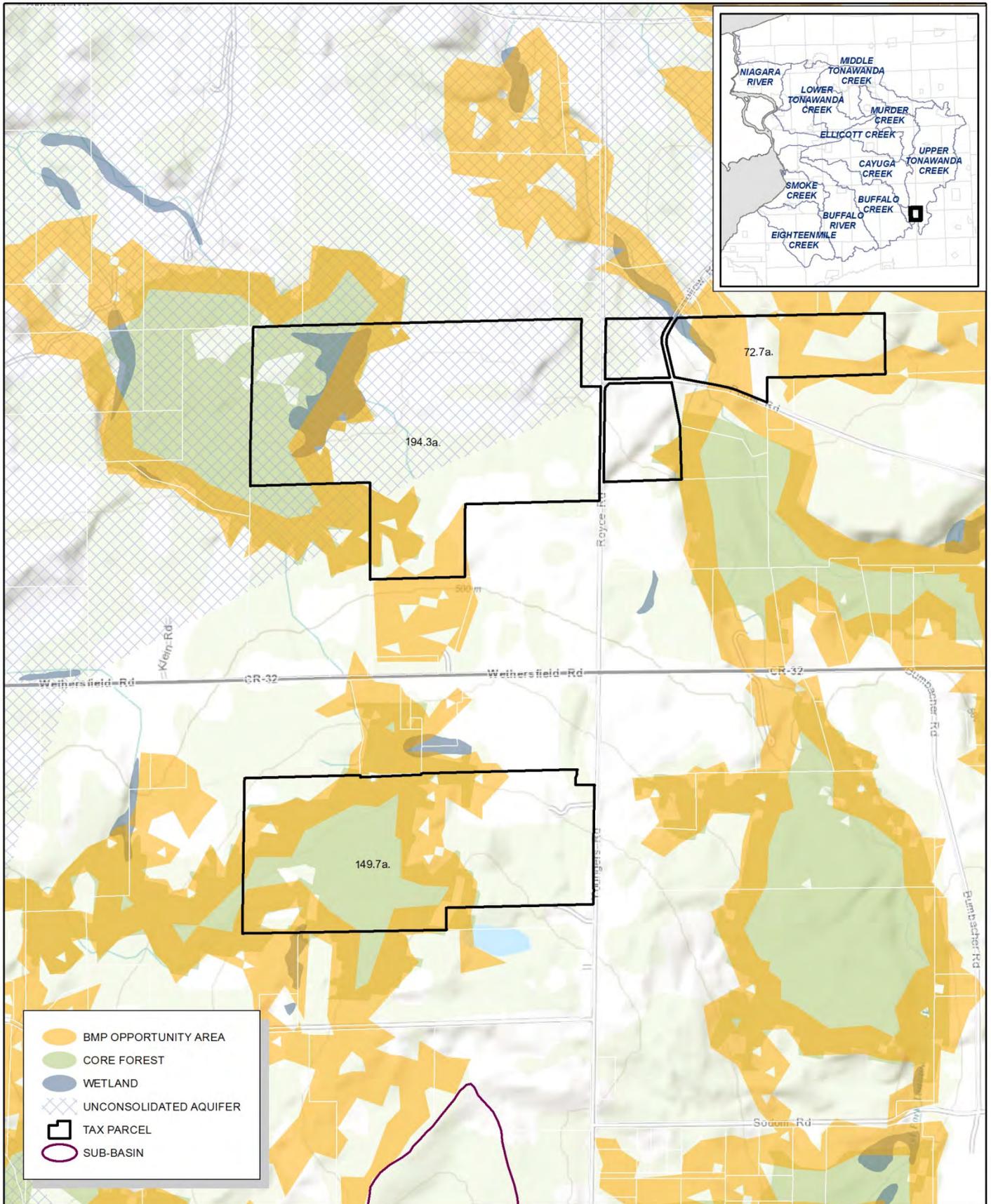


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

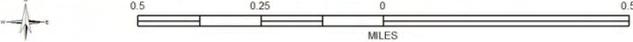
Area 2
Agricultural Best Management Practice
(BMP) Opportunities
NIAGARA RIVER WATERSHED

Map 4.25 Area 3 Agricultural Best Management Practice (BMP) Opportunities Niagara River Watershed

31C.REV01.2014-0311

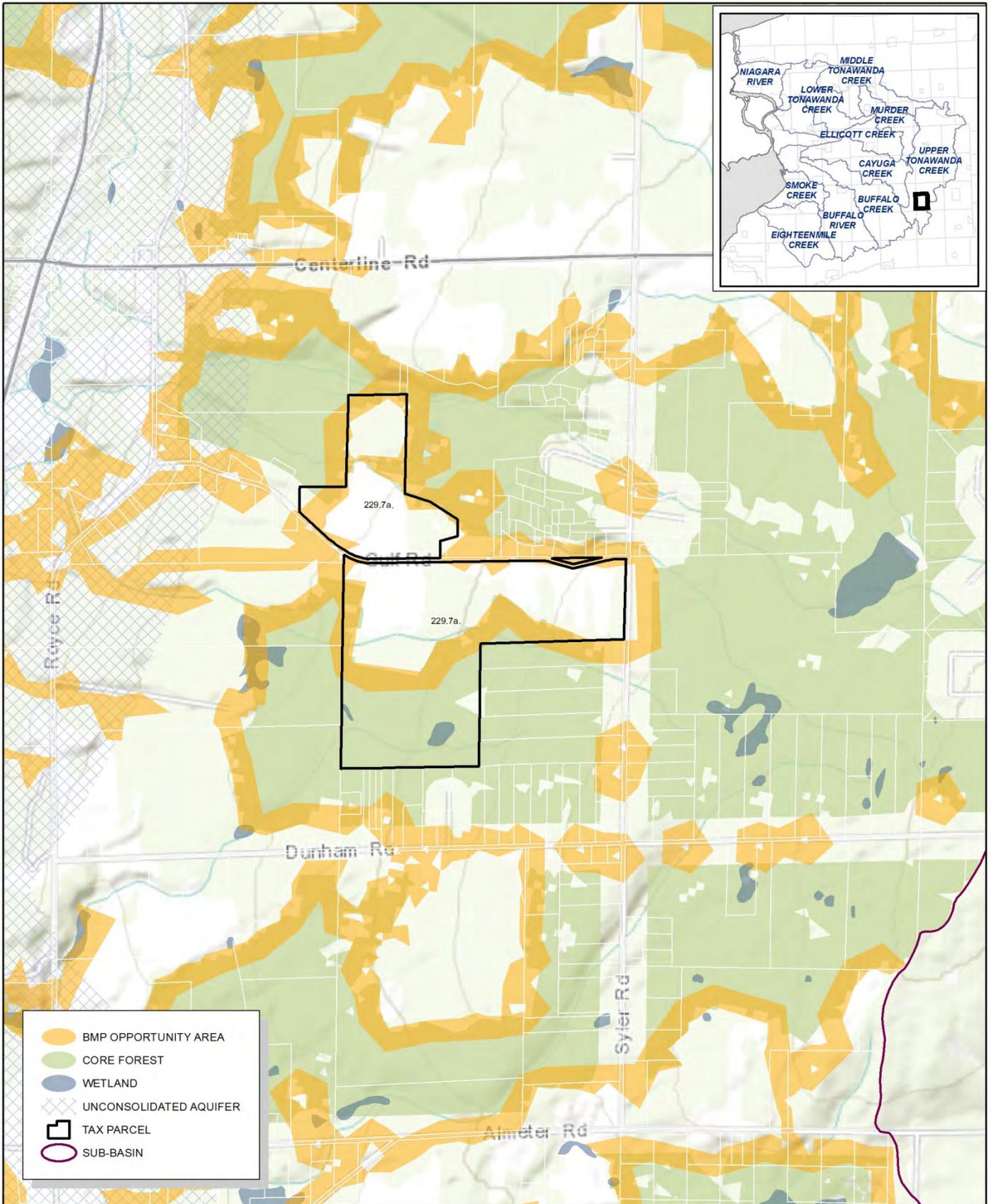


- BMP OPPORTUNITY AREA
- CORE FOREST
- WETLAND
- UNCONSOLIDATED AQUIFER
- TAX PARCEL
- SUB-BASIN

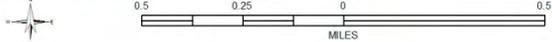


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

Area 3
Agricultural Best Management Practice
(BMP) Opportunities
NIAGARA RIVER WATERSHED



- BMP OPPORTUNITY AREA
- CORE FOREST
- WETLAND
- UNCONSOLIDATED AQUIFER
- TAX PARCEL
- SUB-BASIN

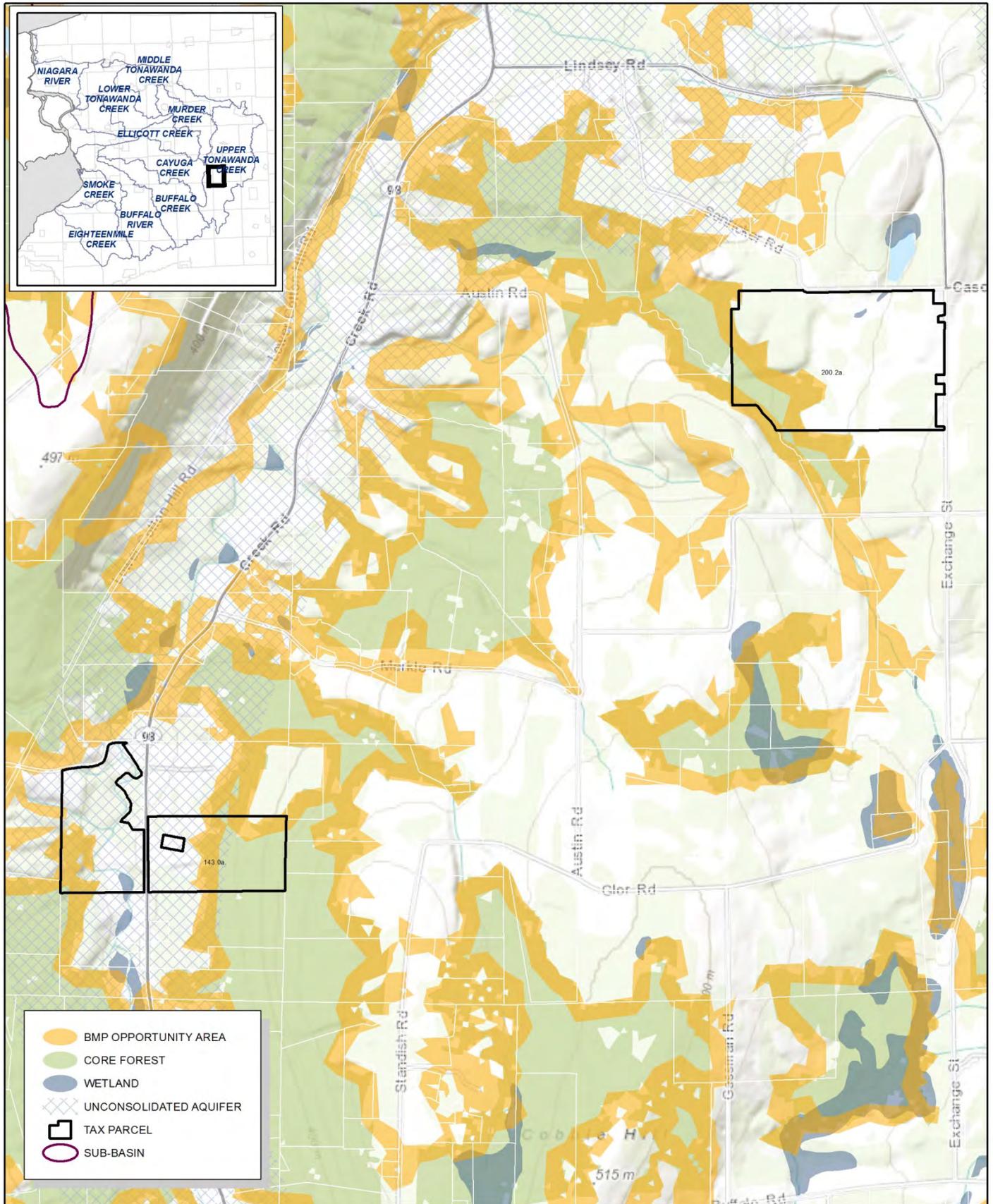


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

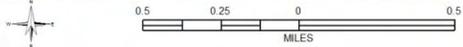
Area 4
Agricultural Best Management Practice
(BMP) Opportunities
NIAGARA RIVER WATERSHED

Map 4.27 Area 6 Agricultural Best Management Practice (BMP) Opportunities Niagara River Watershed

31F.REV01.2014-0311

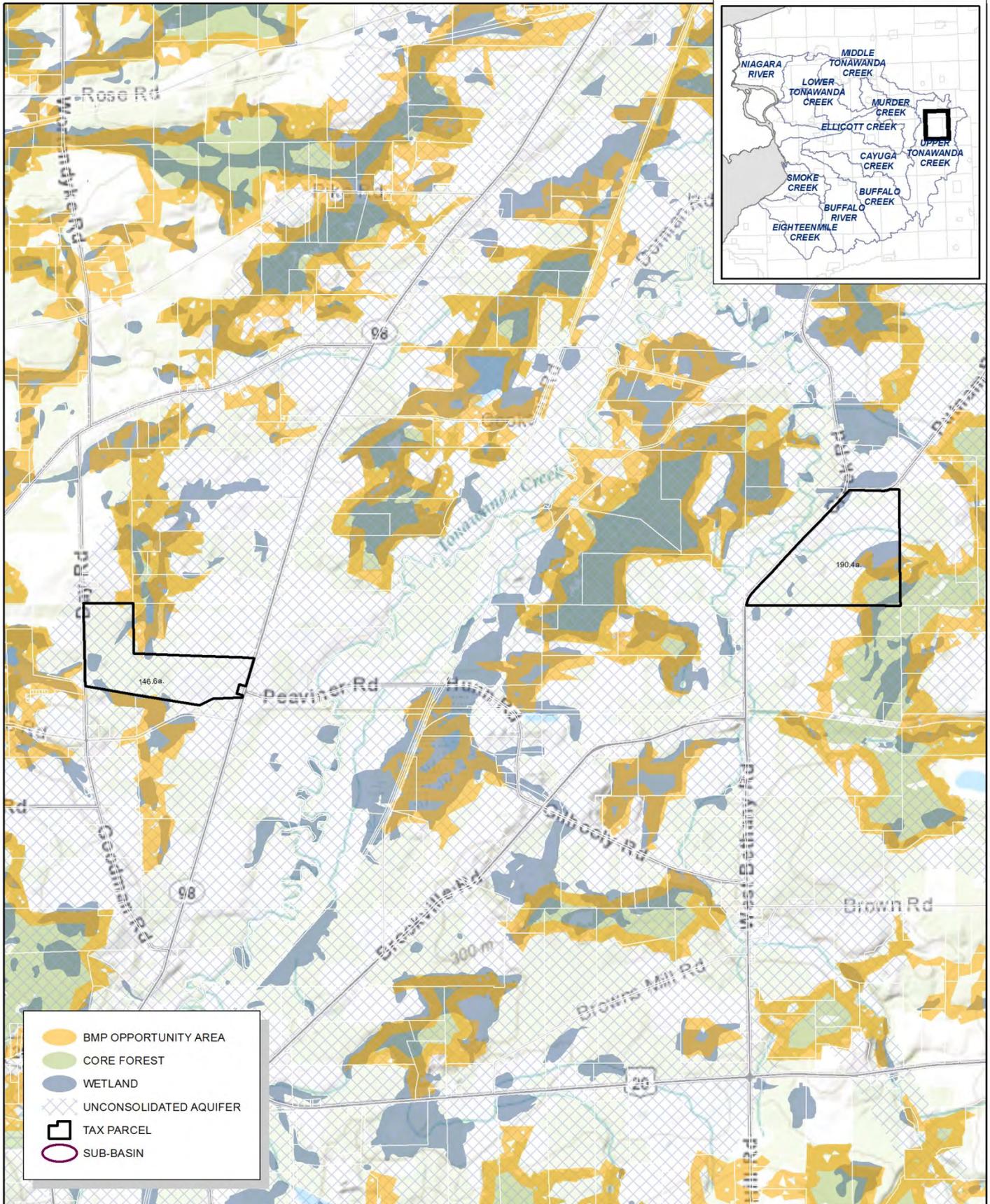


- BMP OPPORTUNITY AREA
- CORE FOREST
- WETLAND
- UNCONSOLIDATED AQUIFER
- TAX PARCEL
- SUB-BASIN

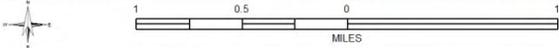


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

Area 6
Agricultural Best Management Practice
(BMP) Opportunities
NIAGARA RIVER WATERSHED



- BMP OPPORTUNITY AREA
- CORE FOREST
- WETLAND
- UNCONSOLIDATED AQUIFER
- TAX PARCEL
- SUB-BASIN

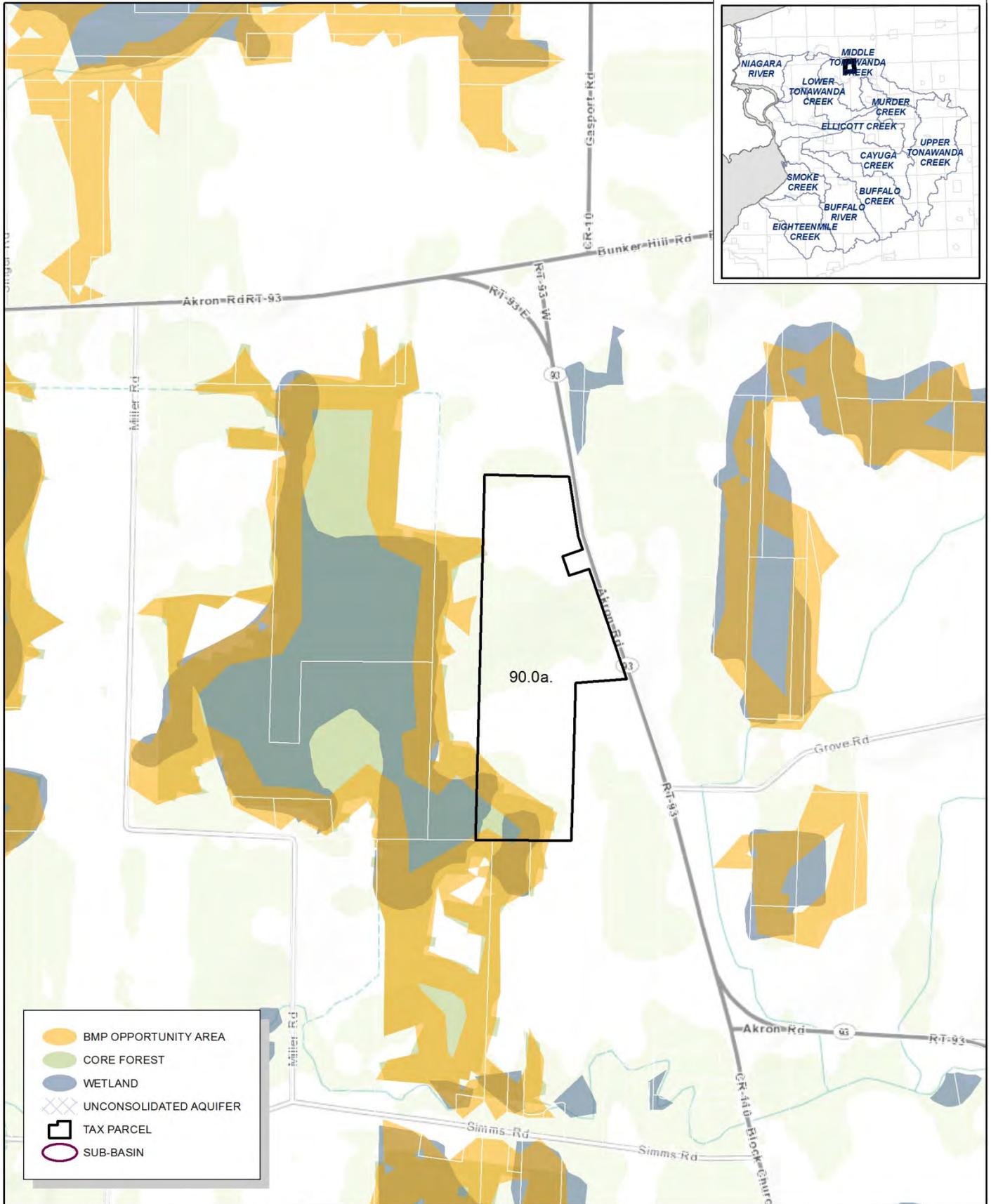


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

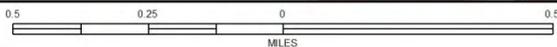
Area 7
Agricultural Best Management Practice
(BMP) Opportunities
NIAGARA RIVER WATERSHED

Map 4.29 Area 9 Agricultural Best Management Practice (BMP) Opportunities Niagara River Watershed

311.REV01.2014-0311



- BMP OPPORTUNITY AREA
- CORE FOREST
- WETLAND
- UNCONSOLIDATED AQUIFER
- TAX PARCEL
- SUB-BASIN



Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "Agricultural BMP Opportunities."

Area 9
Agricultural Best Management Practice
(BMP) Opportunities
NIAGARA RIVER WATERSHED

Action: Identify opportunities to restore grassland and wetland habitat connectivity

Threats Addressed: Fragmentation, Invasive Species, Mowing Regimes, Lack of Ecological Management Plans

Out of the five main habitat types that were analyzed within the Strategy project, grassland habitat is the least abundant. Although only 0.9% of the watershed project area contains grasslands (NOAA 2005 land cover data,) the existence of this habitat type within the watershed is of great importance for the species that rely on it. Studies of grassland birds conducted within the Western New York area have resulted in management implications that increasing areas of grasslands will have a positive effect on the productivity of breeding grassland birds and will also, “meet other important conservation goals, such as maintenance of open, attractive cultural landscapes, and regional biodiversity” (Norment et al, 2010 & 1999).

Further, New York State’s Department of Environmental Conservation publication, *Comprehensive Wildlife Conservation Strategy*, calls for the identification of targets for acquisition and land management for grassland and wetland dependent species in greatest conservation need. Species that would benefit from conservation and restoration of the lands identified in this analysis include various salamander and bird species requiring contiguous wetland/grassland tracts to reproduce and survive. The purpose of this analysis was to identify specific tracts of land considered to be opportunities to restore or reconnect grassland and wetland habitats.

Opportunities:

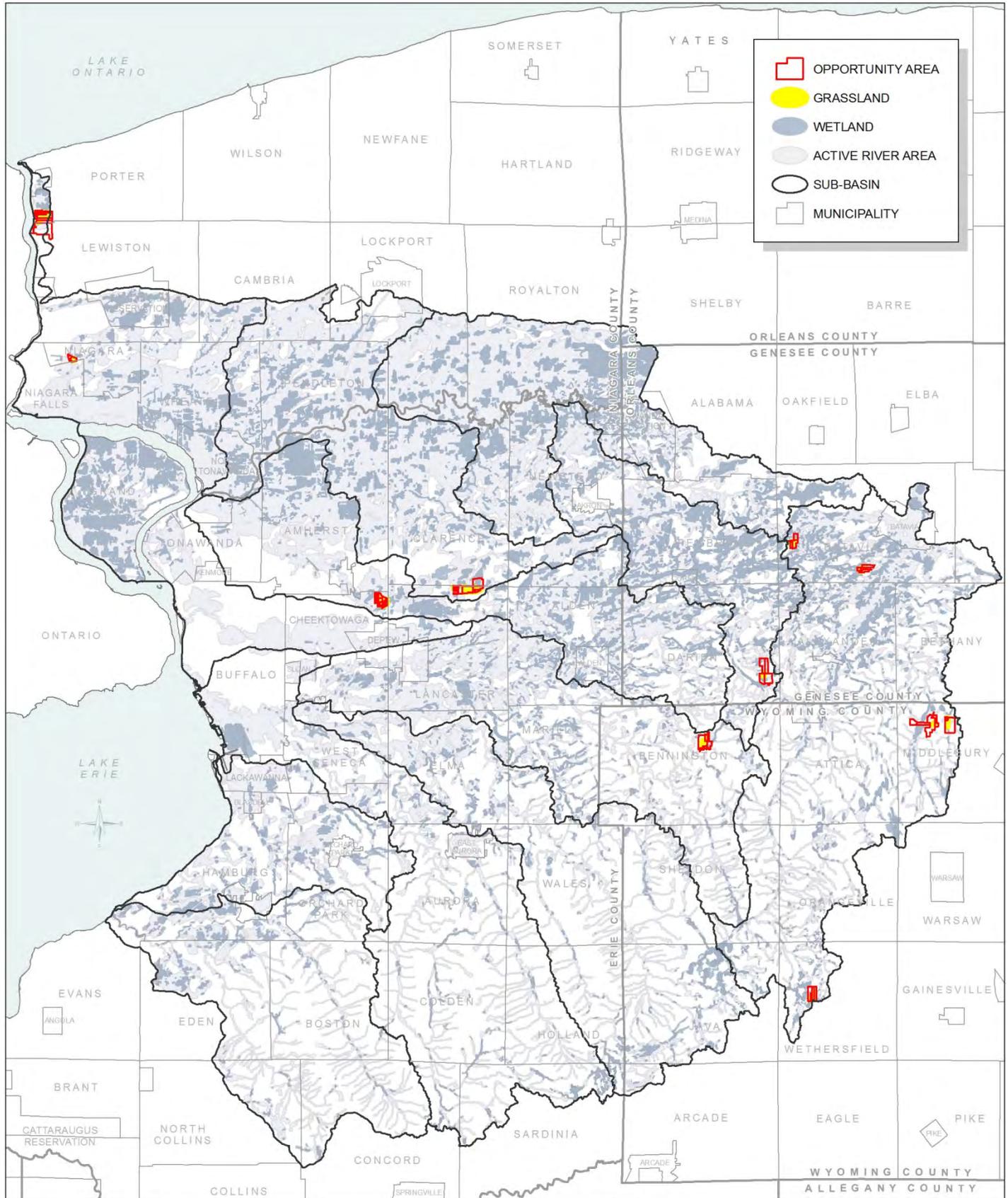
The analysis resulted in 14 priority areas for grassland and wetland matrix conservation. Many of these opportunities exist on parcels classified as vacant industrial, commercial, and landfill/dumps, and all warrant further investigation at the site level. The opportunity with the largest amount of acreage for protection is area #1, which is a 115-acre patch of grassland just north of Joseph Davis State Park within the Niagara River sub-basin. Both NWI and DEC wetlands are located immediately north of the area. At this site, an opportunity exists for participation in the Natural Resource Conservation District’s Grassland Reserve Program. Particularly given the grassland bird habitat restoration taking place at Joseph Davis State Park in recent years, area #1 presents an important opportunity to connect large patches of wetlands to a grassland area already protected and with valuable habitat components.

Another opportunity for conservation exists in the Ellicott Creek sub-basin on mostly vacant lands in commercial areas. Two patches of grassland (areas #2 and #3) bisected by a road contain close to 135 acres, nestled between two Class 1 DEC wetlands. Potential impacts due to the proximity to the Buffalo Niagara International Airport would require further analysis before on-the-ground work is conducted.

Finally, in areas #9 and #10, located in Carlton Hill State Forest within the Upper Tonawanda Creek Sub-basin, an important grassland habitat is identified that is largely under protection by virtue of the State Forest designation. However, it is important to note that the patches in areas #9 and 10 together contain 44 acres of grassland habitat, 15.7 of which is classified as being on mining and quarry land. The management practices and plan for Carlton State Forest should be reviewed in order to determine the protection level of these areas of grassland given the underlying active mining and quarry uses. Continued protection of the grassland/wetland matrix features should remain a priority for management of these State lands (Maps 4.30-4.33).

Map 4.30 Wetland/Grassland Complex Restoration Opportunities Niagara River Watershed

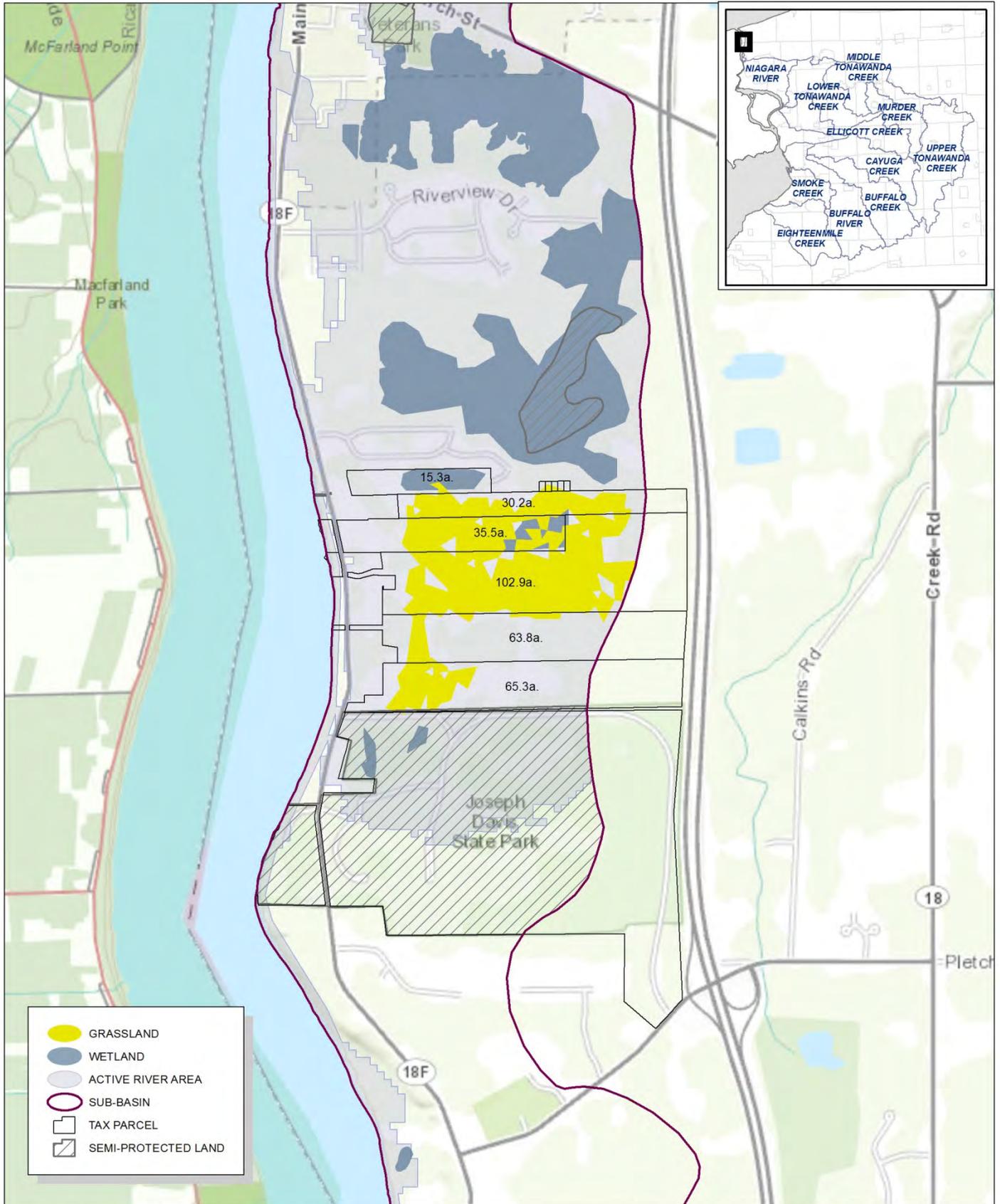
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	OPPORTUNITY AREA
	GRASSLAND
	WETLAND
	ACTIVE RIVER AREA
	SUB-BASIN
	MUNICIPALITY

Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "GRASSLAND TRACTS ADJACENT TO WETLAND PROPERTIES."

**Wetland/Grassland Complex
 Restoration Opportunities
 NIAGARA RIVER WATERSHED**

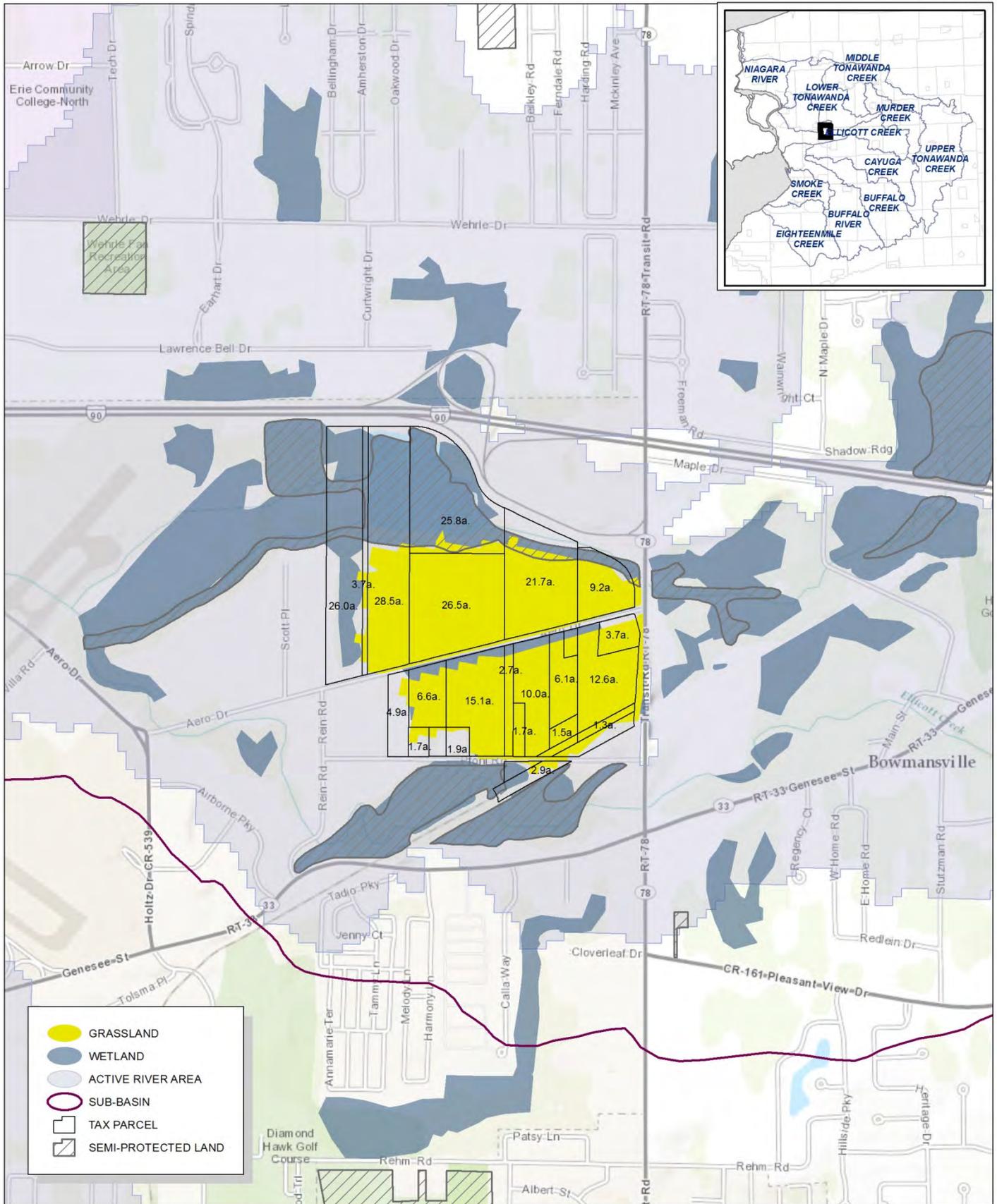


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "GRASSLAND TRACTS ADJACENT TO WETLAND PROPERTIES."

Area 1
Wetland/Grassland Complex
Restoration Opportunities
NIAGARA RIVER WATERSHED

Map 4.32 Areas 2 and 3 Wetland/Grassland Complex Restoration Opportunities Niagara River Watershed

33B.REV01.2014-0311

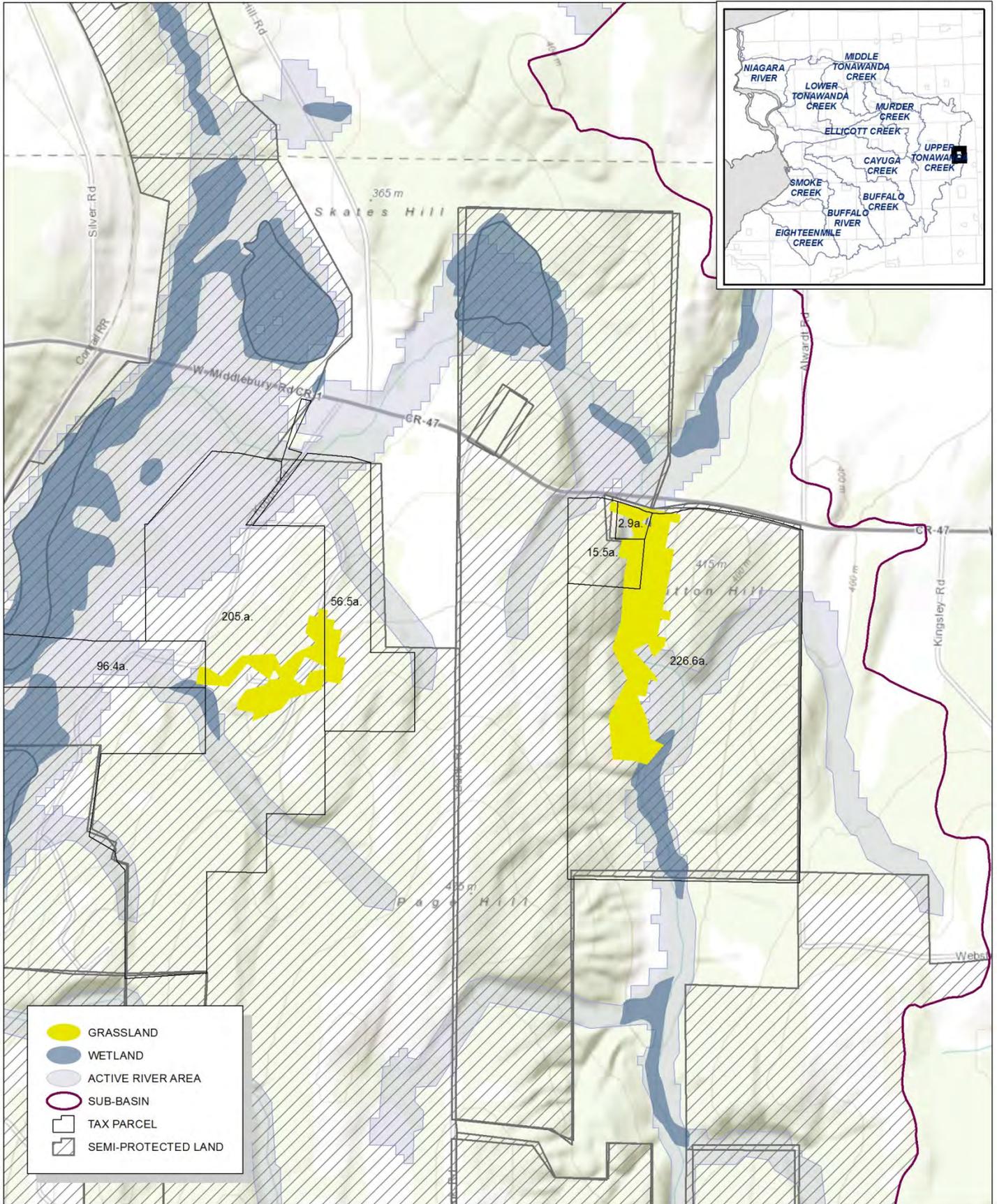


Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "GRASSLAND TRACTS ADJACENT TO WETLAND PROPERTIES."

**Areas 2 and 3
 Wetland/Grassland Complex
 Restoration Opportunities
 NIAGARA RIVER WATERSHED**

Map 4.33 Areas 9 and 10 Wetland/Grassland Complex Restoration Opportunities Niagara River Watershed

33F.REV01.2014-0311



Map Notes:
 Procedure documented in Jul 14, 2013 SOP entitled "GRASSLAND TRACTS ADJACENT TO WETLAND PROPERTIES."

**Areas 9 and 10
 Wetland/Grassland Complex
 Restoration Opportunities
 NIAGARA RIVER WATERSHED**

4.5 Landscape Level Policy Recommendations: All Ecoregions

Strategy: Conserve headwater forest lands for water quality, stream habitat and climate change resilience

Action: Identify opportunities to conserve upland core forest areas resilient to climate change

Climate change is identified as a threat to all habitats and sub-basins within the Niagara River Watershed (Chapter 2). Faced with uncertain climate change scenarios, regional planning must incorporate broad principles of resiliency and be protective of those lands with potential to withstand additional climate pressures. Map 4.34 shows the remaining 500-plus acre tracts of undisturbed forest within the five upland sub-basins to illustrate this potential. Municipal planners should use these maps to develop climate change-ready policies and regulations that are protective of these key living infrastructure elements.



Niagara River Watershed Core Forest; Photo credit: AES

Action: Clarify, fund and implement ecology-based headwater forest management plans

Many of the large remaining forested areas identified on Map 4.34 include a nucleus of protected land such as Erie County forests and parks with potentially high conservation values though not necessarily for biodiversity and ecosystem services. For example, The Erie County Forest Management Plan (EC, 2003), builds on two separate inventories of the County’s forest tracts; one is based on ecological principles and the other on silviculture principles. The management recommendations sometimes conflict. Thus the need to clarify management goals is a priority action for County forest and park lands.

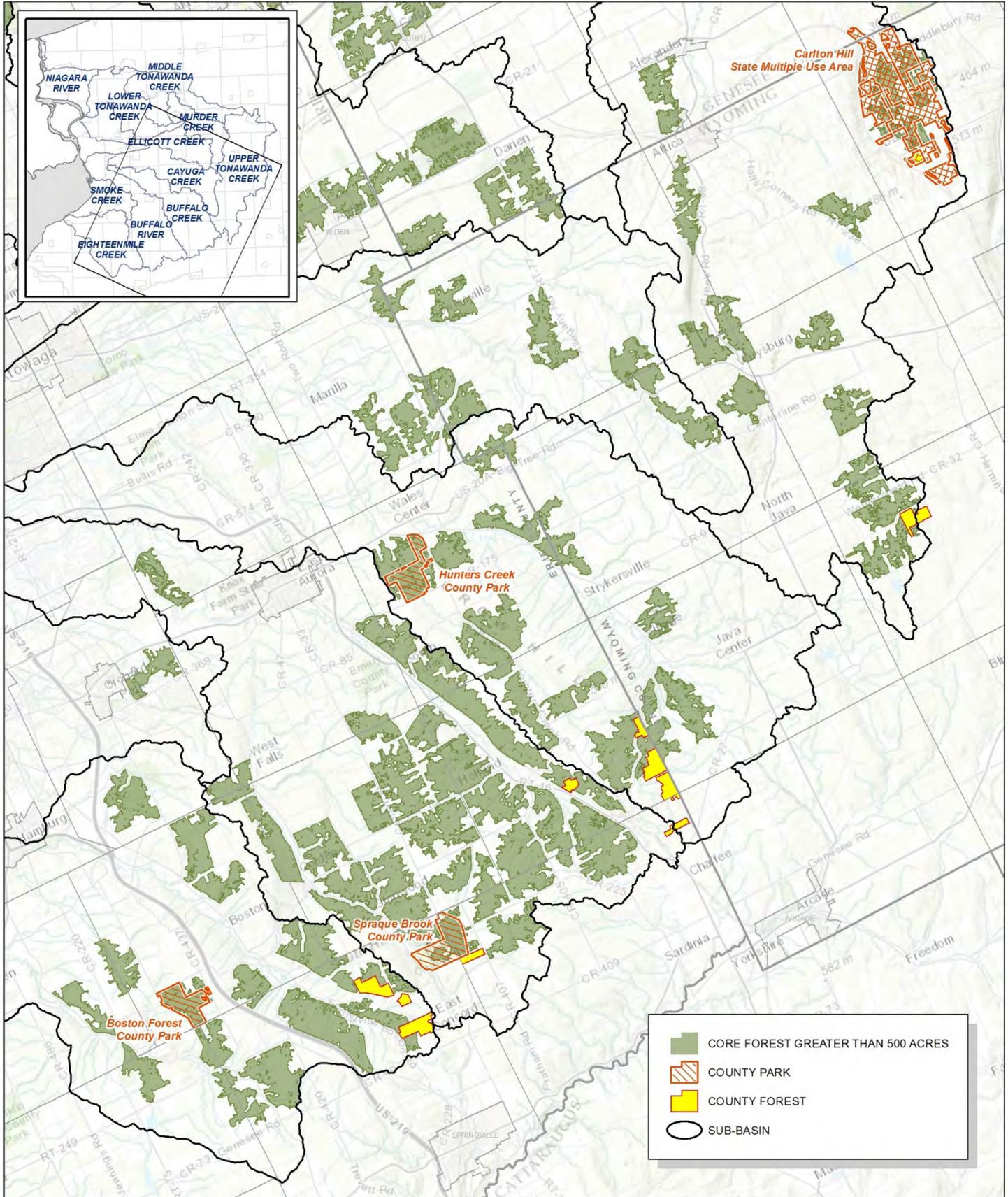
Those County lots already identified as having high ecological value were further assessed by Applied Ecological Services for headwater functional values, plant and animal community structure, listed or unique species and other CAP indicators (Section 4.2). These assessments resulted in specific proposed actions for each lot, and in the general observation that the many tracts of still functional upland headwater forest and wetland are the most critical places to protect in the Niagara River Watershed.

Note that Erie County currently employs just one forester and one assistant to manage a total of over 3,000 acres of forest. Sustained funding for implementation of forest management plans is an important recommendation of this action.

The NYS Forest Resource Assessment and Strategy: 2010-2015 (DEC, 2012, P. 164.) lists “keeping New York’s forests as forests” as its highest priority in the face of the threats of ever greater development pressures and climate change. In addition to habitat values, “protecting and managing forests as source watersheds is an essential part of future strategies for providing clean, safe drinking water that citizens can afford.”

Map 4.34 Core Forests Upland Sub-Basins Niagara River Watershed

24.REV01.2014-0311



Map Notes:
 Procedure documented in Apr 15, 2013 SOP entitled "LARGE TRACTS OF UNDISTURBED WOODLAND WITHIN THE ACTIVE RIVER AREA NATURAL AREAS." Land Use Land Cover dataset from NOAA, 2005.

**Core Forests
 UPLAND SUB-BASINS
 NIAGARA RIVER WATERSHED**

Niagara River Habitat Conservation Strategy

Action: Establish community and municipal initiatives to acquire and/or protect critical headwater forest areas

In the Niagara River Watershed, forest tracts containing 1st and 2nd order streams are considered critical headwater areas. These areas contribute woody debris and nutrients and have a direct role in shaping the form and function of the entire downstream system. Using the Active River Area model, GIS analysis identified areas within the sub-basins where protection of headwater forests is critical to maintaining healthy downstream channel structure and water quality. Maps 4.36-4.42 illustrate opportunities for municipalities and communities to develop forest and stream conservation priorities and policies to protect the building blocks for the entire watershed. Snapshots of opportunities within 6 sub-basins are included here. Additional maps can be found within the technical report.

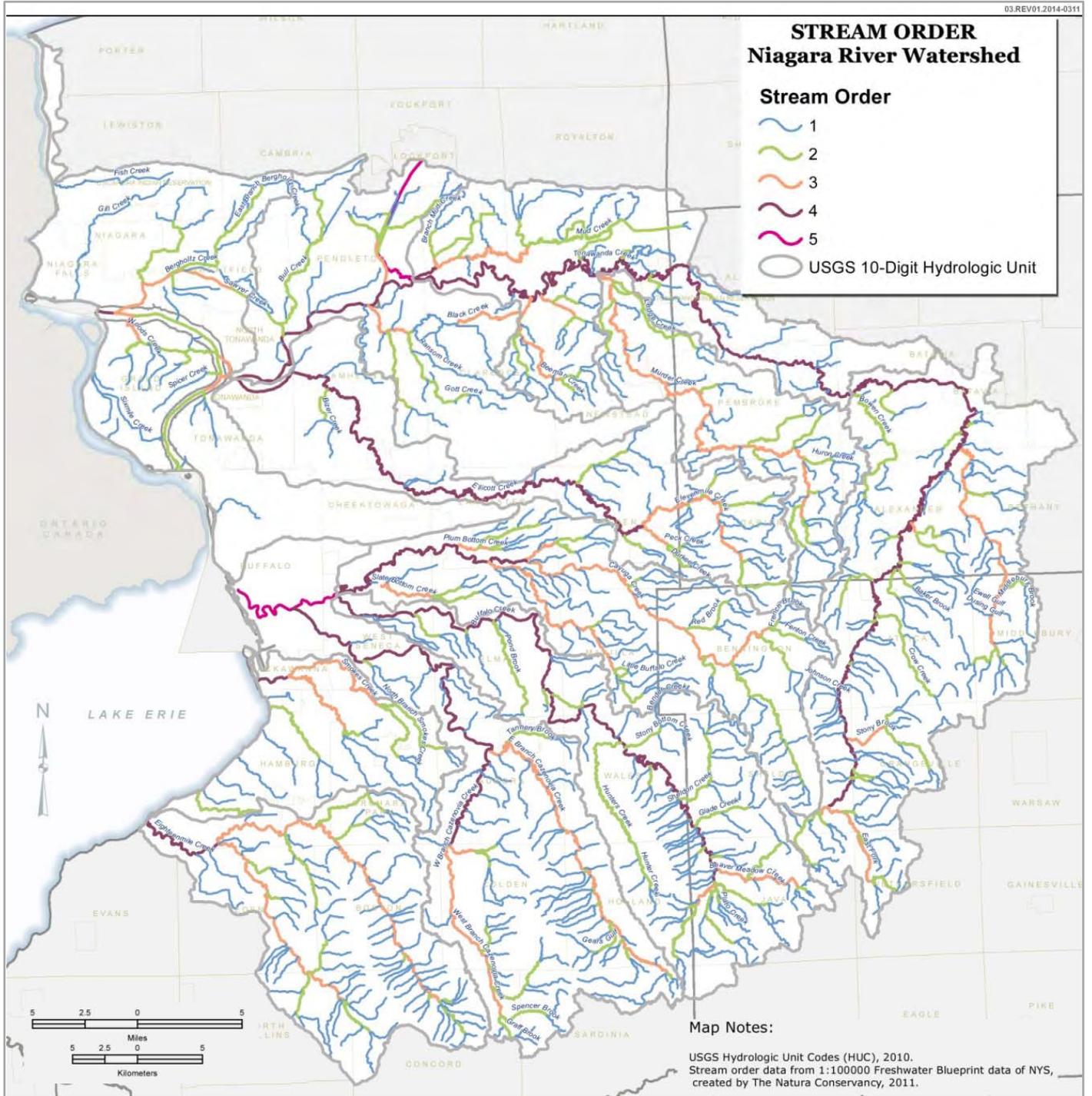


Headwater Forest in Boston Forest Park; Photo credit: AES

Niagara River Habitat Conservation Strategy

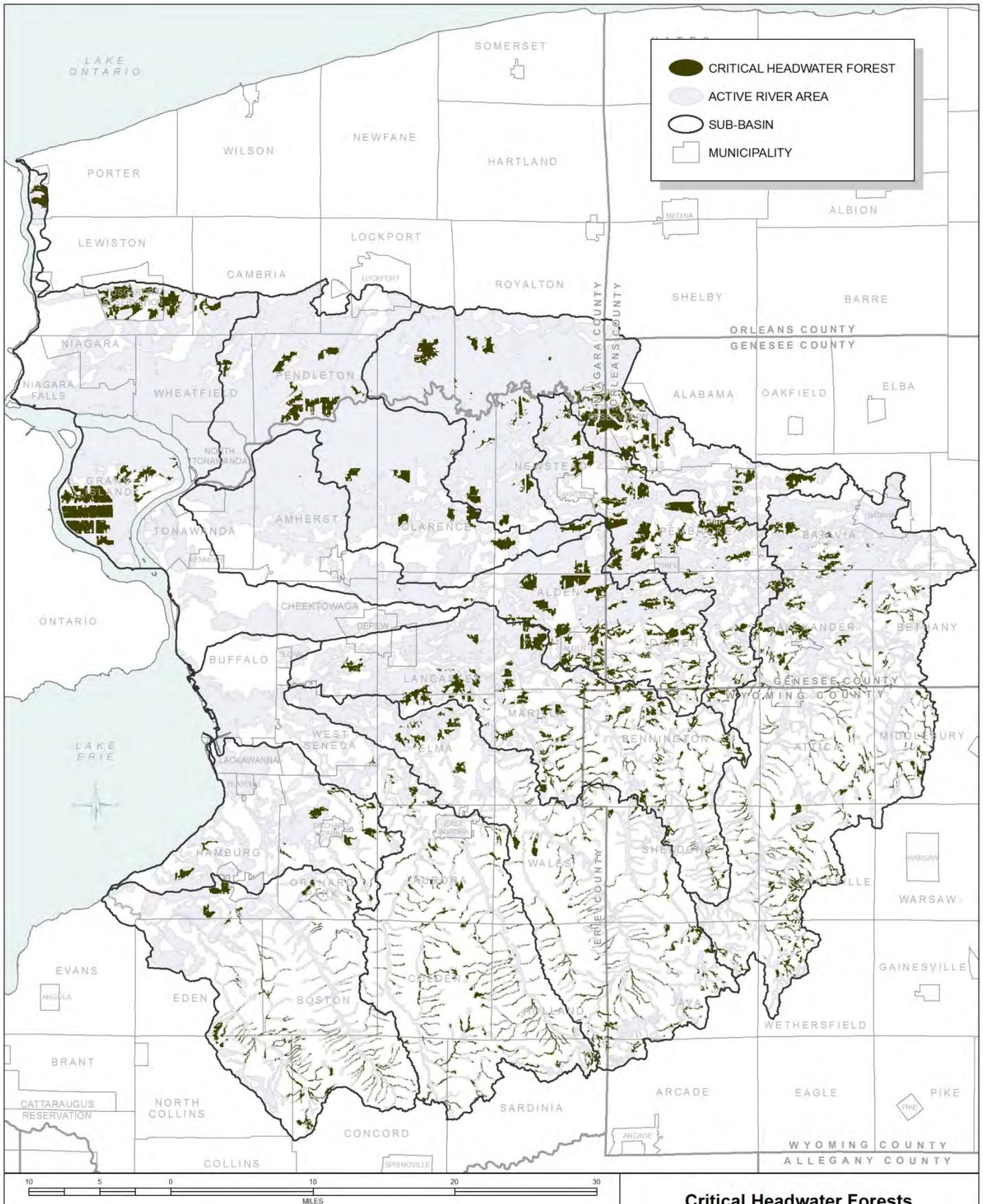
Map 4.35 Stream Order Niagara River Watershed

03.REV01.2014-0311



Map 4.36 Critical Headwater Forests within the Active River Area Niagara River Watershed

25.REV01.2014-0311

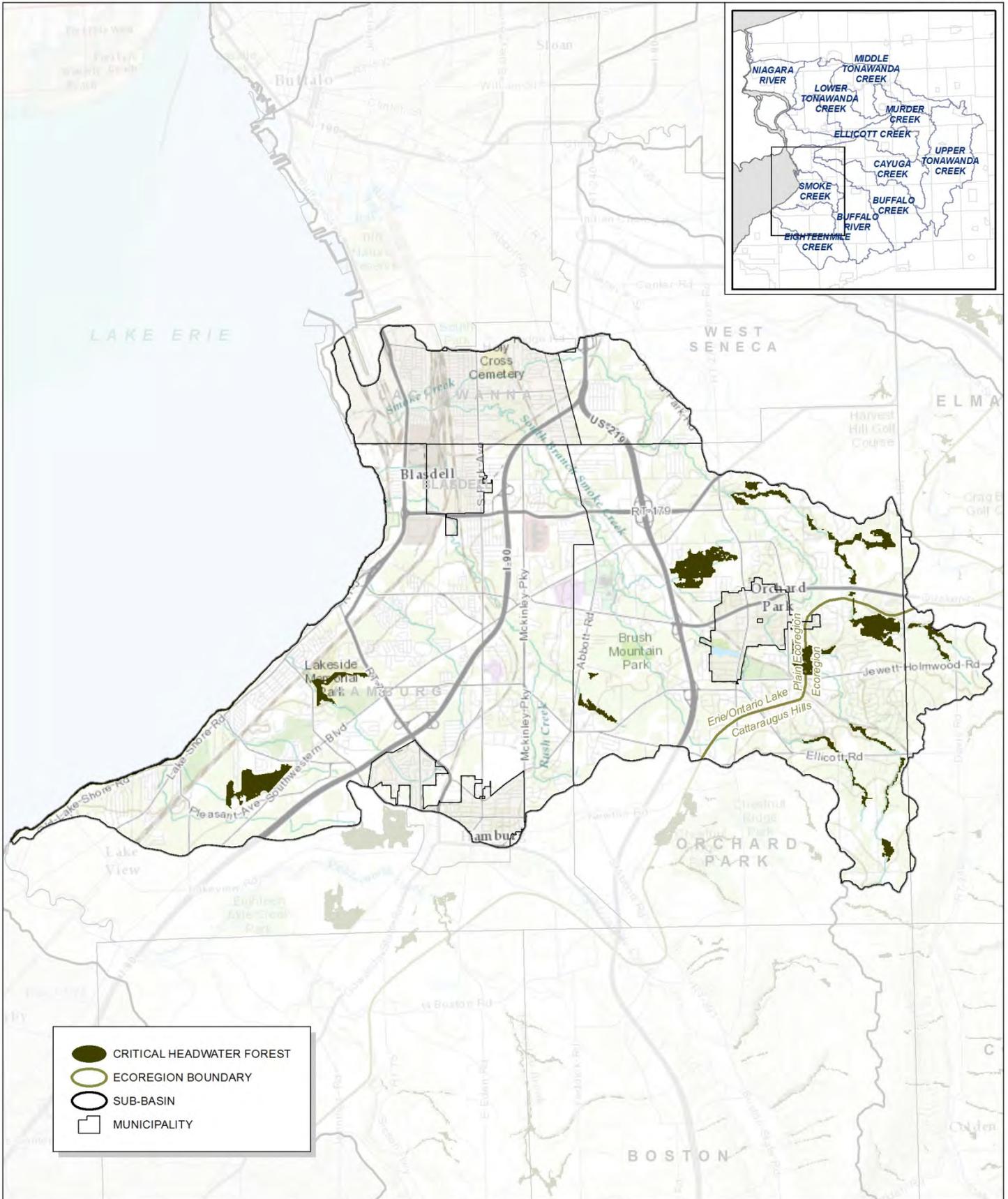


Map Notes:
 Dataset was derived from ARA Material Contribution Zones (MCZ) for Headwater Streams, MCZ Woodlands, and Large Tracts of Riparian Woodlands. Associated summary table is entitled: Critical_Headwater_Forests_2013_1030.xlsx

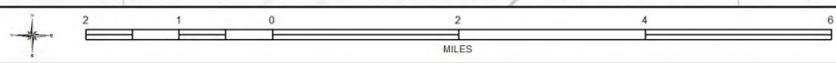
**Critical Headwater Forests
 within the Active River Area
 NIAGARA RIVER WATERSHED**

Map 4.37 Critical Headwater Forests Smoke Creek Sub-Basin

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	CRITICAL HEADWATER FOREST
	ECOREGION BOUNDARY
	SUB-BASIN
	MUNICIPALITY

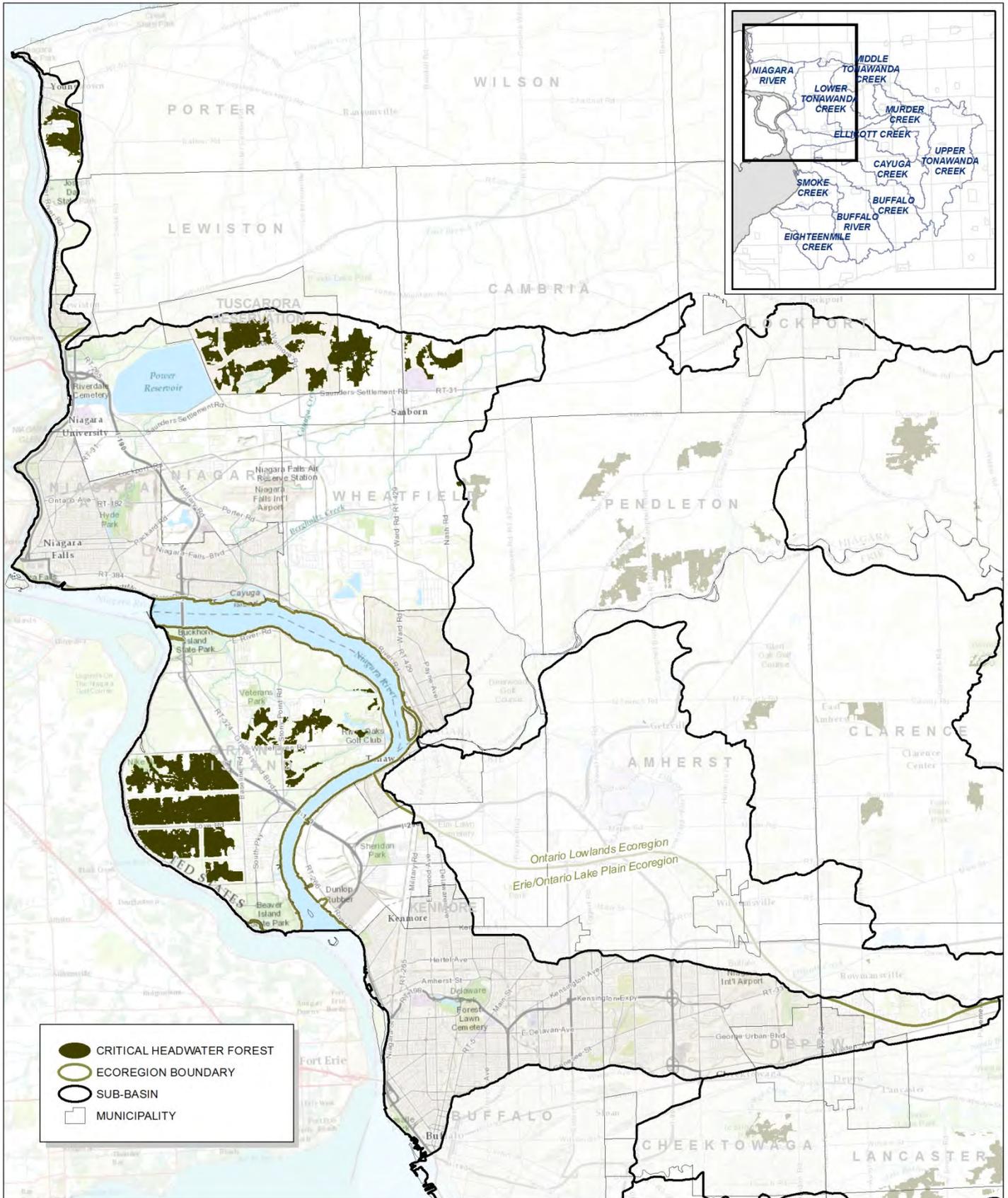


Map Notes:
 Dataset was derived from ARA Material Contribution Zones (MCZ) for Headwater Streams, MCZ Woodlands, and Large Tracts of Riparian Woodlands. Associated summary table is entitled: Critical_Headwater_Forests_2013_1030.xls

Critical Headwater Forests
SMOKE CREEK SUB-BASIN

Map 4.38 Critical Headwater Forests Niagara River Sub-Basin

2013.03.14.14:50:11

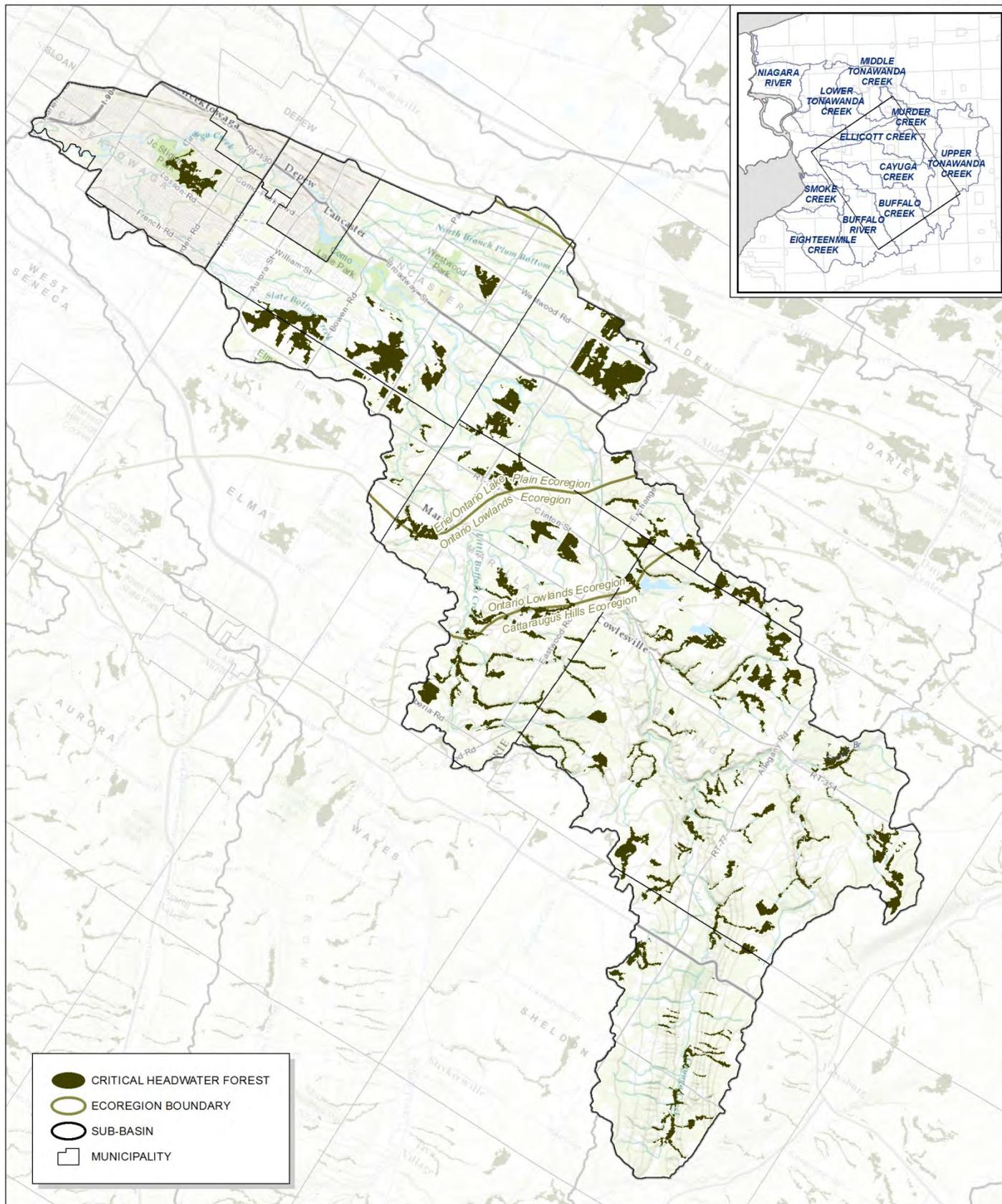


Map Notes:
 Dataset was derived from ARA Material Contribution Zones (MCZ) for Headwater Streams, MCZ Woodlands, and Large Tracts of Riparian Woodlands. Associated summary table is entitled: Critical_Headwater_Forests_2013_1030.xlsx

**Critical Headwater Forests
 NIAGARA RIVER SUB-BASIN**

Map 4.39 Critical Headwater Forests Cayuga Creek Sub-Basin

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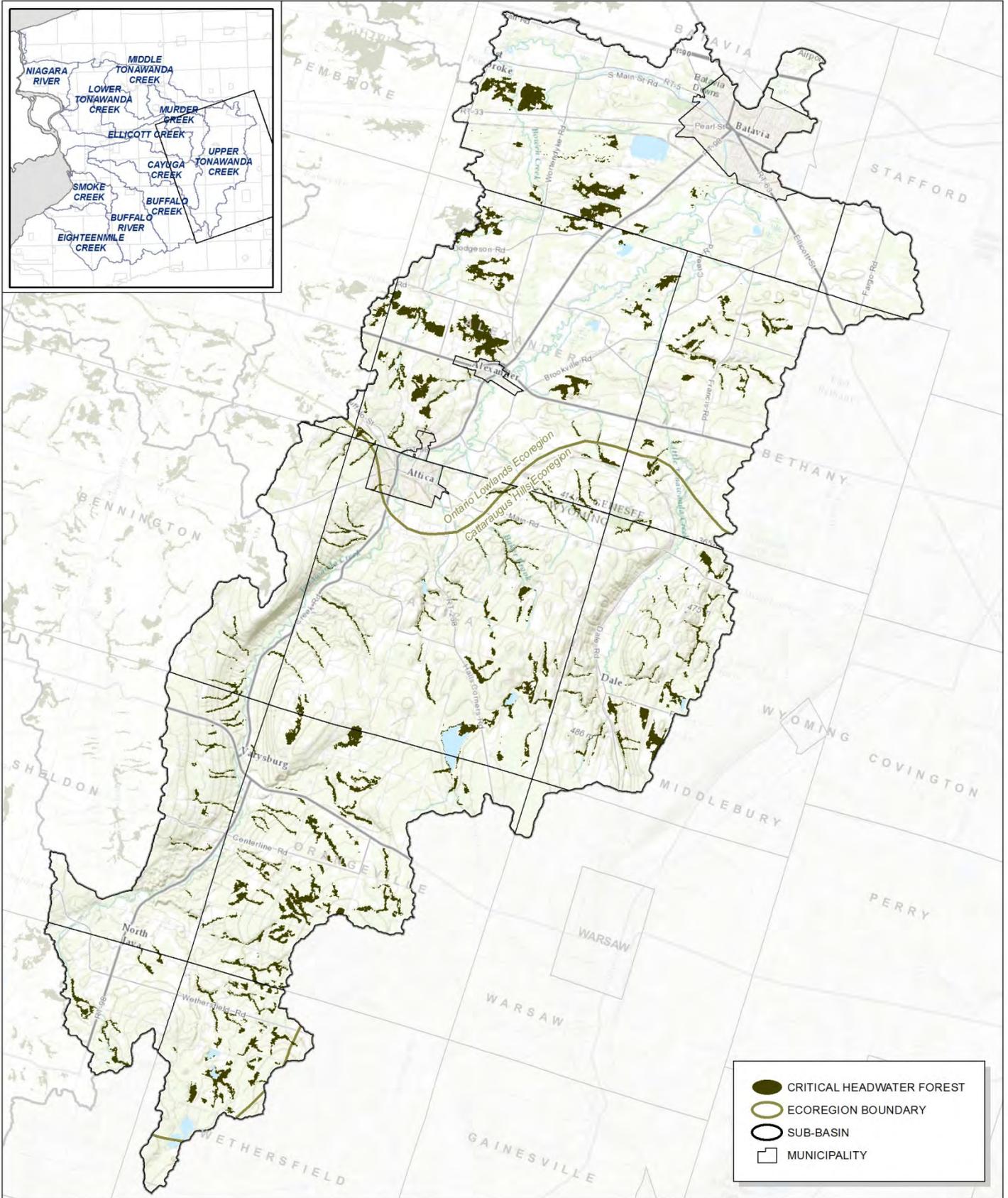
CRITICAL HEADWATER FOREST
 ECOREGION BOUNDARY
 SUB-BASIN
 MUNICIPALITY



Map Notes:
 Dataset was derived from ARA Material Contribution Zones (MCZ) for Headwater Streams, MCZ Woodlands, and Large Tracts of Riparian Woodlands. Associated summary table is entitled: Critical_Headwater_Forests_2013_1030.xlsx

**Critical Headwater Forests
 CAYUGA CREEK SUB-BASIN**

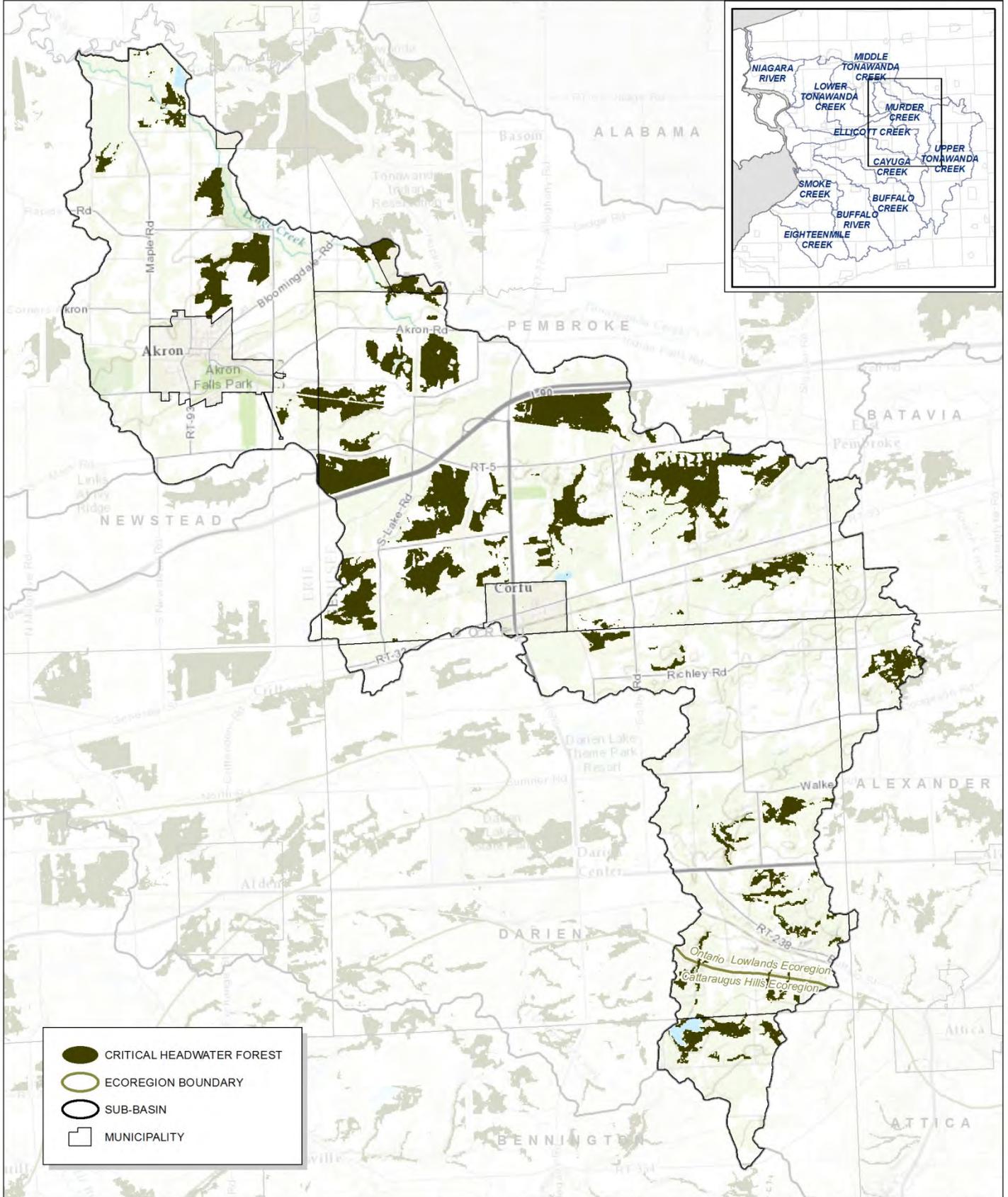
Map 4.40 Critical Headwater Forests Upper Tonawanda Creek Sub-Basin



Map Notes:
 Dataset was derived from ARA Material Contribution Zones (MCZ) for Headwater Streams, MCZ Woodlands, and Large Tracts of Riparian Woodlands. Associated summary table is entitled: Critical_Headwater_Forests_2013_1030.xlsx

Critical Headwater Forests
UPPER TONAWANDA CREEK SUB-BASIN

Map 4.41 Critical Headwater Forests Murder Creek Sub-Basin



CRITICAL HEADWATER FOREST
 ECOREGION BOUNDARY
 SUB-BASIN
 MUNICIPALITY

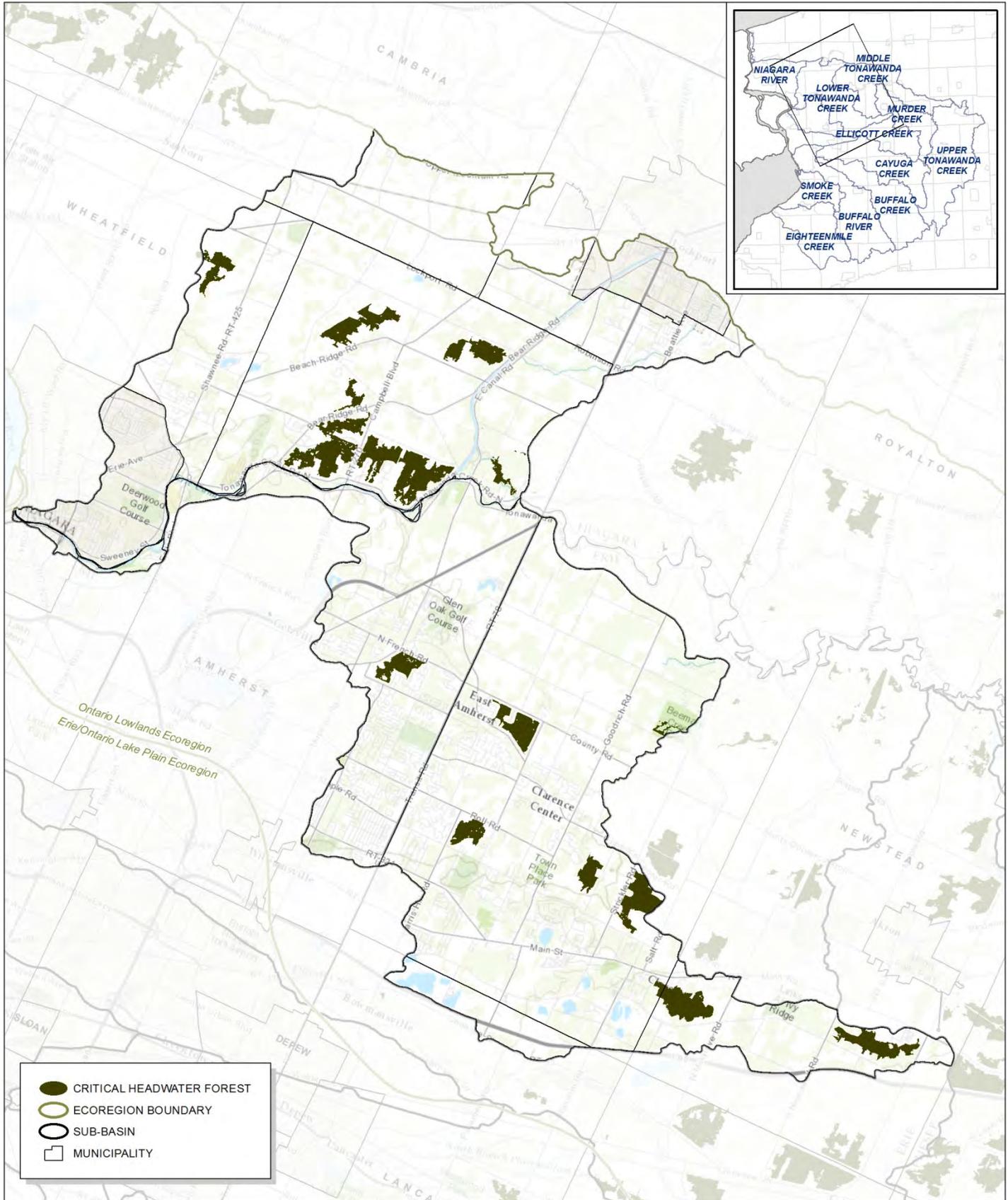


Map Notes:
 Dataset was derived from ARA Material Contribution Zones (MCZ) for Headwater Streams, MCZ Woodlands, and Large Tracts of Riparian Woodlands. Associated summary table is entitled: Critical_Headwater_Forests_2013_1030.xlsx

**Critical Headwater Forests
 MURDER CREEK SUB-BASIN**

Map 4.42 Critical Headwater Forests Lower Tonawanda Creek Sub-Basin

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Map Notes:
 Dataset was derived from ARA Material Contribution Zones (MCZ) for Headwater Streams, MCZ Woodlands, and Large Tracts of Riparian Woodlands. Associated summary table is entitled: Critical_Headwater_Forests_2013_1030.xlsx

Critical Headwater Forests
LOWER TONAWANDA CREEK SUB-BASIN

Niagara River Habitat Conservation Strategy

Action: Identify key riparian forest tracts to protect water quality and conserve species

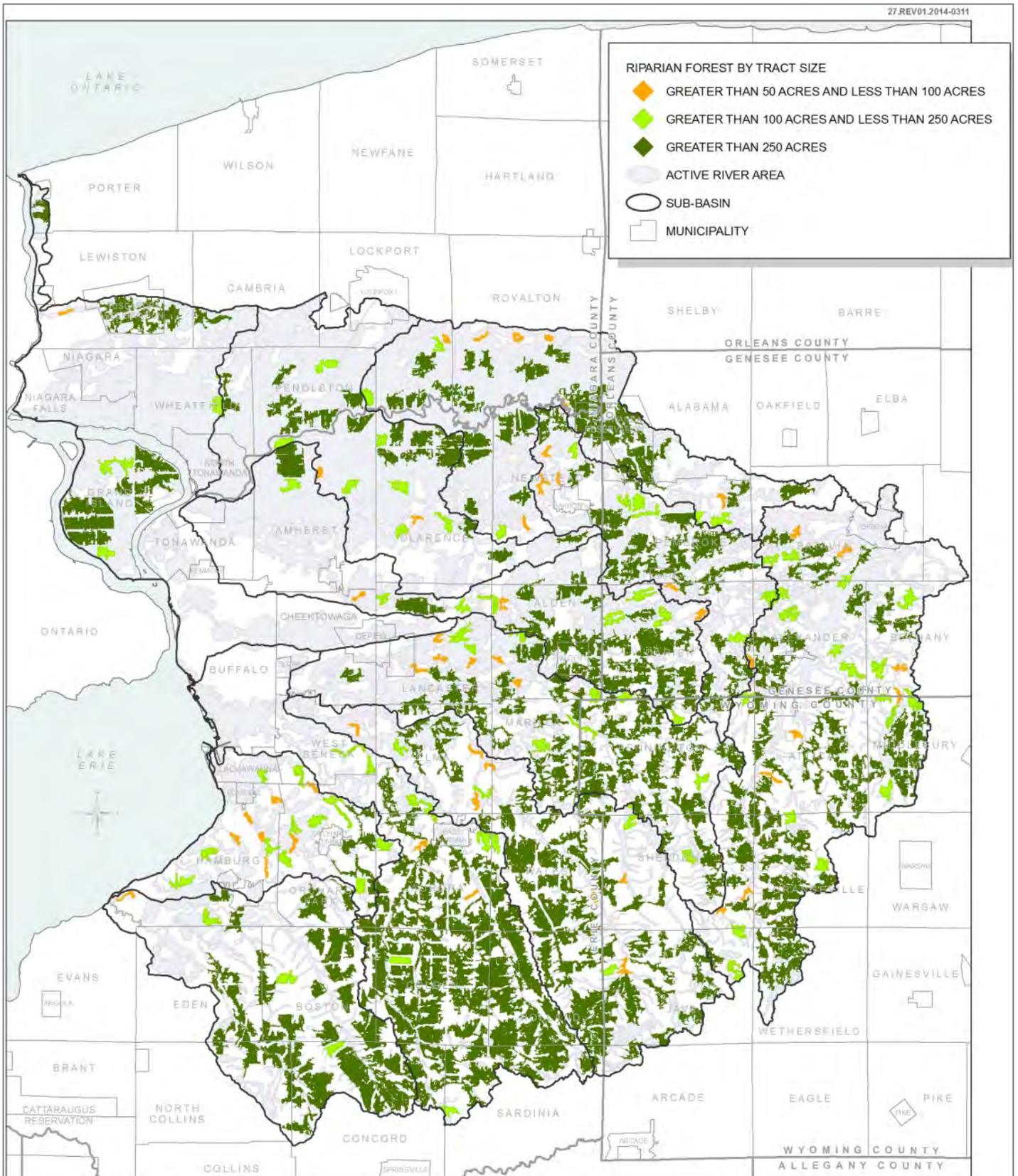
The population dynamics of certain species require the presence of large and undisturbed forested tracts spanning waterways (riparian forests). These areas are critical for species' long-term survival based on their migratory, breeding and feeding patterns. In addition, protection of riparian forest tracts is critical for stream structure and water quality protection. Often related to increasing and sprawling development patterns, the fragmentation of riparian forests is occurring throughout the Niagara River Watershed. Maps 4.43 - 4.49 identify the location and size of lands that should be conserved to benefit both riparian species and water quality and to mitigate the threat of further riparian forest fragmentation. These maps provide a snapshot within selected sub-basins. Additional maps can be found in the technical report.



Native Cinnamon Fern found within intact floodplains; Photo credit: AES

Map 4.43 Riparian Forests Niagara River Watershed

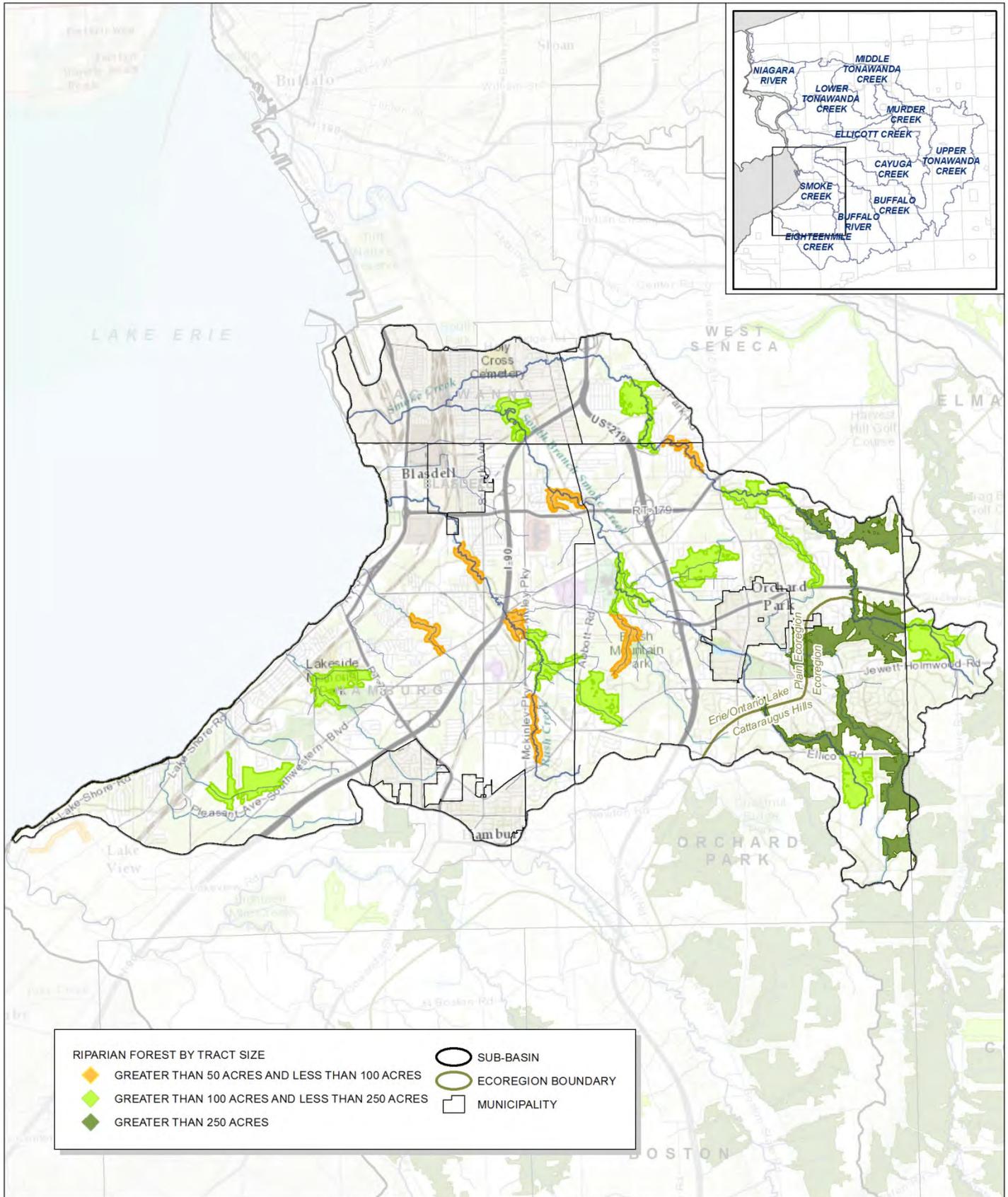
27.REV01.2014-0311



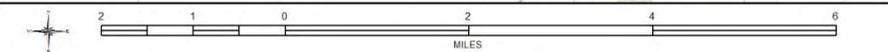
Map Notes:
 Procedure documented in Apr 16, 2013 SOP entitled "LARGE TRACTS OF FUNCTIONAL RIPARIAN WATERWAY."
 Land Use Land Cover dataset from NOAA, 2005.

**Riparian Forests
 NIAGARA RIVER WATERSHED**

Map 4.44 Riparian Forests Smoke Creek Sub-Basin



RIPARIAN FOREST BY TRACT SIZE		○ SUB-BASIN
◆ GREATER THAN 50 ACRES AND LESS THAN 100 ACRES	◆ GREATER THAN 100 ACRES AND LESS THAN 250 ACRES	▭ ECOREGION BOUNDARY
◆ GREATER THAN 250 ACRES		▭ MUNICIPALITY

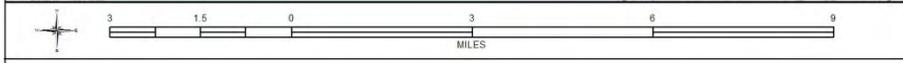
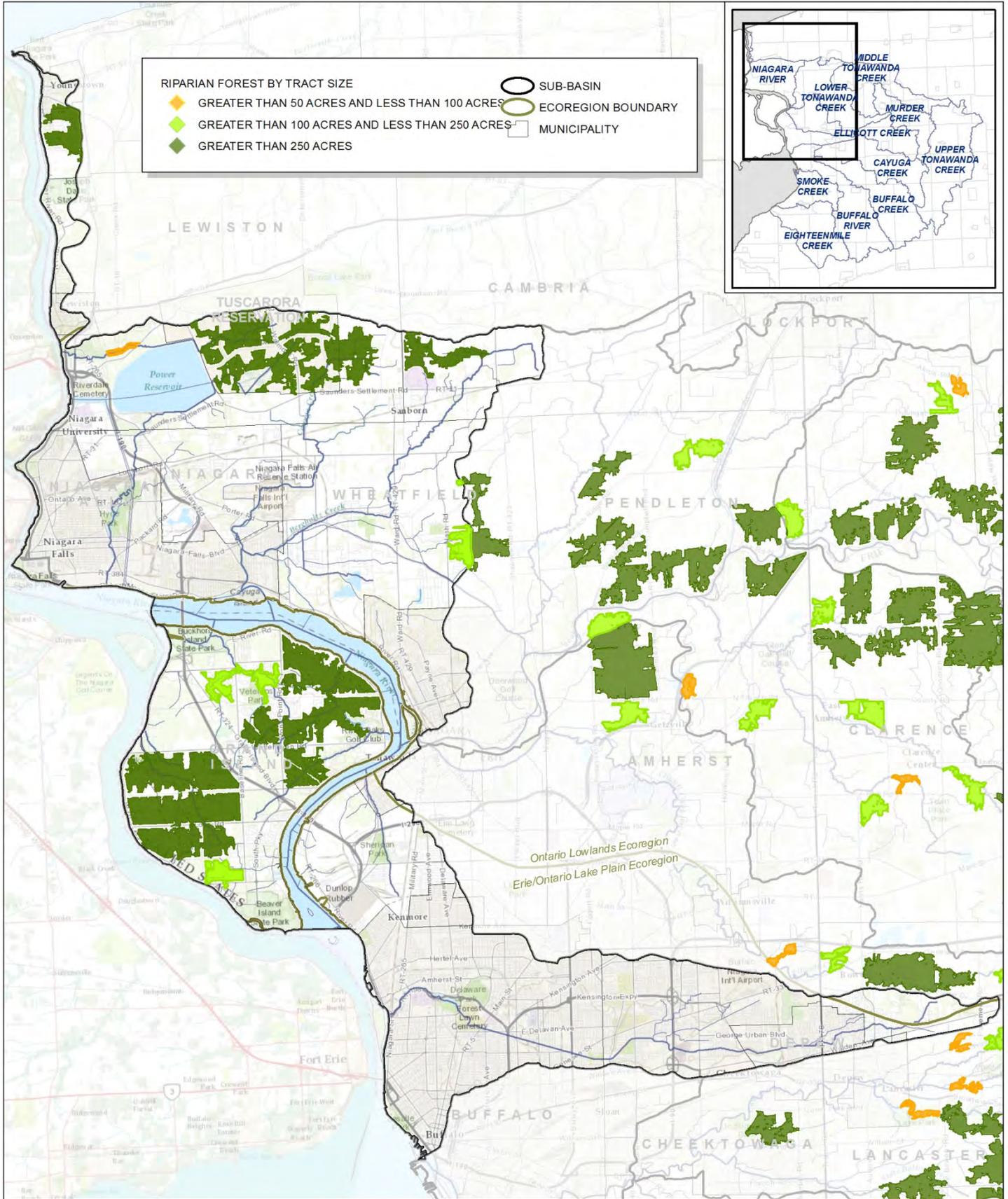


Map Notes:
 Procedure documented in Apr 16, 2013 SOP entitled "LARGE TRACTS OF FUNCTIONAL RIPARIAN WATERWAY."
 Land Use Land Cover dataset from NOAA, 2005.

Riparian Forests
SMOKE CREEK SUB-BASIN

Map 4.45 Riparian Forests Niagara River Sub-Basin

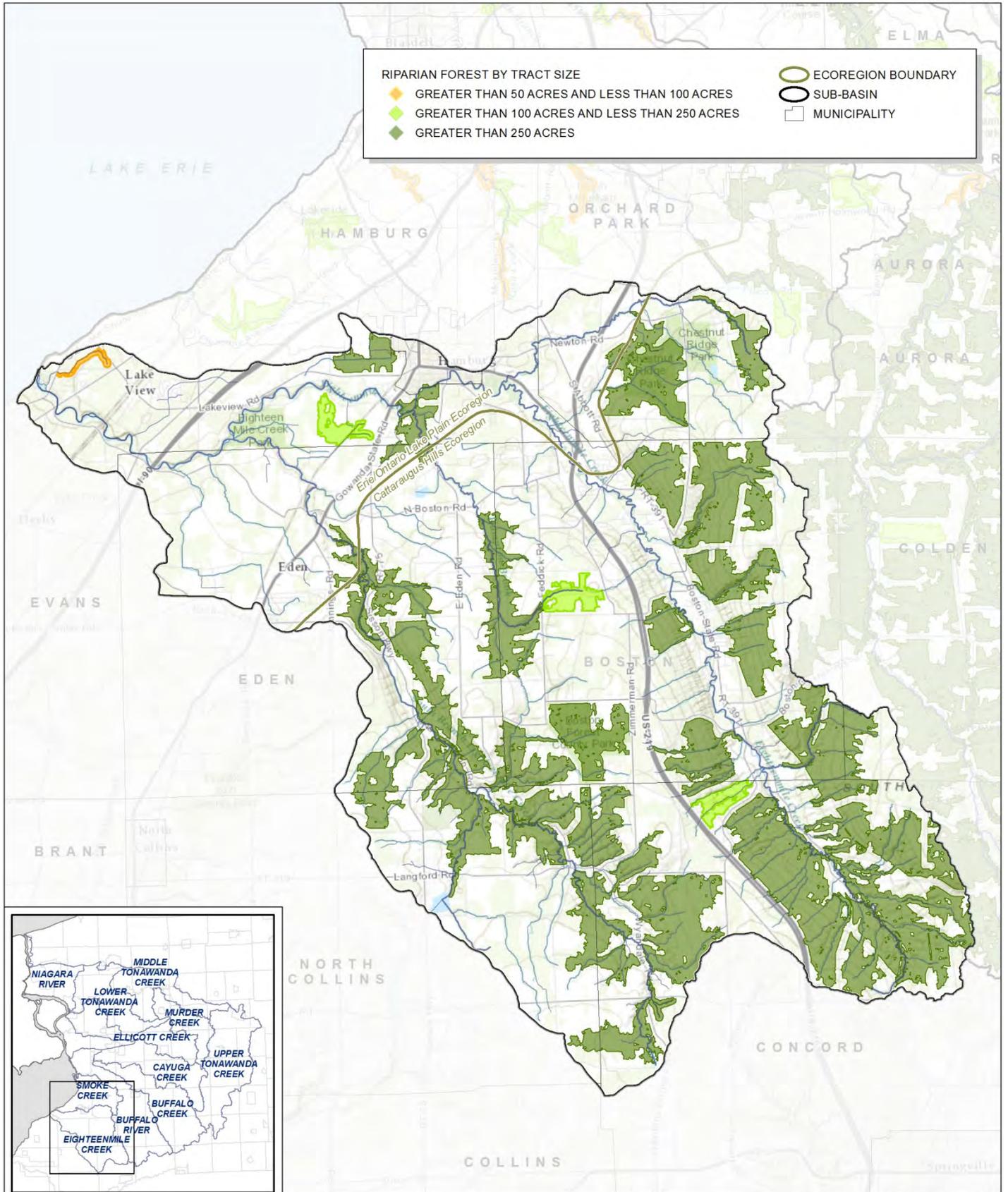
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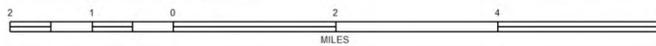
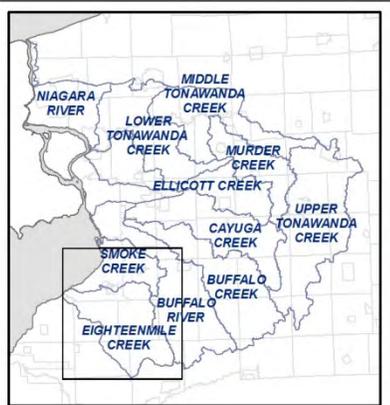
Map Notes:
 Procedure documented in Apr 16, 2013 SOP entitled "LARGE TRACTS OF FUNCTIONAL RIPARIAN WATERWAY."
 Land Use Land Cover dataset from NOAA, 2005.

Riparian Forests
NIAGARA RIVER SUB-BASIN

Map 4.46 Riparian Forests Eighteenmile Creek Sub-Basin



RIPARIAN FOREST BY TRACT SIZE		ECOREGION BOUNDARY	
■	GREATER THAN 50 ACRES AND LESS THAN 100 ACRES		SUB-BASIN
■	GREATER THAN 100 ACRES AND LESS THAN 250 ACRES		MUNICIPALITY
■	GREATER THAN 250 ACRES		

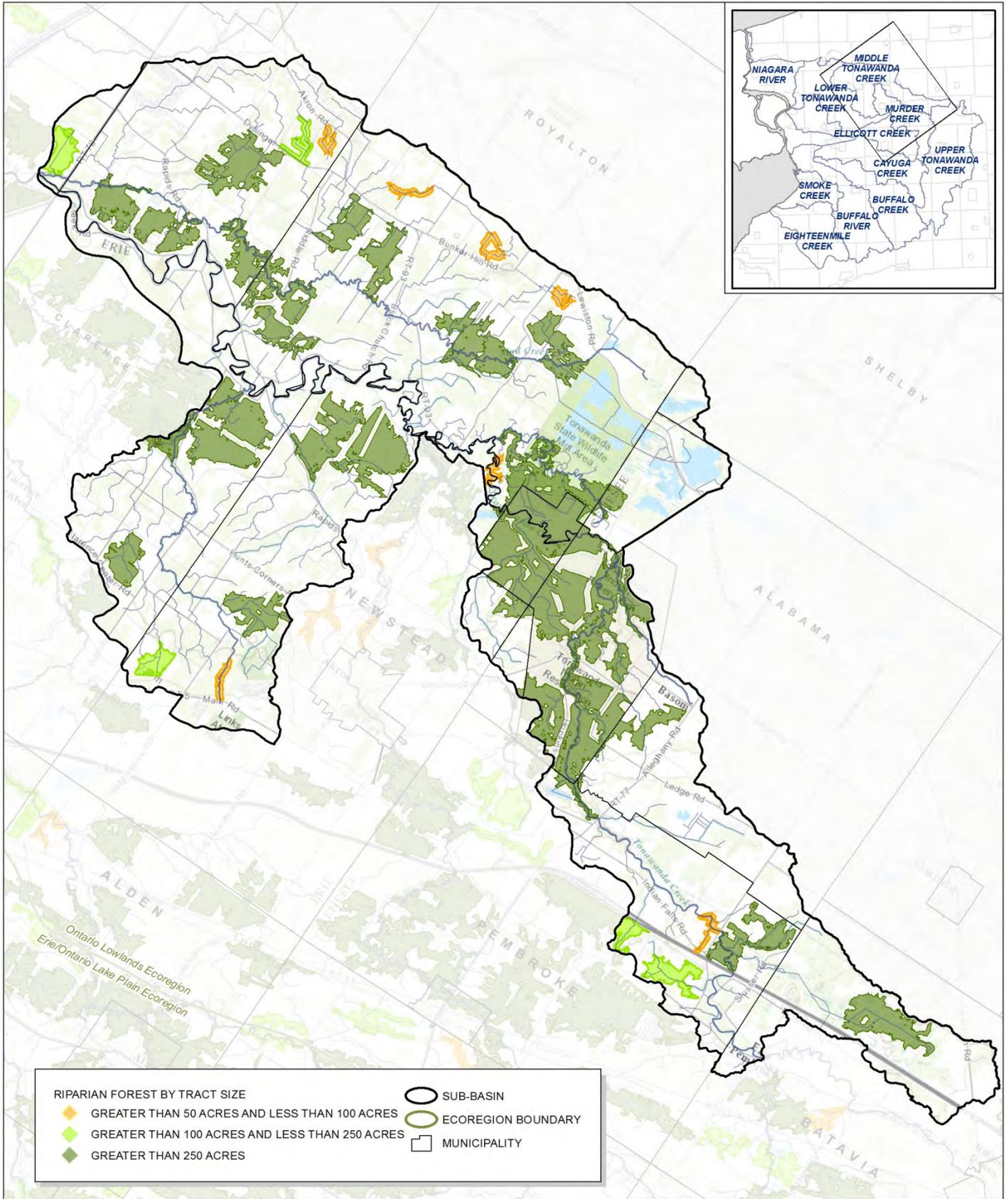


Map Notes:
 Procedure documented in Apr 16, 2013 SOP entitled "LARGE TRACTS OF FUNCTIONAL RIPARIAN WATERWAY."
 Land Use Land Cover dataset from NOAA, 2005.

Riparian Forests
EIGHTEENMILE CREEK SUB-BASIN

Map 4.47 Riparian Forests Middle Tonawanda Creek Sub-Basin

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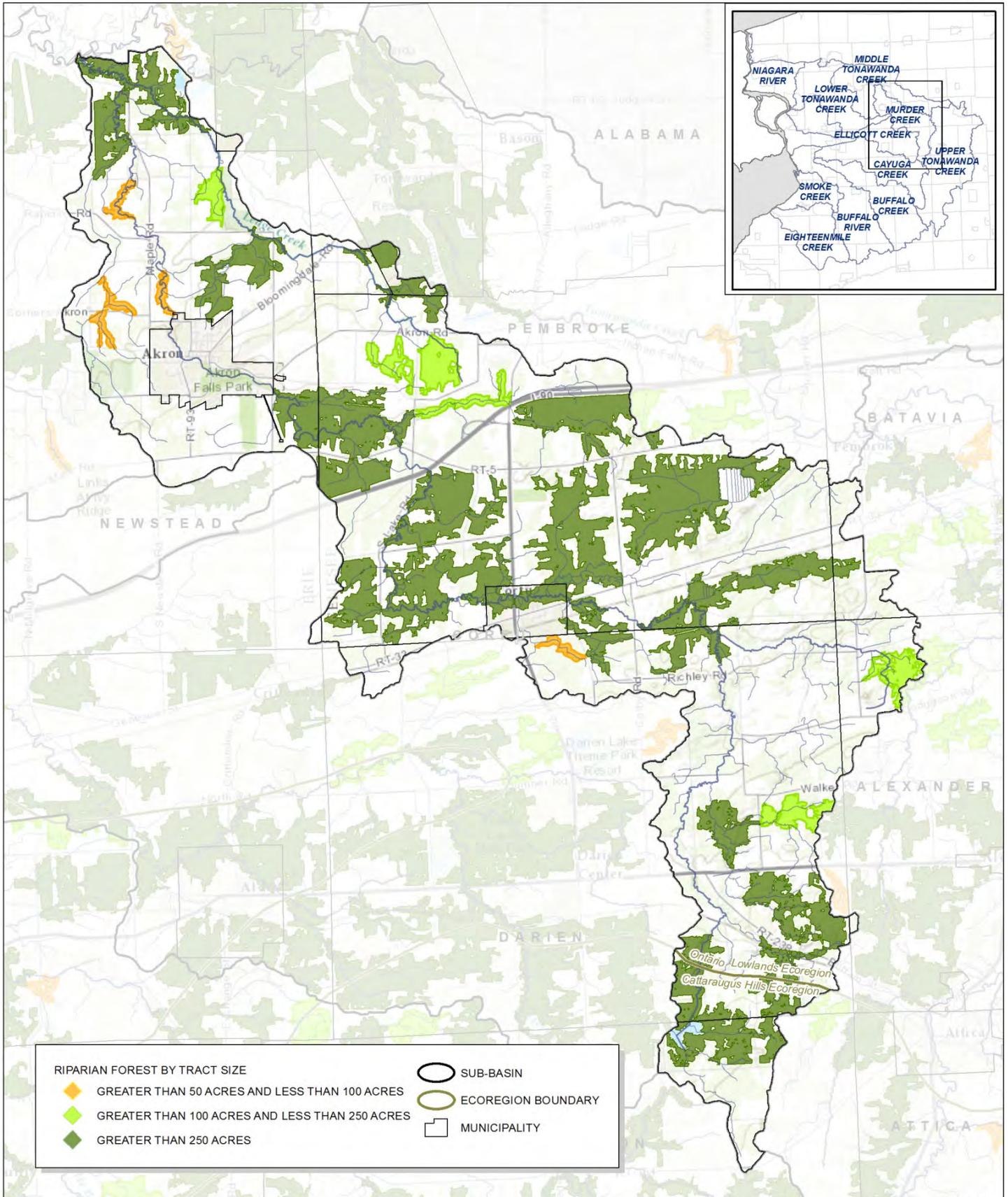


<p>RIPARIAN FOREST BY TRACT SIZE</p> <ul style="list-style-type: none"> ◆ GREATER THAN 50 ACRES AND LESS THAN 100 ACRES ◆ GREATER THAN 100 ACRES AND LESS THAN 250 ACRES ◆ GREATER THAN 250 ACRES 		<ul style="list-style-type: none"> SUB-BASIN ECOREGION BOUNDARY MUNICIPALITY 	
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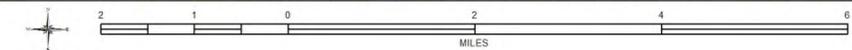


Map Notes:
 Procedure documented in Apr 16, 2013 SOP entitled "LARGE TRACTS OF FUNCTIONAL RIPARIAN WATERWAY."
 Land Use Land Cover dataset from NOAA, 2005.

Riparian Forests
MIDDLE TONAWANDA CREEK SUB-BASIN



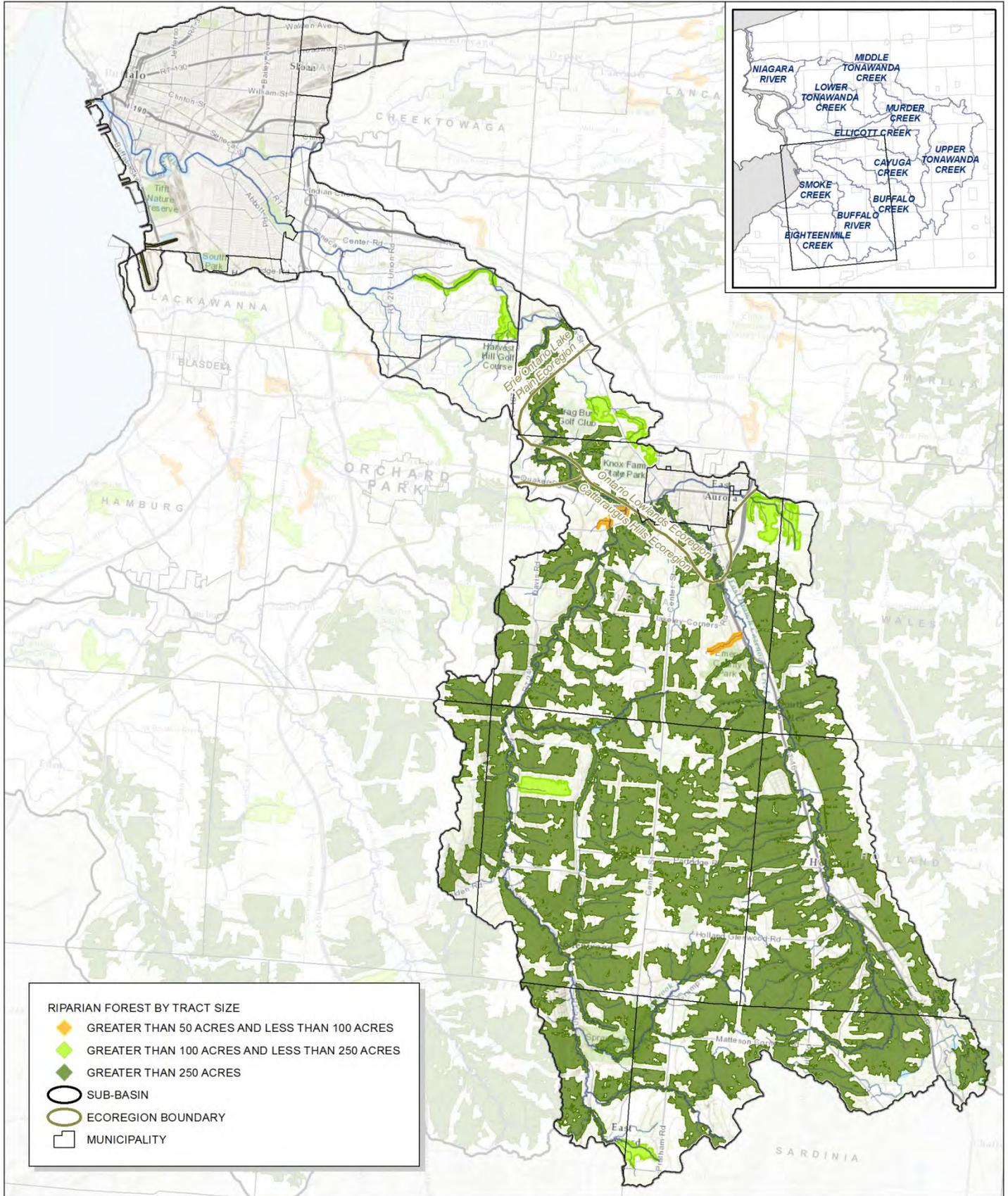
RIPARIAN FOREST BY TRACT SIZE		○ SUB-BASIN
◆ GREATER THAN 50 ACRES AND LESS THAN 100 ACRES		○ ECOREGION BOUNDARY
◆ GREATER THAN 100 ACRES AND LESS THAN 250 ACRES		□ MUNICIPALITY
◆ GREATER THAN 250 ACRES		



Map Notes:
 Procedure documented in Apr 16, 2013 SOP entitled "LARGE TRACTS OF FUNCTIONAL RIPARIAN WATERWAY."
 Land Use Land Cover dataset from NOAA, 2005.

Riparian Forests
MURDER CREEK SUB-BASIN

Map 4.49 Riparian Forests Buffalo River Sub-Basin



Map Notes:
 Procedure documented in Apr 16, 2013 SOP entitled "LARGE TRACTS OF FUNCTIONAL RIPARIAN WATERWAY."
 Land Use Land Cover dataset from NOAA, 2005.

Riparian Forests
BUFFALO RIVER SUB-BASIN

Strategy: Identify and protect areas with high ecological value, and use them as reference sites for restoration projects

Action: Fill data gaps in stream visual assessments to develop a more comprehensive and replicable picture of high quality stream habitat within the watershed

The Project Team chose several potential “very good” aquatic habitat reference sites such as MTON03, a segment of Middle Tonawanda Creek with high Biological Assessment Profile scores and historic native mussel diversity. However, the field team generally did not find better than average stream conditions at these sites. In 2010, the DEC began including stream visual assessment profiles at their BAP sites using the EPA’s model which ranks physical conditions such as in-stream fish cover, canopy cover, water appearance, bank stability, channel alterations, frequency of riffles and pools, and the width of naturally vegetated riparian zones. This additional information should help identify, protect and replicate very good aquatic habitat reference sites in the future.

However, stream habitat conditions have not been assessed for most of the tributaries outside the immediate Niagara River sub-basin, pointing to a major data gap that needs to be filled in order to protect remaining high quality stream segments. Map 4.50 identifies the locations where SVAP or similar in-stream assessments have been conducted to date and/or published data is available. The Strategy recommends that additional funds be sought to conduct SVAP or similar stream assessments in order to establish a robust and comprehensive baseline condition for the watershed. Particularly important for AOC delisting, obtaining and maintaining good baseline data that considers entire stream systems from source to mouth is a high priority need (Section 4.3).



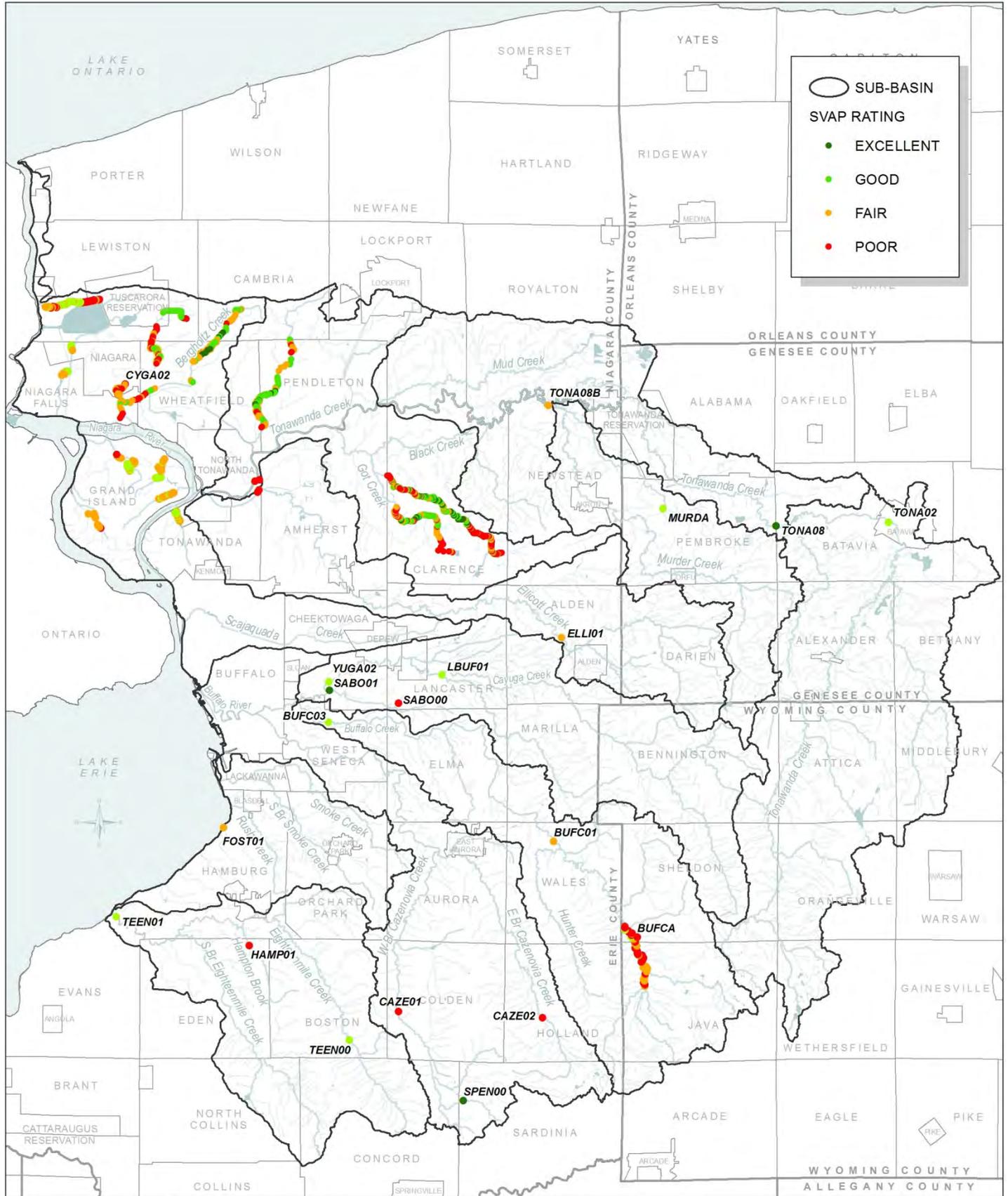
Two-Mile Creek SVAP: 2013; Photo credit: Buffalo State College



Native freshwater mussel; 2013-Cayuga Creek; Photo credit: Buffalo State College

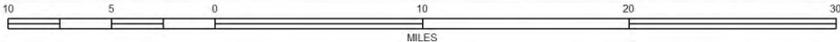
Map 4.50 Stream Visual Assessment Protocol (SVAP) Sites and HMA Scores Niagara River Watershed

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Legend

- SUB-BASIN
- SVAP RATING**
- EXCELLENT
- GOOD
- FAIR
- POOR



Map Notes:
 Data compiled by Buffalo Niagara Riverkeeper from hardcopy SVAP reports.
 HMA data created by Buffalo Niagara Riverkeeper Aug 20, 2012

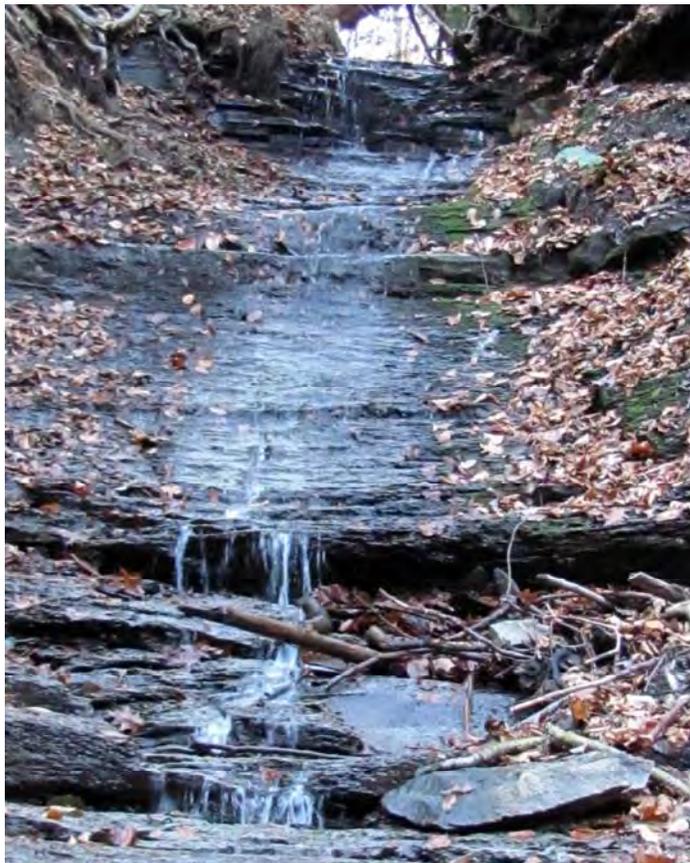
**Stream Visual Assessment Protocol (SVAP) Sites and HMA Scores
 NIAGARA RIVER WATERSHED**

Strategy: Identify opportunities for landscape ecology stewardship including inter-municipal coordination, stewardship partnerships and Highway Department trainings

Action: Educate stakeholders and facilitate partnerships focused on shared resources and interests to achieve larger impacts for water quality, biodiversity and ecological service benefits

Potential for watershed education and landscape level source area protection already exists in many of our headwater areas. In Wyoming County, the 2,484-acre Carlton Hill multiple use area, located on the height of land dividing the Niagara and Genesee River Watersheds, includes a matrix of State and County forest, and wetland and grassland habitats totaling over 2,484 acres. A large part is designated as a “Bird Conservation Area” targeting early successional listed grassland bird species. Carlton Hill also includes a Natural Heritage forested floodplain supporting high quality aquatic habitat (non-impacted BAP scores; trout) in upper Little Tonawanda Creek.

Buffalo Audubon’s Beaver Meadow Nature Preserve is another protected headwater natural area with high biodiversity, mineral springs, peat-based wetlands and wooded uplands that could serve as a reference for other headwater stewards. Audubon’s experience with ecology-based education would suit this purpose well. Partners in stewardship could include private owners like the Faun Lake Association at the headwaters of Tonawanda Creek. Shared knowledge of biodiversity features, species, threats, and opportunities would benefit these sites.



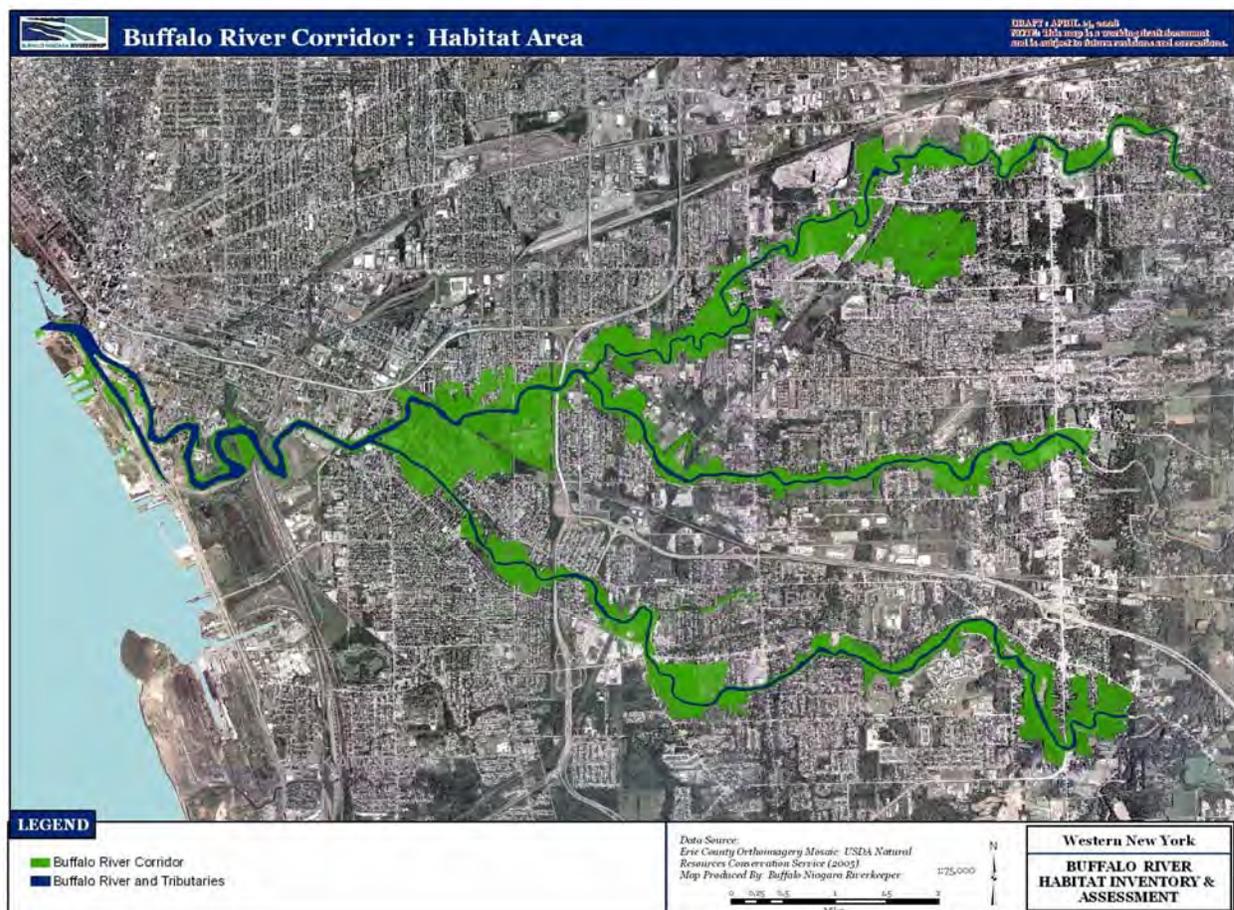
Buffalo Creek Sub-basin Headwaters; Photo credit: Margaret Wooster

Action: Build partnerships between municipalities to conserve shared resources

Inter-municipal partnerships involving local governments in shared resource conservation increasingly make sense as our watershed is developed and ecological impacts in one town affect communities upstream or downstream. In their Comprehensive Master Plans the Towns of Elma, Marilla, Aurora and West Seneca call for integrated protection of the Buffalo, Cayuga and Cazenovia Creek stream corridors they share. A recommended next step is to coordinate stream corridor protective programs and regulations by creating municipal creek corridor committees or initiatives. Collaboratively, the group can conduct the large-scale planning that is needed to support living infrastructure systems resilient to climate change and development pressures.

Another collaborative opportunity exists for communities along the Onondaga and Niagara Escarpments. These headwater features offer local governments linear landscape-scale conservation opportunities through the use of conservation overlay districts and other regulatory tools discussed in Chapter 5. Protection of these biodiverse, unique and scenic escarpments can also benefit recreational and tourism-based trails.

Headwater municipalities within the upland sub-basins should consider forming headwater forest conservation coalitions to conduct planning across municipalities whose landscapes have the opportunity to significantly impact downstream water quality and community health. These communities have the opportunity to establish models for conservation which can attract national recognition and provide additional funding for resource protection. Many of the maps included within the Strategy can help identify where opportunities for coalitions and partnerships exist.



Niagara River Habitat Conservation Strategy

Action: Involve municipal highway departments in conservation-based BMPs

Highway departments are a major vector for spreading invasive plant species through roadside maintenance practices that can disturb soils and spread seeds or propagules. Other highway department activities with broad and unintended consequences include poorly placed culverts that break stream connectivity and strand aquatic life (especially in trout headwaters) and removal of large woody debris that may be providing essential stream habitat. Cornell Cooperative Extension and others provide training on Best Management Practices for highway departments for these routine activities. Additional funding could support outreach oriented workshops targeted to municipal workers.



Culvert in the Town of Marilla; Photo credit: Kerrie Gallo

Strategy: Restore fullest biodiversity and functionality values possible in quarry habitat reclamation projects

Action: Use local regulatory tools to Identify and protect significant habitats and natural features

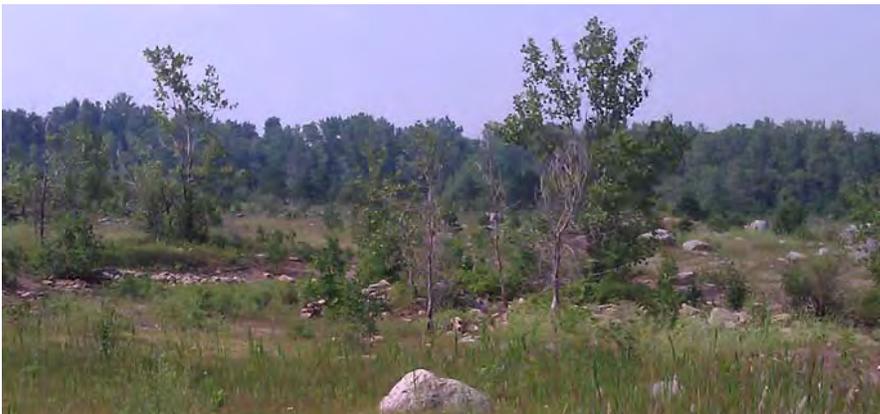
New York State is sixth in the nation for sand and gravel production. For each mine or quarry, the DEC requires a Mined Land Use Plan, intended to preserve the environmental integrity of the land, and including a reclamation objective and plan. However, siting a mine in the first place may target land with important natural values. Municipalities can have a major role in determining mine siting through their planning and zoning regulations (Chapter 5).

Action: For already permitted sand and gravel quarries, design habitat reclamation plans into quarry development from the beginning to return fullest functional habitat value to the land over the long term

The Niagara River Watershed has a significant amount of quarries and other abandoned industrial land with underdeveloped habitat potential. One area of interest for the Strategy includes three towns in the Ontario Lowland Ecoregion where quarries may intersect with the Onondaga Escarpment of Onondaga Aquifer. Of the 20 active or reclaimed sand and gravel pits in the towns of Clarence, Newstead and Alden (Map 4.51), 16 list habitat as the reclamation objective. The value of these habitats, given their location, could be enhanced with clearer goals and better planning and restoration approaches. Grading, buffering, and the strategic use of soils and fines to create areas for pioneer plants to establish, are all important reclamation tools.



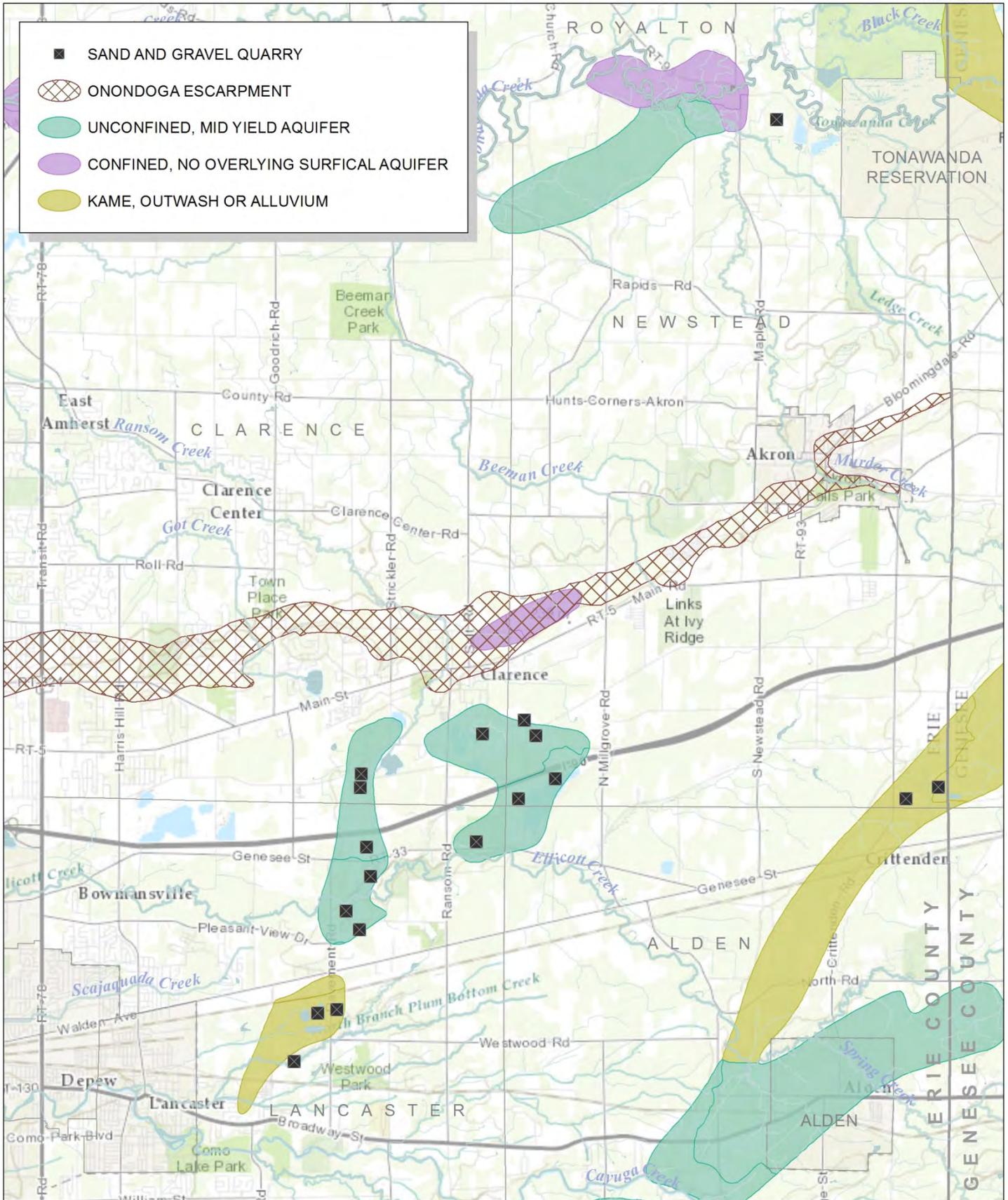
Quarried lands near Clarence, NY; Photo credit: Google Earth



Formerly quarried lands near Clarence;
Photo credit: AES

Map 4.51 Sand and Gravel Quarries and Aquifers near the Onondaga Escarpment Towns of Clarence, Newstead and Lancaster, Erie County, NY

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Map Notes:
 Significant unconsolidated aquifers; those that consist of sand and gravel and yield large supplies of water to wells; mapped statewide by NYSDEC. Onondaga Escarpment boundary provided by Erie County OGIS. Quarry locations provided by NYSDEC.

Sand and Gravel Quarries and Aquifers near the Onondaga Escarpment
TOWNS OF CLARENCE, NEWSTEAD AND LANCASTER
ERIE COUNTY, NY

Strategy: Identify and conserve State-listed fish and wildlife species and plant communities.

Action: Update listed species information for the Niagara River Watershed

Biodiversity in the Niagara River Watershed as a whole may be seriously under-represented in State inventories due to the relative lack of field assessment. For example, The Niagara River and Buffalo River sub-basins appear to host more rare, threatened, endangered and at-risk species than the other nine sub-basins in the watershed. This may reflect the greater number of migratory fish-eating birds and other coastal species in these sub-basins, but it is also likely related to the greater amount of field work associated with the Buffalo River and Niagara River RAPs.

Audubon and Buffalo Ornithological Society bird lists, Niagara Frontier Botanical Association documentation of rare plants and plant communities, and other local and regional data generally report many more observations of more species at more locations, including species included on the State's list of animals thought to be now extirpated from the Erie-Niagara region. Ontario's Niagara River Corridor Comprehensive Action Plan (Javlava, 2010) includes comprehensive plant and animal lists based on an intensive biological study of the Ontario peninsula between the Welland Canal and the Niagara River within Canada. These lists may help shed light on what species are present or now absent on this side of the border. Partnerships between State agencies and other entities could be established to help fill data gaps or collect additional field assessed data regarding species presence and absence.



*Yellow Rumped Warbler, New York State protected bird;
Photo credit: Margaret Wooster*



*Green Gentian, a NYS Threatened species found in the
Niagara River Watershed; Photo Credit: Josh Konovitz*

Chapter 5: Toolkit for Conservation

5.1 Habitat Protective Laws & Policies within Niagara River Watershed Municipalities

Most of the 71 municipalities in the Niagara River Watershed have basic zoning, site plan review and sub-division regulations in place, and some include regulations that specifically support conservation of habitat and ecological function, such as the following:

- **Environmental Protection Overlay Districts** provide additional regulations to underlying zoning districts that can be implemented through existing mechanisms like subdivision regulations and site plan reviews. They are used to protect natural features from unsuitable development and to guide land use changes over time in already developed areas.
- **“Critical Environmental Area”** is a designation under the State Environmental Quality Review Act that requires a higher level of review for development potentially impacting a wetland, floodplain, riparian area or other natural feature designated in the zoning as a CEA.
- **Minimum development setbacks** can also be more strictly defined and enforced in zoning laws to maintain open space, habitat, floodplain function, or access along stream corridors. **Vegetated buffers** may be required within the setback to enhance ecological values.
- **Conservation easement acquisition programs** enable communities to purchase development rights on important natural or agricultural lands in perpetuity or, less effectively, for specified terms (such as 25 years). Municipal bonds are usually passed to support these programs, and partnerships with land trusts allow site monitoring over time.
- **Subdivision regulations** control the way the land is divided into smaller parcels and can affect where new development occurs and where natural features are protected. They can support cluster development, for example, allowing village-like densities adjacent to large preserved functional woodlands or other natural features.

Examples of Existing Local Laws, Regulations and Zoning Practices

Environmental Protection Overlay Districts

- City of Lackawanna: Requires 50-foot development setbacks and 15-foot vegetated shoreline buffers along Smoke’s Creek.
- Town of Clarence: Open Space Design Overlay encourages cluster development to protect resources such as woodlands and prime farmland identified in the Open Space Plan.
- Town of Eden: Creekside Open Space Overlay includes a minimum development setback of 100-feet or out of floodplain, whichever is greater, for proposed new uses along Eighteen-mile Creek. All proposals are reviewed by the Conservation Advisory Board.
- Town of Grand Island Local Waterfront Revitalization Plan: Defines an Enhanced Environment Overlay District to protect identified valuable ecosystems and features.

- Town of Hamburg: Lakeview Overlay District requires site plans to preserve important environment features including wetlands, woodlands, habitats, and significant trees.
- Town of Lewiston: Riverfront Overlay District for Niagara River shoreline requires site plan review to account for soils, hydrology, slopes and erosion factors.
- Town of Marilla: Conservation Overlay District requires 50-foot development setbacks on major creeks .
- Village of Youngstown: Waterfront Bluff Overlay preserves the steep bluff along the Niagara River from erosion through site-specific design standards.

Critical Environmental Area

- Town of Cheektowaga: Establishes Cayuga Creek, its 100-year floodplain, all freshwater wetlands, Stiglemeier Park, Reinstein Woods Preserve and its surrounding 400-foot buffer, as CEAs under SEQRA, prohibiting adverse land uses.
- Town of Hamburg: Establishes Eighteenmile Creek as a CEA for its unique character.

Development Setbacks and Buffers

- City of Buffalo: Zoning law requires a 100-foot minimum development setback for non water-dependent new uses along the Buffalo River from Ohio Street Bridge east to city line. A 50-foot buffer of native vegetation is encouraged within the setback.

Codified Conservation Easement Programs

- Town of Amherst
- Town of Clarence
- Town of Eden
- Town of Elma (allows term easements)
- Town of Grand Island

Subdivision Regulations

- Town of Grand Island: Use cluster development to protect natural features and minimum 50-foot buffers around them

Examples of Existing Local Policies and Policy Objectives

Comprehensive Plans can also be used to guide conservation of local ecological assets. They allow communities to define their sense of what should be conserved, and map out a clear direction for next steps to achieve ecologically-sound land use management. Most municipalities in the watershed have Comprehensive Plans. The following lists provide an idea of some specific goals and recommendations:

Policy: Inventory, Map and Protect Open Spaces and Important Natural Features. Note: see previous section, for a list of communities where some of these policies have been adopted into law.

- T of Alden: Would identify Ellicott and Cayuga Creeks as stream corridors of regional significance and work with Erie County to preserve them, including archaeologically significant Slate Banks on Ellicott Creek
- T of Aurora: Would establish a goal of 1,500 acres conserved in perpetuity
- T of Batavia: Would include as an important feature “the natural flow of streams”
- T of Bethany: Would include groundwater resources as a high priority
- T of Holland: Would include public wellhead and groundwater recharge areas
- T of Lockport: Would include hazardous waste sites with development limitations
- T of Newstead/V of Akron: Would “maintain agricultural vitality in eastern Erie County; counteract loss of viable soils”
- T of Orchard Park: Would “protect lands that contribute to biodiversity and natural groundwater recharge”
- Ts of Niagara and Wheatfield: Would focus on Sawyer Creek as an important drainage and greenway
- T of Pendleton: Would make poor drainage areas and floodplains a conservation priority

Policy: Amend Local Laws to regulate uses impacting important natural features.

- T of Amherst: Would require stream buffers and setbacks for new development
- T of Aurora: Would designate important stream corridors as Critical Environmental Areas (CEAs) under SEQRA
- V of Attica: Would “adopt an aquifer protection law”
- T of Clarence: Would “require, in project reviews, the preservation of mature woodlands or other valuable features”
- T of Darien: Would amend zoning to include stream buffer zones and setbacks
- T of Eden: Would designate Eighteenmile Creek as a CEA under SEQRA

Policy: Establish Conservation Overlay Districts to protect important resources.

- T of Alden: Would establish an aquifer overlay district
- T of Amherst: Would establish greenway corridors along streams, including trails along Tonawanda Creek
- T and V of Attica: Would establish a Tonawanda Creek protection overlay
- T of Batavia: Would “provide long-range protection for water resources, wildlife habitat and erosion stability”
- T of Bethany: Would establish overlay preservation districts for land with unique character
- T of Clarence: Would establish agricultural zoning and natural features overlays
- T of Darien: Would promote overlays to protect natural streams and woodlands
- C of Niagara Falls: Would “improve Gill Creek as an ecological connection between Hyde Park and the Upper Niagara River. The creek is one of only two water-based links from the river into the city and could be better integrated within the city’s open space network “
- T of Orangeville: Would “require developers to dedicate easements along creeks (Tonawanda) to allow for maintenance and to reduce the risk of flood damages”
- T of Orchard Park: Would explore overlay/floating zones to address drainage and storm water concerns
- T of W Seneca: Would protect Buffalo, Cazenovia, Smoke’s Creeks and associated floodplains
- C of Tonawanda LWRP: Would preserve a Two Mile Creek corridor from the Niagara River to City limits, and protect wooded wetlands in coastal zone at Veterans’ Park

Policy: Establish a Conservation Easement Program allowing municipality to acquire important development rights on natural features including floodplains.

- V of Attica: Would “Improve safety in the Village’s floodplain including purchase land or facilitate the creation of a land trading program to prevent flood damage to homes and increase the flood storage capacity of the area; encourage land uses in the floodplain to be of ecological benefit to the area.”

Policy: Coordinate Inter-Municipal Regulations and BMPs for shared resources such as stream corridors and groundwater aquifers.

- T of Alden: Would cooperate with the V of Alden to protect quality groundwater aquifer, and would work with Erie County to preserve and enhance Ellicott and Cayuga Creeks as stream corridors of regional significance.
- Towns of Aurora, Holland, Elma, Wales and Village of East Aurora: “Implementation actions, zonings and infrastructure improvements in any one community should be coordinated with adjacent communities. Ideally the five communities will establish a regional comprehensive plan implementation committee to monitor future planning actions . . . to include stream corridor preservation and the creation of linkages between important open space and recreational features.” *Regional Comprehensive Plan and Draft Generic Environmental Impact Statement*, 2010.

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- T of Orangeville: Would coordinate drainage planning efforts with neighboring towns
- T of Pendleton: Would extend trails to interconnect open spaces w/ adjacent communities

Policy: Maximize Preserved Open Space in Subdivisions and maintain viable agricultural areas.

- T of Alden: Would promote conservation farming to reduce the impact on natural habitats and environmental resources
- T of Eden: Would target the Creekside Open Space Overlay District
- T of Pembroke/ V of Corfu: Would utilize cluster development and PUDs in rural areas

Policy: Use Native Plants as Components of Landscape Design on Public Lands to improve habitat and water quality, and to lessen water demands.

- V of Hamburg
- City of Buffalo Olmsted Parks Plan

Policy: Use “Soft Engineering” (e.g. grading, terracing, vegetated buffers) **vs “Hard Engineering”** (riprap, sheetpile, channelization) to control erosion.

- V of Hamburg

Policy: Protect and Restore Coastal Fish and Wildlife Habitats to foster their continued existence as natural, self-regulating systems.

- T of Hamburg LWRP: Targets Eighteenmile Creek, Smoke’s Creek Shoals, and Seneca Shoals
- T of Tonawanda LWRP: Targets Strawberry and Motor Island shallows; Two Mile Creek and Rattlesnake Creek linear trails; coastal wetlands at Cherry Farm, Tonawanda Coke, and 8 acres just north of the South Grand Island bridge

Policy: Require Responsible Sand and Gravel Mining Practices, including local involvement in mine siting and reclamation planning.

- T of Alexander: “Revise Town zoning regulations to prohibit the establishment of new commercial gravel mines and the expansion of existing mines”
- T of Newstead: use abandoned sand and gravel pits for wetlands mitigation banking

Policy: Train Highway Departments in BMPs that Support Biodiversity Features.

- T of Alexander. Provide training to Town Highway Department personnel in practices that minimize erosion and sedimentation from roadside ditches

5.2 Funding Sources

There are many resources available from Federal and State governments and private entities that should be utilized to implement the projects and strategies identified in this report. The strategy is intended to be used as a means to demonstrate the importance of each site to funders so that monies can be secured to make the concepts listed in the Action Plans a reality. There is a large need for projects that fit into a watershed context. The following table lists potential funding sources related to conservation and restoration. It is important to note that the list is not comprehensive (there are many funding sources that were not captured in the table) and the long term availability of each individual grant is subject to change based on funding.

Table 5.1 Funding Sources

ORGANIZATION	AMOUNT	DESCRIPTION	ELIGIBLE APPLICANTS	FUNDING CYCLES	WEBSITE
ACTrees (Alliance for Community Trees)	Ranges based on project size	ACTrees and grantees work with local groups, sponsors, and other partners to coordinate and execute volunteer tree planting events. ACTrees grants fund the purchase and installation of trees, as well as help grow the capacity of local organizations through acquiring tools, new partners, and visibility.	Organizations with goals to improve common	Annual	http://actrees.org/what-we-do/grants-and-awards/planting-trees/
Buffalo Ornithological Society	Up to \$750	Grant seekers must contribute to ornithological research or advance the education of people about birds in Western New York.	Applicants who will participate in ornithological research	Annual (in March)	http://www.buffaloornithologicalsociety.org/cou-nts-and-research/grants
Charles Stewart Mott Foundation	Up to \$300,000	This program area seeks to advance the conservation and restoration of freshwater ecosystems in North America, with emphasis on the Great Lakes. Funding categories include strengthening the environmental community, design and implementation of water quality policies, and site-based conservation (on an invitation-only basis).	Not specified	Not specified	http://www.mott.org/FundingInterests/programs/environment
Community Foundation for Greater Buffalo	\$100,000 total	Projects vary greatly, ranging from architectural restoration to the creation of urban farms.	Grants are awarded to nonprofits who serve the eight counties of Western New York	Every other Year	http://www.cfgb.org/for-nonprofits/for-grant-seekers/21st-century-fund-grants/
Community Foundation for Greater Buffalo	Not specified	Preserve and restore the regions natural assets. Improve the public's knowledge of environmental issues. Strengthen individual environmental organizations.	501 (c)3 nonprofits	Continuous	http://www.cfgb.org/for-nonprofits/for-grant-seekers/
Doris Duke Charitable Foundation	Unknown	The mission of the Environment Program is to enable communities to protect and manage wildlife habitat and create efficient built environments. Grants include four areas: land conservation in an era of climate change, wildlife and energy development, strengthening the conservation field, and environmental stewardship in the tri-state area.	Any	Occasional proposals and funding competitions	http://www.ddcf.org/Programs/Environment/
Earthwatch Institute	\$20,000 average per grant	Create opportunities for teams of adults and students (age 15-18) to participate and assist in research and data collection of scientists working on active research projects. Projects should lead to a significant advancement in scientific understanding or make significant contributions to environmental policies or management plans. Topics of interest include people and wildlife, conservation biology, and climate change and species conservation.	Earthwatch supports doctoral and postdoctoral researchers, or researchers with equivalent scholarship or commensurate life experience. Earthwatch welcomes applications from advanced scholars and professionals of any nationality	Annual	http://earthwatch.org/scientific-research/scientist-opportunities/working-with-earthwatch
ESRI	\$100,000 per grant	Fosters innovative approaches that help organizations use GIS, image processing, and remote-sensing technologies to solve natural resources management problems. Grant recipients use their awards to develop projects that increase efficiencies, productivity, and accuracy in the use of radar and optical sensor imagery data for detecting and analyzing land-cover change.	Private companies, educational institutions, NGOs, state and local regional governments, and tribal organizations	Not specified	http://www.esri.com/grants/image-grant-program
Fields Pond Foundation, Inc.	\$500 - \$25,000	The primary mission of Fields Pond Foundation is to provide financial assistance to nature and land conservation organizations that are community-based and that serve to increase environmental awareness by involving local residents in conservation issues. Project grants for trail making and other enhancement of public access to conservation lands, rivers, coastlines and other natural resources; Land acquisition for conservation; Assistance in establishment of endowments as a means of funding stewardship of newly protected conservation areas; and Directly related education programs and publications as components of a land protection project.	Community-based land conservation organizations	Rolling Basis	http://fieldspond.org/guidelines.htm
Freshwater Future	\$500 - \$5,000	This grant aims to engage communities in preparing and responding to climate change impacts in the Great Lakes region. Funding will be given to projects that: implement an on-the-ground project to reduce climate impacts and have secondary benefits to the community, serve Great Lakes urban areas, and engage underserved neighborhoods/communities.	Nonprofits, Canadian charities, or organizations that have a sponsoring US nonprofit (in addition applicants must be Organizational Members of Freshwater Future)	Annual	http://www.freshwaterfuture.org/grant-programs/climate-grant-program.html

ORGANIZATION	AMOUNT	DESCRIPTION	ELIGIBLE APPLICANTS	FUNDING CYCLES	WEBSITE
Freshwater Future	\$500 - \$15,000	The goal of the Healing Our Waters grants program is to provide financial support that will aid in the development and implementation of Great Lakes Restoration Initiative and other Federal proposals or projects.	Any community based initiative working to restore aquatic habitats, who have received, or will be applying for, funding under the Great Lakes Restoration Initiative RFP or other federal funding sources	Continuous	http://www.freshwaterfuture.org/userfiles/file/2013%20RFP%20HealingOurWaters%20final.pdf
Freshwater Future	\$500 - \$2,500	To build capacity of grassroots organizations, which could include training, board development, membership expansion, fundraising, and strategic planning. Grant funds will be used for Freshwater Future staff time to provide professional assistance to your project or organization, no monetary award will be made to your organization. A 25% match by your organization is required for this program.	Organization Members	Continuous	http://www.freshwaterfuture.org/grant-programs/insight-services-grant-program.html
Freshwater Future	\$500 - \$3,500	Projects to protect aquatic habitats in the following strategic program areas will be considered: protection and restoration of wetlands; on-the-ground restoration activities that include an action component to create permanent change; advocating for low impact solutions to community stormwater issues; participation in land use planning and zoning; participation in watershed planning; watch-dogging and participating in the development, implementation, and enforcement of local, state, provincial, and federal aquatic habitat protection regulations.	Not specified- eligibility quiz on website	Twice Annually	http://www.freshwaterfuture.org/grant-programs/project-grant-program.html
Freshwater Future	Up to \$500	The Special Opportunity Grants Program (Emergency Grants) is for the aquatic habitat protection efforts that may not coincide with the application timeline or grant period for the Projects Grants Program.	Nonprofits, Canadian charities, or organizations that have a sponsoring US nonprofit (in addition applicants must be Organizational Members of Freshwater Future)	Continuous	http://www.freshwaterfuture.org/grant-programs/special-opportunity-grant-program.html
Fund for Wild Nature	\$1,000 - 3,000 per grant	The Fund for Wild Nature provides small grants for North American campaigns to save native species and wild ecosystems, with particular emphasis on actions designed to defend threatened wilderness and biological diversity. Funding areas include advocacy, litigation, public policy work, development of citizen science, and similar endeavors.	501(c)(3) nonprofits (annual budgets must be less than \$250,000)	Twice Annually (May 1st and November 1st)	http://www.fundwildnature.org/proposal-dates-a-guidelines/dates-a-guidelines.html
George Gund Foundation	Up to \$200,000	Within the broad range of environmental issues, the Foundation focuses on promoting alternatives to urban sprawl, decreasing energy consumption and waste, conserving ecosystems and biodiversity, reducing environmental health hazards, increasing public awareness of environmental issues and building the skills of nonprofit environmental leaders.	Federally tax-exempt charitable organizations, government units or agencies, and local education agencies or libraries	Winter-Spring, Summer, and Fall applications	http://gundfoundation.org/how-to-apply/online-grant-application/
Great Lakes Protection Fund	Average \$460,000 per grant	The Great Lakes Protection Fund welcomes proposals for projects that enhance the health of the Great Lakes ecosystem and will return the greatest ecosystem benefits. Specific areas awarded include preventing biological pollution, restoring natural flow regimes, organizing markets to improve the environment, and providing leadership for ecosystem restoration.	Any	Project ideas and pre-proposals are accepted at any time	http://www.glpf.org/working-with-us/general-funding-guidelines
National Environmental Education Foundation	Up to \$5,000	Grants offered to non-profits (i.e. Friends Groups) whose mission is focused on a public land site in the US and the improvements and responsible use of that sites. The funding serves to strengthen the potential of these groups to serve their public lands through organizational capacity building.	501 (c)(3) Nonprofits (must demonstrate a positive, collaborative partnership with a local public land site)	Rolling Basis	http://publiclandseveryday.org/grants/capacity-building-grants
National Fish and Wildlife Foundation	\$2.5 million in 2014	This is NFWF's premiere land conservation program, and was established to provide urgently needed funding for projects that conserve large, landscape-level areas that are important habitat for fish, wildlife, and plants through acquisition of interest in real property.	Federal, state, and local governments, educational institutions, and nonprofit organizations	Annual	http://www.nfwf.org/accelerate/Pages/2013rfp.aspx
National Fish and Wildlife Foundation	1.75 million in 2014	Developing the Next Generation of Conservationists offers grants to connect youth to the outdoors by providing financial support for youth conservation job training programs. Landscape Conservation Stewardship Program offers grants to develop community-based partnerships that further the conservation of fish, wildlife, plants and other natural resources in distinct landscapes.	Federal, state, and local governments, educational institutions, and nonprofit organizations	Annual	http://www.nfwf.org/youth/Pages/home.aspx
National Fish and Wildlife Foundation	\$25,000 - \$100,000	This program invests in conservation activities that restore, protect, and enhance native populations of sensitive or listed fish species across the United States, especially in areas on or adjacent to federal agency lands. Because the leading factors in native fish species decline are habitat alteration, lack of adequate instream flows, and invasive and/or non-native species, projects that address these threats, as well as projects that protect coastal and marine habitats, are of particular interest.	Federal, state, and local governments, educational institutions, and nonprofit organizations	Annual	http://www.nfwf.org/bbq/Pages/home.aspx
National Fish and Wildlife Foundation	Not Listed	This program focuses on establishing viable populations of the American Woodcock, Golden-winged Warbler, and some two dozen additional imperiled species that nest in young, regenerating forests. Cost-effective, ecologically sound habitat creation and enhancement in key bird conservation regions is the primary goal of this program. Conservation planning for these species is also a priority.	Federal, state, and local governments, educational institutions, and nonprofit organizations	Twice Annually	http://www.nfwf.org/Pages/whatwedo/business-plan-application.aspx
National Fish and Wildlife Foundation	\$20,000 - \$50,000 per grant	Five Star Project: On the ground restoration that includes wetland, riparian, in stream or coastal habitats. Projects must have a measurable ecological, educational and community benefits. Include partnerships, and have the ability to educate and train the community and/or school curricula. Urban Waters Project: Improve water quality, increase access, and restore riparian and forest habitat in urban watersheds. Must include a 1:1 match of non-federal funds. Projects should use invasive species removal, forested habitat restoration and forest connectivity. Use of stormwater management methods is encouraged, along with a monitoring program. Should also provide education to the community about restoration activities.	Any entity that can receive grants	Annual	http://www.nfwf.org/fivestar/Pages/home.aspx

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ORGANIZATION	AMOUNT	DESCRIPTION	ELIGIBLE APPLICANTS	FUNDING CYCLES	WEBSITE
National Fish and Wildlife Foundation	\$15,000-\$75,000 per grant	This grant provides modest funds to help local communities effectively manage invasive plant species. The funds are intended to help support the creation of local Cooperative Weed Management Area partnerships. Such partnerships should bring together local landowners, citizen groups, and weed experts to develop and implement strategies for managing weed infestations on public lands, natural areas, and private working lands.	Federal, state, and local governments, educational institutions, and nonprofit organizations	Annual	http://www.nfwf.org/pti/Pages/home.aspx
National Fish and Wildlife Foundation & Wells Fargo	\$25,000 - \$100,000 per grant	This grant program funds projects related to sustainable agriculture and forestry, conservation of land and water resources, energy efficient and urban infrastructure, and community outreach and environmental educations. Preference will be given to projects that include volunteerism or support low-to-moderate income communities.	501(c)(3) Non-profit organizations, as well as qualified tribal and government agencies, including public school systems	Annual	https://www.wellsfargo.com/downloads/pdf/about/csr/reports/environmental-guidelines.pdf
Niagara Area Foundation	\$55,000 in 2013	Grants will be considered for the following categories: health, human services, arts, civic needs, community development, education, environment. Preference will be given to grant applications that have the greatest impact on positive youth development and demonstrate collaboration with other organizations.	501(c)(3) Non-profit organizations	Annual	http://www.cfqb.org/for-nonprofits/for-grant-seekers/niagara-area-foundation-grants/
Niagara River Greenway Commission	Not Specified	Support the creation, improvement, and maintenance of conservation areas and ecological projects within the Niagara River Basin. Priority given to projects within the Niagara River Greenway Focus area.	Nonprofits, cities, towns, villages, counties, or Indian Nations located in the area defined by the Greenway Plan, and public benefit corporations under the laws of New York State	5 dates for submission each year	http://growwny.org/funding-training-opportunities/2195-greenway-ecological-fund-2013-application-schedule
North American Native Fishes Association	Up to \$1,000 (Possible Multiple Awards)	Conservation Research Grant, focusing on supporting research relating to the conservation of North America's indigenous fish fauna, particularly those that are threatened or endangered.	Academia, Conservation Groups, Independent Researchers	Annual	http://www.nanfa.org/research.shtml
Royal Bank of Canada	\$1,000-\$100,000	Projects will focus on supporting initiatives that help protect and preserve water in towns cities, and urbanized areas with populations of more than 10,000 people. Project areas include: Improved control and management of urban storm or rain water, Efficient and innovative use of water in towns and cities, Protection and restoration of urban waterways, and Improved urban water quality.	501 (c)3 nonprofits	Twice Annually	http://www.rbc.com/community-sustainability/apply-for-funding/guidelines-and-eligibility/blue-water-project.html
The Hagen Family Foundation	Not specified	The Hagen Family Foundation provides financial grants to not-for-profit organizations in the areas of the arts, education, environment, religion, and social services.	Nonprofits	Annual	http://www.hagenfamilyfoundation.org/
Wells Fargo	\$50,000 - \$200,000 per grant	This grant program funds clean technology programs along with research and development projects involving universities and colleges. Project areas include water quality and resources and sustainable agriculture.	501(c)(3) Non-profit organizations, as well as qualified tribal and government agencies, including public school systems	Annual (from June to August)	https://www.wellsfargo.com/downloads/pdf/about/csr/reports/environmental-guidelines.pdf

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