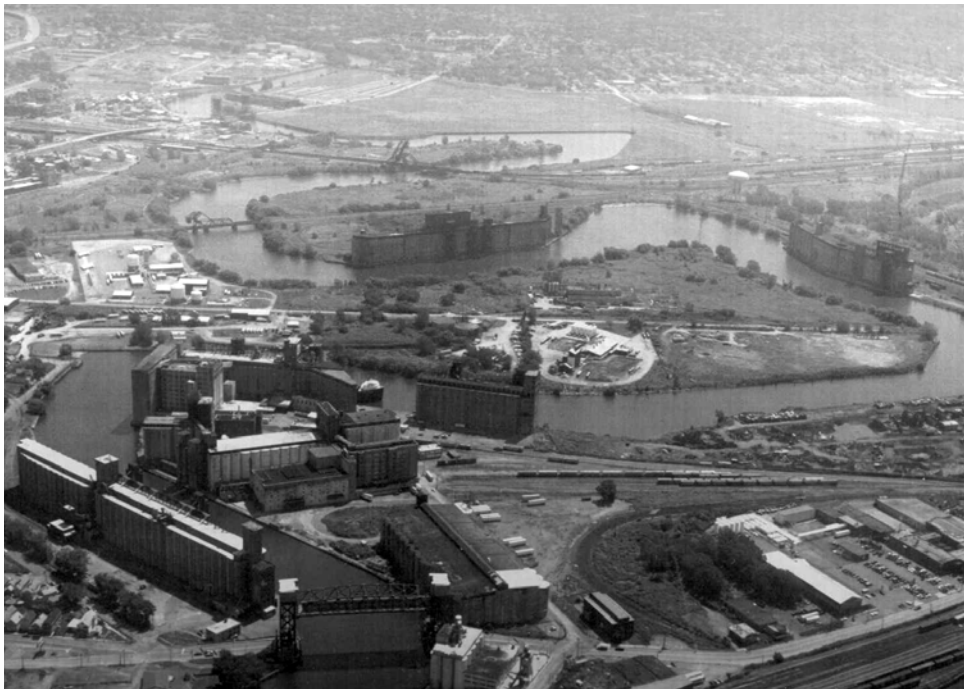
BUFFALO RIVER REMEDIAL ACTION PLAN

2005 STATUS REPORT



PREPARED BY:
BUFFALO NIAGARA RIVERKEEPER

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REMEDIAL ADVISORY COMMITTEE

Joseph Atkinson, PhD
UNIVERSITY AT BUFFALO GREAT LAKES PROGRAM

Christopher Balduf
PVS CHEMICALS, INC.

Barry Boyer, Esq.
STATE UNIVERSITY OF NEW YORK AT BUFFALO

Frank DiMascio
BUFFALO SEWER AUTHORITY

Helen Domske
NEW YORK SEA GRANT/UNIVERSITY AT BUFFALO GREAT LAKES PROGRAM

Martin Doster
NYS DEPT. OF ENVIRONMENTAL CONSERVATION

Mark Gaston
ERIE COUNTY SOIL AND WATER CONSERVATION DISTRICT

David Gianturco, RAC Chairman
BUFFALO NIAGARA RIVERKEEPER

Michael Greer
US ARMY CORPS OF ENGINEERS

Michael Hamilton
BUFFALO NIAGARA RIVERKEEPER/BUFFALO ORNITHOLOGICAL SOCIETY

Thomas R. Hersey, Jr.
ERIE COUNTY DEPT. OF ENVIRONMENT AND PLANNING

Kim Irvine, PhD
BUFFALO STATE COLLEGE

Jill Spisiak Jedlicka, RAP Coordinator
BUFFALO NIAGARA RIVERKEEPER

Michael Raab
ERIE COUNTY DEPT. OF ENVIRONMENT AND PLANNING

Mary Rossi
ERIE COUNTY DEPT. OF ENVIRONMENT AND PLANNING

Byron Rupp
US ARMY CORPS OF ENGINEERS

Jill Singer, PhD
BUFFALO STATE COLLEGE

Mardell Sundown
TONAWANDA BAND OF SENECAS

Gregory Sutton
NYS DEPT. OF ENVIRONMENTAL CONSERVATION

Elizabeth Trometer
US FISH & WILDLIFE SERVICE

John Whitney
USDA-NRCS

Margaret Wooster
BUFFALO NIAGARA RIVERKEEPER

Acknowledgements

BUFFALO NIAGARA RIVERKEEPER TEAM MEMBERS

Jill Spisiak Jedlicka, RAP Coordinator

Julie Barrett O'Neill, Riverkeeper Executive Director

Robbyn Drake, Environmental Planner

Joe Ghosen, Technical Consultant

Todd Bolster, Research Associate

Copies of this report may be obtained:

Buffalo Niagara Riverkeeper
617 Main St., M108
Buffalo, New York 14203
www.fbnr.org

NYSDEC-Region 9
270 Michigan Avenue
Buffalo, New York 14203

NYSDEC-Division of Water
Great Lakes Section
625 Broadway
Albany, New York 12233-3508

USEPA-Region II
290 Broadway
New York, New York 10007-1866
www.epa.gov

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Acronyms & Abbreviations

ADA	Americans with Disabilities Act
ARCS	Assessment and Remediation of Contaminated Sediments
AOC	Area of Concern
BOA	Brownfields Opportunity Area
BOD	Biological Oxygen Demand
BOS	Buffalo Ornithological Society
BMP	Best Management Practices
BNR	Buffalo Niagara Riverkeeper
BUI	Beneficial Use Impairment
BRIC	Buffalo River Improvement Corporation
BSA	Buffalo Sewer Authority
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Response, Compensation and Liabilities Act (also known as Superfund)
CFPP	Cornell Fish Pathology Project
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DDT	Dichlorodiphenyltrichloroethane
DELT	Deformities, Eroded fins, Lesions and Tumors
DEP	Erie County Department of Environment and Planning (or ECDEP)
DO	Dissolved Oxygen
EBPS	Environmental Benefit Permit System
EIS	Environmental Impact Statement
EPT	Ephemeroptera, Plecoptera, Trichoptera (mayfly, stonefly, caddisfly taxa)
FBNR	Friends of the Buffalo Niagara Rivers
FS	Feasibility Study
FY	Fiscal Year
GLNPO	Great Lakes National Program Office
GIS	Geographic Information System
IBI	Index of Biotic Integrity
IJC	International Joint Commission
IRM	Interim Remedial Measures
km	Kilometers
LTCP	Long Term Control Plan
LWRP	Local Waterfront Revitalization Plan

Acronyms & Abbreviations

mgd	million gallons per day
mg/L	milligram per liter
MS4	Municipal Separate Storm Sewer System
NFTA	Niagara Frontier Transportation Authority
NMC	Nine Minimum Control
NTU	Nephelometric Units
NYCRR	New York Environmental Conservation Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation (or DEC)
NYSDOH	New York State Department of Health (or DOH)
NYSDOS	New York State Department of State (or DOS)
O&M	Operation and Maintenance
PAH	Polycyclic (or polynuclear) aromatic hydrocarbon
PCB	Polychlorinated Biphenyl
PSA	Preliminary Site Assessment
PWL	Priority Waterbodies List
RAC	Remedial Advisory Committee
RAP	Remedial Action Plan
RI	Remedial Investigation
RIBS	Rotating Integrated Basin Studies
ROD	Record of Decision
SEIS	Supplemental Environmental Impact Statement
SPDES	State Pollution Discharge Elimination System
SVOCs	Semi-Volatile Organic Compounds
TAG	Technical Advisory Group
TMDL	Total Maximum Daily Load
USACE	United States Army Corps of Engineers
UAW	United Auto Workers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VCA	Valley Community Association
WRDA	Water Resources Development Act
YOY	Young-of-Year

Preface

In 1989, a combined Stage 1 and Stage 2 Remedial Action Plan (RAP) was prepared for the Buffalo River, as required for all Areas of Concern through the Great Lakes Water Quality Agreement. (EPA specifies a three-stage RAP structure; Stage 1- Problem Identification and Planning, Stage 2- Goals, Options and Recommended Actions, and Stage 3- Restoration of Beneficial Uses.) Since the development of the Remedial Action Plan, NYS Department of Environmental Conservation (DEC) in its role as RAP Coordinator has tracked progress within the Buffalo River AOC through six Status Reports (1989-2002).

In October 2003, the USEPA Great Lakes National Program Office (GLNPO) selected Friends of the Buffalo Niagara Rivers (FBNR) to coordinate the implementation of the Buffalo River Remedial Action Plan. Effective July 2005, FBNR changed its name to Buffalo Niagara Riverkeeper.

With the assistance of the Remedial Advisory Committee (RAC), NYSDEC and other governmental and non-governmental agencies and organizations, Riverkeeper has begun to make significant progress towards delisting of the Buffalo River AOC. Efforts over the last two years included a full re-assessment of all beneficial uses, creation of delisting criteria, and identification of data gaps and needed projects. This 2005 Status Report Update documents progress that has been made towards delisting during the period of April 2002 through October 2005.

All previous Status Reports produced by NYSDEC (1989-2002) may be accessed as .pdf files at the www.fbnr.org, or by using the following link: http://www.fbnr.org/programs/tributary/buffalo_river/Buffalo_river.htm. These reports are also available on CD-ROM by request from Riverkeeper.

Members of the Remedial Advisory Committee (RAC), Technical Advisory Groups

(TAG), local agencies, stakeholders and project partners all contributed to the development of the 2005 RAP Status Report Update.

Executive Summary

Buffalo Niagara Riverkeeper (formerly Friends of the Buffalo Niagara Rivers) was selected to coordinate the Buffalo River Remedial Action Plan by USEPA in October 2003. Since that time, Riverkeeper has re-engaged the Remedial Advisory Committee (RAC), re-evaluated the status of all 14 beneficial uses, developed Delisting Criteria/Restoration Targets for five beneficial use impairments (BUIs), tracked Buffalo River research and ongoing projects, and identified data gaps related to BUI assessment.

This 2005 RAP Status Report Update documents progress that has been made towards delisting during the period of April 2002 through October 2005, as well as next steps and commitments. In addition, it includes discussions on research conducted since the inception of the RAP, interprets project findings and current efforts, as well as lays out preliminary RAC recommendations, next steps and commitments for the AOC.

BUFFALO RIVER AOC OVERVIEW

- Covering nearly 440 square miles, the Buffalo River watershed includes Cayuga Creek, Buffalo Creek and Cazenovia Creek. Land use in the upper watershed, or "source area", is primarily residential, farmland and wooded areas. Industrial uses dominate the landscape in the lower 6.2 miles, or "impact area" of the AOC.
- The major sources of contamination in the AOC are contaminated bottom sediments and non-point source pollution. There are 33 Combined Sewer Overflow (CSO) outfalls and 45 inactive hazardous waste sites in the watershed.
- Contaminants of concern include PCBs, PAHs, heavy metals and industrial organics. Water quality concerns include low dissolved oxygen, turbidity, and bacteria. Habitat is severely altered, invasive plant species dominate the landscape and fish consumption advisories exist for the AOC. Benthic deformities within the navigational channel are 54.5%, and fish tumor rates range from 14 to 87% for the six most commonly found species.
- The City Ship Canal, a 1.4 mile stretch adjacent to and connected to the mouth of

the Buffalo River, has been a long-ignored part of the AOC. The canal is known to hold some of the most highly contaminated sediments within the AOC, there is undetermined impact of contaminated groundwater, and very little benthic or fishery data exists for the Canal.

BENEFICIAL USE IMPAIRMENTS

- All 14 beneficial uses were re-evaluated by the Remedial Advisory Committee in 2004. There are six known impairments including; restrictions on fish consumption, fish tumors or other deformities, degradation of benthos, restrictions on dredging, degradation of aesthetics, and loss of fish and wildlife habitat.
- There are three "likely" impairments, which include tainting of fish and wildlife flavor; degradation of fish and wildlife populations; and bird or animal deformities or reproductive problems. The two unknown impairments are eutrophication or undesirable algae; and degradation of phytoplankton populations. The Buffalo River RAC, through the assistance of Buffalo Niagara Riverkeeper, will be conducting additional beneficial use assessments during the next two fiscal years (2006-08).

DELISTING CRITERIA/RESTORATION TARGETS

- The Buffalo River RAC, with the assistance of Riverkeeper, developed delisting criteria/restoration targets for 5 of the 6 "impaired" beneficial uses. Of these six confirmed impairments, "loss of fish and wildlife habitat" is still being assessed and evaluated and quantitative targets are under development.
- Additional research and information is needed for the five beneficial uses that are defined as "likely impaired" or "unknown". Data gaps include testing PAH levels in fish and angler surveys (tainting); assessing bird, mammal and herp populations (degradation of fish and wildlife populations); assessing bird/animal deformities; quantifying algal and phytoplankton populations; and developing a

comprehensive habitat analysis and quantification within the AOC.

WATER QUALITY

- The Buffalo River is designated as a Class C waterway by NYSDEC. The major factors that are known to affect water quality include dissolved oxygen, turbidity, heavy metals, and bacteria. Degradation of the aesthetics in the lower river continues to be a problem.
- The Buffalo River has never been fully assessed for eutrophication and the possible presence of microcystins (toxic algae) has never been studied. There is minimal data available regarding phytoplankton; therefore, an accurate determination of its beneficial use status can not be made.
- The Buffalo River RAC has made nine preliminary recommendations regarding water quality concerns to help make additional progress towards delisting:

  i. Fully implement Stormwater Phase II regulations through the implementation of best management practices and pollution prevention strategies;
  ii. Implement non-point source (agricultural and other runoff) pollution abatement practices in the upper watershed through a possible wet weather or stormwater project.
  iii. Continue erosion control measures in the upper watershed (i.e. Cayuga, Buffalo and Cazenovia Creeks).
  iv. Continue to address failing septic systems throughout the upper watershed.
  v. Complete assessment and evaluation of nutrients and possible eutrophication, algal populations and phytoplankton populations.
  vi. Eliminate all SSOs in accordance with the Clean Water Act.
  vii. Complete review and evaluation of BSA's LTCP.
  viii. Adopt long-term CSO control programs consistent with EPA's National CSO Policy and the Great Lakes Strategy.

ix. Identify gaps in data and research and obtain funding or develop programs to fill these gaps.

- Project Updates include detailed information about the following: NYSDEC Rotating Integrated Basins Studies (RIBS); 2002 Niagara River/Lake Erie Basin Waterbody Inventory/Priority Waterbodies List; municipal and industrial wastewater facilities; municipal sewer systems (Buffalo Sewer Authority Draft Long-Term Control Plan, and sewer separation activities); stormwater (stormwater coalition, illicit discharge trackdown, and impervious surface modeling); and the Buffalo River Improvement Corporation (BRIC).

CONTAMINATION

- Two forms of contamination continue to affect the Buffalo River AOC; these include contaminated bottom sediments, and upland contamination associated with inactive hazardous waste sites, current industry or brownfields. Combined with upper watershed sources, historical and current industrial activity resulted in contamination of upland areas and sediments by metals, pesticides, PCBs, PAHs, and industrial organics.
- River sediments are contaminated with cyanides and metals to levels that prohibit open lake disposal. The dredge materials require controlled disposal at a Confined Disposal Facility (CDF), and therefore result in the impairment of beneficial use #10 (restrictions on dredging).
- Since the inception of the RAP, some 45 inactive hazardous waste sites have been identified within the Buffalo River watershed. To date, all Phase I & II site investigations have been concluded. Remedial Investigations, Feasibility Studies or Interim Remedial Measures were completed at 42 of the 45 sites. The remaining three are undergoing restoration planning or have entered voluntary clean-up agreements.

- The Buffalo River RAC has made six preliminary recommendations regarding contamination concerns to help make additional progress towards delisting:
  i. Complete the Buffalo River Environmental Dredging Feasibility Study by April 2008;
  ii. Apply to the Great Lakes Legacy Act or use USACE's 312 Program for funding by FY-2008 for contaminated sediment remediation in the Buffalo River AOC;
  iii. Support NYSDEC efforts to complete remediation of all 45 inactive hazardous waste sites and continue monitoring leaching potential at sealed or remediated sites;
  iv. Track down illegal connections or illicit discharges to storm sewer lines;
  v. Implement non-point source (agricultural and other runoff) pollution abatement practices in the upper watershed through a possible wet weather or stormwater project;
  vi. Continue erosion control measures in the upper watershed (i.e.; Cayuga Creek, Buffalo Creek and Cazenovia Creek).
- Project Updates include detailed information about the following: Feasibility Study for Environmental Dredging within the Buffalo River AOC, and remediation of inactive hazardous waste sites.

FISH AND WILDLIFE

- Fish consumption in the Buffalo River and Harbor is impaired due to a NYSDOH health advisory that recommends eating no carp because of elevated PCB levels.
- A voluntary two-year bird survey and population assessment is currently underway through the efforts of the Buffalo Ornithological Society (BOS) and Canisius College. Minimal data from a 1993 fish and wildlife inventory exists regarding wildlife and herpetological populations within the AOC.

- The Buffalo River RAC has identified information gaps regarding updated data on tainting, wildlife populations, bird and animal deformities, and habitat quantification. The RAC has made seven preliminary recommendations regarding fish and wildlife to continue to make progress towards delisting:
  i. Complete assessment and evaluation of mammal and herpetological populations, and bird health throughout the AOC.
  ii. Support NYSDEC and NYSDOH efforts for fish contaminant testing, with recommendations to increase number of species tested and frequency of testing to at least every 5 years.
  iii. Complete an updated assessment of tainting in fish and wildlife through PAH testing and angler surveys.
  iv. Complete assessment, evaluation and quantification of habitat throughout the AOC.
  v. Implement projects/programs to preserve open space and increase wetland areas and aquatic habitat.
  vi. Implement invasive species eradication efforts.
  vii. Prioritize sites identified in the Buffalo River Greenway Plan and identify funding or programs to protect critical lands and improve/increase habitat.
- Project Updates include detailed information about the following: "Assessment of Potential Aquatic Habitat Restoration Sites Within the Buffalo River AOC" project; fish health and populations (fish consumption, tumors and deformities, Buffalo River walleye restoration project, Goby Survey); and habitat restoration (pocket parks, Seneca Bluffs, and DEC-managed sites).

COMPLEMENTARY PROJECTS

- Complementary projects are efforts that may have a direct or indirect impact on the implementation of the Buffalo River RAP. The activities have not yet been

identified as specific RAP goals, and they are not directly related to the 14 beneficial uses.

- Project Updates include detailed information about the following: habitat restoration (Times Beach and the Ohio Street Park); environmental education and public involvement (outreach, Report Card and stewardship); and land use and development (Greenway, bike path, Erie Canal Harbor, brownfields planning, and local waterfront revitalization).

NEXT STEPS AND COMMITMENTS

- This includes a summary of plans and commitments for current and future projects relating to the RAP. Wherever possible, timelines, responsible parties and funding sources have been identified.

1 THE BUFFALO RIVER AREA OF CONCERN

The Buffalo River is located in the City of Buffalo, Erie County, in western New York State. The river flows from the east and discharges into Lake Erie at the head of the Niagara River.

The Buffalo River Area of Concern "impact area" extends from the mouth of the Buffalo River to the farthest point upstream at which the backwater condition exists during Lake Erie's highest monthly average lake level. The impact area is 6.2 miles (10 km) in length. The AOC also includes the entire 1.4-mile (2.3 km) stretch of the City Ship Canal, located adjacent to the river (see Figure 1-1). The AOC impact area is characterized by historically heavy industrial development in the midst of a large municipality.

There are three major streams in the watershed that comprise the AOC "source area": Cayuga Creek, Buffalo Creek and Cazenovia Creek (see Figure 1-2). Land use in the tributary watersheds primarily consists of residential communities, farmland, wooded areas and parks interspersed with commercial land use. The total drainage area for the Buffalo River watershed is approximately 440 square miles. An analysis of land use and characteristics and habitat type will be initiated by Riverkeeper in Winter 2005, and will quantify acreage by type (i.e.: industrial, forested, wetland, etc) from throughout the AOC. In addition, beginning in Fall 2005, Buffalo State College will be conducting an analysis of impervious vs. pervious surfaces throughout the AOC.

Presently, the major sources of contamination in the AOC are contaminated bottom sediments and non-point source pollution generated throughout the watershed. There are currently 33 CSO outfalls within the watershed that discharge into the Buffalo River and three connections to the Buffalo sewer system from outside sewer districts that also

overflow into the river during storm events. There are 45 inactive hazardous waste sites within the AOC and contaminants of concern include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals, and industrial organics. Water quality concerns include dissolved oxygen levels, turbidity, and bacterial contamination. Potential habitat areas (riparian and aquatic) are limited due to contamination, development and an altered shoreline. Invasive plant and animal species threaten diversity and quality of habitat. Fish consumption advisories exist for the AOC and recent research indicates a highly elevated deformity and tumor rate for benthic organisms and numerous fish species.

1.1 CITY SHIP CANAL (BUFFALO SHIP CANAL)

During the 1840's, the Buffalo Harbor had reached its capacity, and overcrowding of lake vessels and lack of harbor facilities and mooring sites had become problems for the City of Buffalo.[1] In 1847, Mayor Elbridge Gerry Spaulding sought to ease the pressure through numerous improvements to the Buffalo River (then known as Buffalo Creek), including the construction of a new ship canal[2]. The canal, completed in 1850, was originally known and officially designated as the "E. B. Blackwell Canal" after the contractor responsible for construction. By resolution of the common council, the Blackwell Canal was officially renamed the City Ship Canal[3] in 1953. The waterway is sometimes referred to as the Buffalo Ship Canal.

The canal was widened in 1873 to one hundred and forty feet wide and fifteen feet deep. In 1883, the Buffalo Creek Railway Company applied for and obtained permission to extend the canal in a southerly direction into its own lands. This portion of land is now considered the Lehigh Valley Railroad property[4]. One historical document suggests that, in 1884, the canal culminated in the Tifft Farm Basins, and may have since been backfilled along with numerous other canals in

Buffalo to abate nuisance problems associated with stagnant waters[5]. Four slips cutting between the canal and the Buffalo River at the time were used by ships for unloading. These have since been filled, and the northern tip of the peninsula removed, to open up the Inner Harbor[6]. For historical maps of the City Ship Canal in 1901 and 1948, see Appendix A.

CURRENT CONDITIONS

The City Ship Canal has always been considered part of the Buffalo River Area of Concern, although it was never explicitly described or defined in the original RAP document (see Figure 1-3). The industrial history of the canal mirrors that of the Buffalo River; however, the hydraulics and adjacent land uses are much different. To date, very little research has been completed regarding the Canal. Sediment testing performed during the 1980s as part of the Assessment and Remediation of Contaminated Sediments (ARCS) program suggests that the Canal is home to some of the worst contaminated sediments within the AOC. Limited fishery data suggests a relatively diverse fish population at the head of the canal. Anecdotal evidence has indicated the possibility of contaminated groundwater issues, but there is no known data available to support this suspicion. Local residents have been seen accessing the head of the Canal for fishing.

A portion of the City Ship Canal is considered a federal navigation channel for USACE purposes. The authorized portion of the project is 125 feet wide and 5500 feet in length, with a depth of 23 feet[7]. Minimum depths due to shoaling have been recorded at 18 feet. The City Ship Canal contains four docks: General Mills, Toledo Dock Exchange, Buffalo Dock Forwarders and ADM Milling Co[8].

RAC RECOMMENDATIONS

The Buffalo River Remedial Advisory Committee acknowledges that the amount

of data and research available concerning the City Ship Canal is inadequate. Of greatest concern is the known presence of highly contaminated sediments. However, the City Ship Canal is not included in the ongoing Feasibility Study for Environmental Dredging, and therefore, additional resources must be identified to address the contaminated sediments in the Canal. In addition, no research has been conducted as yet on the groundwater and flow dynamics of the Canal. (It is believed to experience stratification and backflow from Lake Erie, similar to the lower Buffalo River.) The following summarizes the recommended actions:

- Apply for Great Lakes Legacy Act funding in 2006 to conduct assessment, including nature and extent, of contaminated sediments within the City Ship Canal.
- Identify resources and partners to fully evaluate the impact of groundwater on the hydraulics of the canal, as well as identify potential sources of contaminated groundwater.
- Identify resources and partners to fully evaluate the health of benthic populations, fish and wildlife within the Canal.

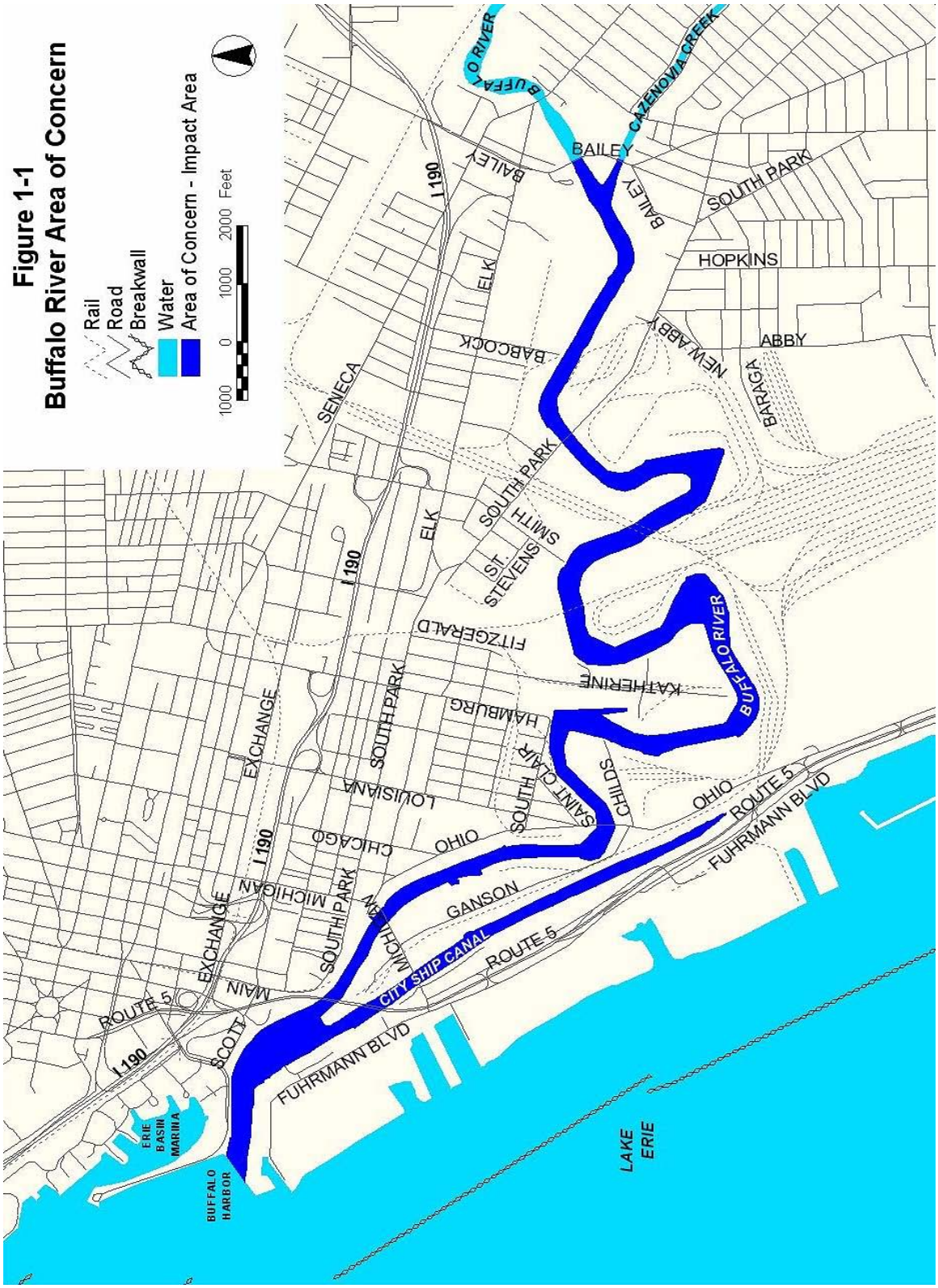


Figure 1-1
Buffalo River Area of Concern
Rail
Road
Breakwall
Water
Area of Concern - Impact Area
1000 0 1000 2000 Feet
BUFFALO RIVER
CAZENOVIA CREEK
BAILEY
SOUTH PARK
HOPKINS
NEW ABBY
ABBY
BARAGA
BABCOCK
ELK
SENECA
I 190
SMITH
ST. STEVENS
FITZGERALD
KATHERINE
HAMBURG
LOUISIANA
CHICAGO
OHIO
SAINT CLAIR
CHILDS
ROUTE 5
FUHRMANN BLVD
GANSON
MICHIGAN
EXCHANGE
MAIN
SCOTT
CITY SHIP CANAL
ERIE BASIN MARINA
BUFFALO HARBOR
LAKE ERIE

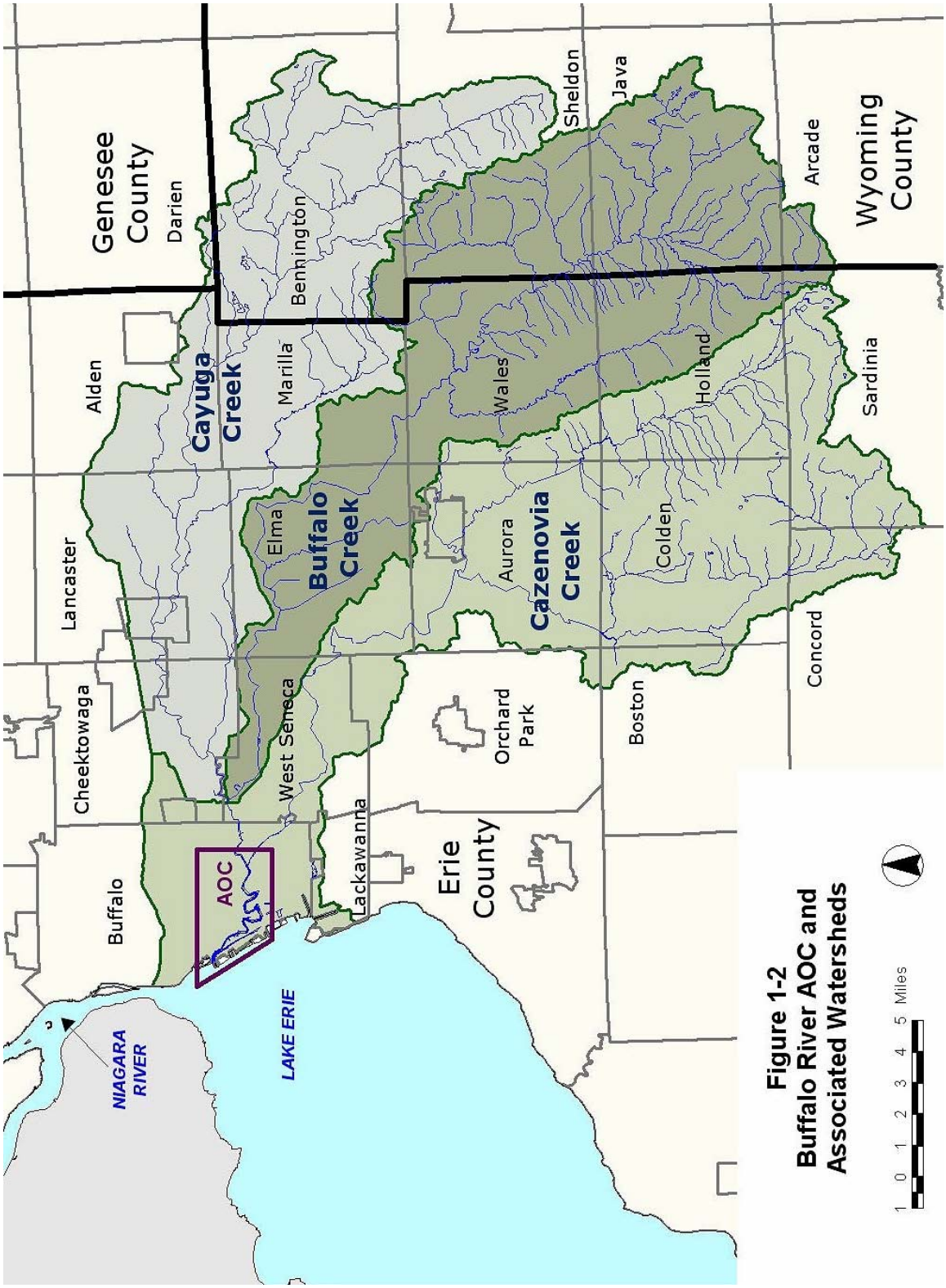
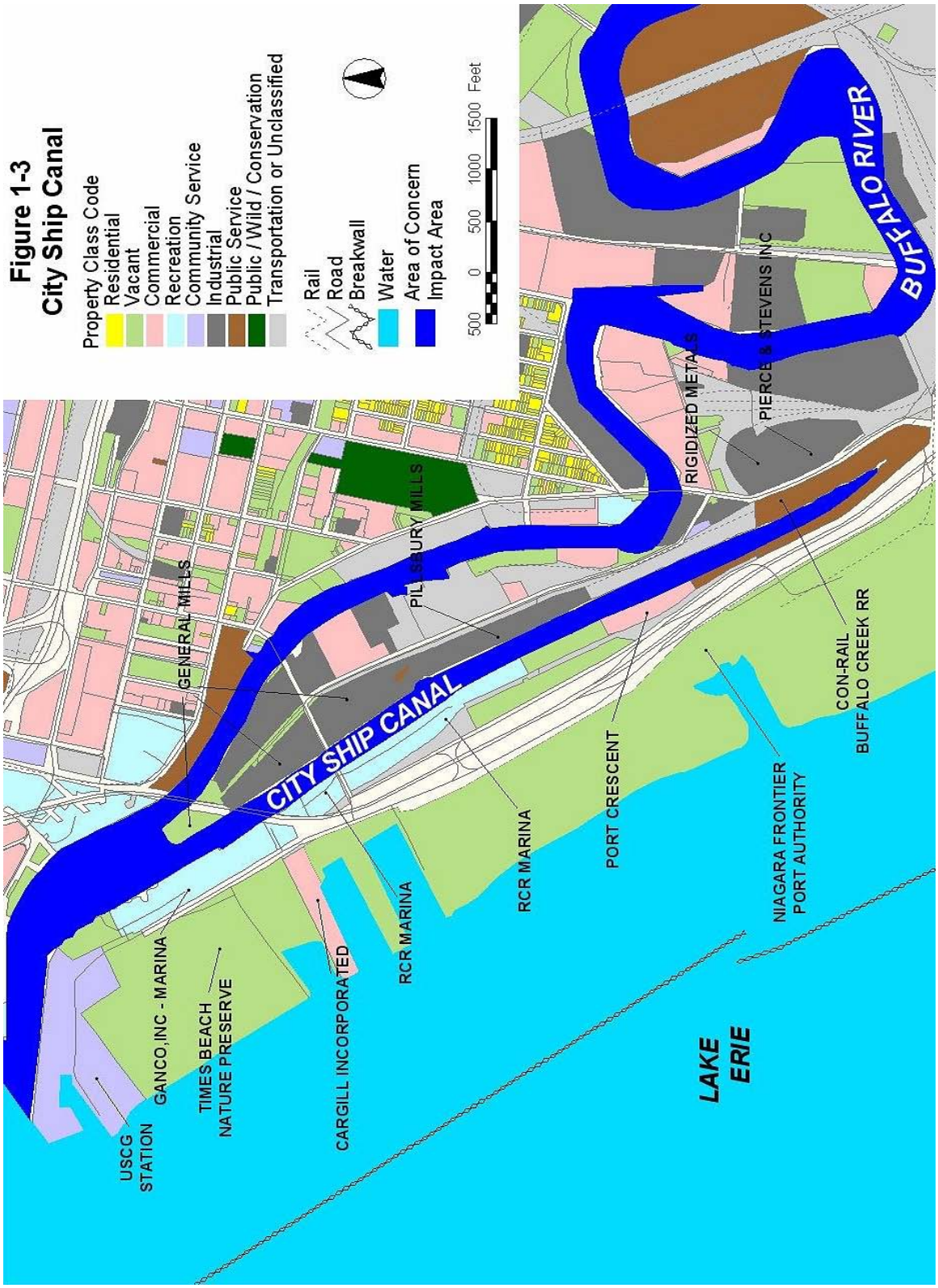


Figure 1-2
Buffalo River AOC and Associated Watersheds

Buffalo River Area of Concern



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[8] USACE, Port Series 41 - The Ports of Buffalo, Rochester, Oswego, and Ogdensburg, NY, (2001).

2 BENEFICIAL USES AND IMPAIRMENTS

The International Joint Commission determines the listing and delisting of an Area of Concern based upon the impairment of fourteen identified Beneficial Uses. In 1989, the Buffalo River RAP determined five of the fourteen Beneficial Uses to be "impaired", with another three listed as "likely impaired." In the fifteen years since the original RAP was written, there has been a significant amount of research and restoration within the Buffalo River AOC. However, this work has not yet translated into the delisting of any impairments. In fact, after a complete review of all 14 Beneficial Uses in 2004, one more impairment has been added to the list- "Degradation of Aesthetics". This does not necessarily reflect lack of progress in improving the river's health, but rather that progress has not reached a level that would allow a Beneficial Use Impairment (BUI) to be delisted or considered restored. See Table 2-1 on the following page for a summary of the updated status of all Buffalo River AOC Beneficial Uses.

The Buffalo River Remedial Advisory Committee (RAC) through the assistance of Buffalo Niagara Riverkeeper will be conducting additional Beneficial Use assessments and evaluations during the next two fiscal years (2006-08). The six uses that have been determined as "likely impaired", "unknown", or assessments that are incomplete include: tainting of fish and wildlife flavor, degradation of fish and wildlife populations, bird or animal deformities or reproductive problems, eutrophication or undesirable algae, degradation of phytoplankton populations, and loss of fish and wildlife habitat.

TABLE 2-1 BUFFALO RIVER AOC BENEFICIAL USES

Impairment Indicator	*2005 Status*	*Known or Likely Causes*
1. Restrictions on Fish & Wildlife Consumption	**Impaired**	**PCBs and Chlordane in sediments.**
2. Tainting of Fish & Wildlife Flavor	Likely Impaired	PAHs in sediments.
3. Degradation of Fish & Wildlife Populations	Likely Impaired	Low dissolved oxygen, river channelization and contaminated sediments.
4. Fish Tumors and Other Deformities	**Impaired**	**PAHs in sediments.**
5. Bird or Animal Deformities or Reproductive Problems	Likely Impaired	PCBs, DDT and metabolites in sediments.
6. Degradation of Benthos	**Impaired**	**Sediments, navigational dredging.**
7. Restrictions on Dredging	**Impaired**	**Various contaminants in sediments.**
8. Eutrophication or Undesirable Algae	Unknown	Unknown.
9. Restrictions on Drinking Water Consumption or Taste and Odor Problems	Not applicable	Not applicable.
10. Beach Closings *(see Section 4.1 for discussion)*	Not applicable	Sediments, CSOs, and bacterial loading from upper watershed.
11. Degradation of Aesthetics	**Impaired**	**Floatables, debris and foul odor from CSOs and upper watershed.**
12. Added Costs to Agriculture and Industry	Not Impaired	Not applicable.
13. Degradation of Phytoplankton and Zooplankton Populations	Not Impaired for Zooplankton; Unknown for Phytoplankton	Inadequate amount of quantitative or qualitative information on algal communities.
14. Loss of Fish & Wildlife Habitat	**Impaired**	**Physical disturbance such as bulk heading, dredging and steep slopes and lack of suitable substrate.**

3 DELISTING CRITERIA AND RESTORATION TARGETS

Buffalo Niagara Riverkeeper's first management goal as Buffalo River RAP Coordinator has been the creation of clear delisting criteria and restoration targets for the six recognized Beneficial Use Impairments (BUIs). Riverkeeper developed the criteria after a re-evaluation of the status of the BUIs by the Remedial Advisory Committee through three Technical Advisory Groups (Sediments, Water Quality, and Habitat & Environs). Local, regional and statewide experts from relevant scientific fields also contributed to development of the criteria. The suggested criteria have been shared with the public at several Buffalo River forums, offering community residents an opportunity to participate in the RAP process.

Table 3-1 on the following page summarizes the delisting criteria/restoration targets for five of the six known beneficial use impairments. Of the confirmed impairments, "loss of fish and wildlife habitat" is still being assessed and evaluated and quantitative targets are under development. As described in Section 2, additional research and information is needed for the remaining beneficial uses that are defined as "likely impaired", "unknown" or are incomplete.

TABLE 3-1 SUMMARY OF DELISTING CRITERIA/RESTORATION TARGETS

BUI #	Beneficial Use	Status	Delisting Criteria/Restoration Target(s)
1	Restrictions on Fish & Wildlife Consumption	Impaired	1) There are no AOC-specific fish and wildlife consumption advisories by New York State (e.g. carp for PCBs); AND 2) When contaminant levels in native and exotic fish and wildlife populations that could be consumed (e.g. walleye, bass, bluegills, perch, eels and pike) do not exceed current NYS standards, and levels are representative of a non-AOC reference community.
4	Fish Tumors and Other Deformities	Impaired	Fish tumors and other deformities shall be no greater than expected rates at non-AOC reference communities in species such as brown bullhead and suckerfish.
6	Degradation of Benthos	Impaired	1) Benthic macroinvertebrate communities are "non-impacted" or "slightly impacted" according to NYSDEC indices[1]; OR 2) In the absence of conclusive community structure data, the toxicity of sediment-associated contaminants is not statistically higher than controls.
7	Restrictions on Dredging	Impaired	No limitations on disposal of dredge spoils.
11	Degradation of Aesthetics	Impaired	1) Minimize debris, general litter, floatables, or contaminants in the river or shoreline via point source or non-point sources through the implementation of Best Management Practices; AND 2) Organic, chemical and biological contaminants should not persist in concentrations that can be detected as visible film, sheen or discoloration on the surface, detected by odor, or form deposits on shorelines and bottom sediments.

BUI #	Beneficial Use	Status	Delisting Criteria/Restoration Target(s)
14	Loss of Fish and Wildlife Habitat	Impaired	1) Invasive plant species, including Japanese knotweed and Purple loosestrife will be managed at levels that do not disrupt the sustainability of native, upland and aquatic plant communities. **Additional criteria and targets under development. Lacking sufficient habitat data to establish quantitative targets.*

SECTION 3 – REFERENCES

[1] Bode, R.W., M.A. Novak, L.E. Abele, D.L. Heitzman and A.J. Smith, for the NYSDEC Division of Water, Stream Biomonitoring Unit, Quality Assurance Work Plan for Biological Stream Monitoring in New York State (Albany NY, 2002).

4 BUFFALO RIVER REMEDIAL ACTION PLAN

The following subsections include information regarding water quality, contamination, and status of fish and wildlife in the Buffalo River AOC. The information and activities described in Section 4 will provide data that will be utilized to further RAP goals and to fill information gaps for the RAP.

4.1 WATER QUALITY

The following beneficial use impairments, or likely impairments, are directly related to the water quality in the Buffalo River AOC:

Impaired:

- *BUI #11- Degradation of Aesthetics*
- *BUI #10- Beach Closings (Not Applicable to AOC, but directly related to primary and secondary contact)*

Likely Impaired or Unknown:

- *BUI # 3- Degradation of Fish and Wildlife Populations*
- *BUI #8- Eutrophication or Undesirable Algae*
- *BUI #13- Degradation of Phytoplankton and Zooplankton Populations (Zooplankton Not Impaired, Unknown status for Phytoplankton)*

Water quality in the Buffalo River is determined by taking the mean concentrations of a variety of parameters (pH, turbidity, color, temperature, bacteria, dissolved oxygen, and concentrations of toxic substances such as metals, organic compounds and radioactive materials) and comparing these values to a set of standards under the New York State stream classification system. The resulting classification becomes the basis for restoration of impaired best uses of the river. The Buffalo River currently has a "Class C" designation, upgraded

from a "Class D" since the original RAP was written. According to NYSDEC, the best use of the Buffalo River has been identified as "fishing, with waters suitable for fish propagation and survival." In addition, "water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes."[1]

The chart below illustrates NYSDEC's classification scheme for best uses according to stream class.[2]

CLASS	BEST USE
AA, A	Source of drinking water, including all best uses for B, C and D streams.
B	Primary and secondary contact recreation, including all best uses for C and D streams.
C	Fishing, and waters must be suitable for fish propagation and fish survival. *Water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use of these purposes.
D	Fishing, and waters must be suitable for fish propagation and fish survival.

PROGRESS AND CURRENT CONDITIONS

Historically, factors affecting water quality in the Buffalo River Area of Concern impact area included industrial discharges, combined sewer overflows, agricultural run-off (including sediments and pesticides), inactive hazardous waste sites, stormwater runoff from urban and upstream sources (e.g. failing septic systems), and re-suspension of historically contaminated sediments.

Due to loss of industry, there are now fewer chemical discharges to the river.

Levels of PCBs, PAHs and pesticides in the water column have declined since the 1970's. Suspended sediment concentrations have declined as well.

Over the past 15 years, extensive technical research has been devoted to Buffalo River water quality issues. Though not all questions about this complex system have been answered, the data generated to date allow for some general observations and hypotheses. We now have a better understanding of the hydrology of the river and how factors such as natural flow rates, its relationship and mixing with Lake Erie water, and navigational dredging activities affect water quality.

Today, the major factors that are known to affect water quality in the Buffalo River are: 1) low dissolved oxygen, 2) turbidity, 3) heavy metals such as iron, mercury, zinc, lead and copper, and 4) bacterial contamination.

DISSOLVED OXYGEN

Dissolved oxygen has been linked to the likely impairment of beneficial use #3 – "Degradation of Fish and Wildlife Populations." The NYSDEC water quality standard for DO for "nontrout waters" such as the Buffalo River is as follows:

> "the minimum daily average shall not be less than 5.0 mg/L, and at no time shall the DO concentration be less than 4.0 mg/L".

Low dissolved oxygen levels (<4.0 mg/L) are generally observed during the warmer part of the summer, but can occur during dry-weather periods when the River has minimal water movement or during watershed-wide storms and CSO events.[3]

Extensive research has been conducted in recent years regarding DO in the Buffalo River and the results remain consistent. According to Irvine, et al., several dissolved oxygen modeling studies conducted for the river (Blair 1992, Wight 1995, Hall 1997) concluded the following: i) stratification in the river at low flows reduced aeration (from mixing); ii) high sediment oxygen demand, together with long residence times due to system hydraulics and background BOD, can produce low dissolved oxygen; and iii) CSOs to the river had minimal impact on dissolved oxygen.[4]

As recently as 2003-04, water quality analysis conducted as part of the "Assessment of Aquatic Habitat Restoration Sites" project indicates that DO levels were frequently below state guidelines within the dredged portion of the AOC, while levels upstream of the dredged channel generally were above state guidelines. At specific habitat sites, DO tended to be lower near the riverbed than higher in the water column.[5]

It is important to note that most of the water quality research and modeling conducted to date reflects the inputs of Lake Erie water through the Buffalo River Improvement Corporation (BRIC) pumping system. See more detailed discussion regarding BRIC at the end of this section.

TURBIDITY

Because of the combination of naturally occurring slow flow rates and inputs from stormwater runoff in the upper watershed, the Buffalo River remains relatively turbid. NYSDEC's RIBS sampling in 2001 indicated a range of 8.68-14.1 NTUs for the Buffalo River. (However, the lone sampling point for RIBS is near the mouth of the river where it is expected that suspended solids will have already begun settling out and most likely show a lower turbidity). Research

associated with the Buffalo Sewer Authority's Long-Term Control Plan has indicated that sharp increases in turbidity are directly related to storm events within the watershed, and that dry-weather turbidity is generally <20 NTU. As recently as 2003-04, water quality analysis conducted as part of the "Assessment of Aquatic Habitat Restoration Sites" showed that during dry periods, turbidity remained relatively low (<20 NTU) in the upper 1m at all 10 potential habitat restoration sites, and increased to about 20-100 NTU near the riverbed. Turbidity sharply increased during storm events, occasionally reaching values of 1,000 NTU. [6]

Turbidity is also suspected to contribute to the likely impairment of Beneficial Use #3- "Degradation of Fish and Wildlife Populations." Fish feeding and spawning may be affected by high turbidity, since most fish feed by sight, and high turbidity would affect their ability to see prey. High turbidity would likely indicate high rates of sedimentation, which may also impact eggs on the riverbed. It is also important to note that high turbidity may be the result of loss of habitat from throughout the AOC. There is a lack of shoreline vegetation to reduce runoff and prevent erosion. The historical loss of wetlands throughout the AOC contributes to the problem, since wetlands would have helped filter out some of the suspended sediments.[7]

Currently, there are no numerical turbidity standards that exist in New York State for a Class C stream. The NYSDEC narrative standard is as follows:

> "No increase that will cause a substantial visible contrast to natural conditions."

Before a delisting target can be developed regarding turbidity, the Remedial

Advisory Committee needs to make the determination of what kind of fishery the Buffalo River should support and what comprises its true "natural condition". At this time, the Buffalo River is representative of a warmwater fishery.

HEAVY METALS

Since the development of the original RAP, metals of concern in the water column have been associated with inactive hazardous waste disposal sites and the discharges from industrial wastewater treatment facilities.[8] The chemicals of concern included arsenic, barium, copper, iron, lead, manganese, zinc and cyanides.

Water column sampling conducted through the 2001 RIBS program at the Ohio Street sampling site indicated iron to be a parameter of concern. However, iron has been consistently detected at elevated levels throughout the watershed and may be naturally occurring.

NYSDEC-Region 9 has recently completed (September 2005) sediment sampling in the Buffalo River AOC in association with the Feasibility Study for Environmental Dredging. In addition to sediment cores, DEC collected 20 surface water samples at site locations that have the actual or highest potential for human contact. Water samples will be tested for metals, PAHs (SVOCs), pesticides and PCBs, and total suspended solids. Results are expected in Fall 2005.

BACTERIAL CONTAMINATION

Fecal coliform continues to be a problem in the Buffalo River, and recent research associated with BSA's LTCP has shown that the majority of fecal coliform loading is coming from the upper watershed. Even though there are no bathing

beaches on the Buffalo River, and therefore no official "impairment" of BUI #10 – "Beach Closings," primary and secondary recreational contact with the River occurs frequently.

Research has indicated that fecal coliform levels decrease downstream as the result of at least two factors; 1) Lake Erie mixes with the Buffalo River and dilutes the concentration, and 2) fecal coliform levels were significantly correlated with total suspended solid concentrations, and data shows turbidity levels decreasing downstream in association with sediment deposition.[9]

The Erie County Water Quality Committee has begun to focus on evaluation and abatement of upstream sources, including failing septic systems and suburban stormwater runoff.[10]

CSOs also continue to be a source of fecal coliform, metals, and suspended solids. There are 17 Combined Sewer Overflows releasing stormwater and sewage directly into the Buffalo River from the border of West Seneca to Buffalo Harbor. In total, there are 33 CSOs throughout the watershed that ultimately discharge into the river (see Figure 4-1). There are 3 connections to the Buffalo Sewer System from outside sewer districts that also overflow into the Buffalo River during storm events.[11]

The Buffalo Sewer Authority (BSA) recently completed its draft Long Term Control Plan (LTCP) that identifies best management practices for CSO abatement. Some of the extensive water quality analyses performed by BSA in the LTCP process will not be applied to the Buffalo River because of its previously mentioned "C" classification. Any discussion of alternatives for CSO abatement in the Buffalo River will be limited by this classification.

The current stream classification – which only acknowledges a best use as being suitable for primary contact recreation if "other factors do not limit" these uses– does not reflect the actual use of the Buffalo River by local residents. Primary and secondary contact occurs on a daily basis during the warm weather months, regardless of weather conditions. Confirmed by public outreach efforts, community discussions and river observations, members of the community continue to remain oblivious or apathetic to the health threats as evidenced by anglers utilizing the CSO outfalls for fishing and area youth using these outfalls and rail bridges for swimming access. The water quality studies associated with the aforementioned draft LTCP have indicated that in addition to CSO inputs, a large portion of the fecal coliform contamination is generated within the upper watershed. However, potential improvements in fecal coliform contamination are not evaluated in the draft LTCP because this water quality standard does not apply to receiving waters with the NYSDEC "C" classification.

Any improvement to human health risk, as well as fishery and benthic organisms, must be addressed through CSO abatement and on a watershed basis. The Buffalo River RAC is evaluating several options to the stream classification conundrum- should the classification represent what the status of the river is now, or what the goal for the river is in the future? Options that have been discussed include: upgrading the river to a "B" classification; requiring warm-weather disinfection at CSO outfalls; development of a watershed management plan; and a push for implementation of statewide TMDLs.

OTHER PARAMETERS

A 1992 study provided the first detailed examination of attached algae (especially diatoms) in the Buffalo River AOC[12]. In that study, a clear pattern of abundance of the attached green algae, *Cladophora*, and nutrient-tolerant attached diatoms

were observed. Though much of the river was composed mainly of the nutrient-tolerant diatoms, this was not considered an indication of a significantly degraded environment.[13]

The Buffalo River has never been fully assessed or evaluated for eutrophication (BUI #8), and more specifically the possible presence of microcystins, or toxic algae has never been studied.

Zooplankton populations have been determined to be "not impaired". Findings from a 1992 survey indicate that, overall, the zooplankton community in the river appears to be at least as diverse as that in the inshore areas of Lake Erie, and does not reflect the impacted nature of the river to nearly the extent of the benthic macroinvertebrate community (Snyder 1993). [14]

Conversely, not enough information and data exists for phytoplankton populations (BUI #13) to make an accurate determination of its status. Phytoplankton is a good indicator of a waterbody's trophic state and potential for fish production. Initial sampling in 1978 by Frederick and Booth looked at three locations in the lower Buffalo River. The study revealed that the highest concentrations of phytoplankton in the river occurred in the upstream portion and progressively decreased downstream towards the mouth. A subsequent survey in 1992 at four sites revealed a general absence of Cyanophyta (blue-green algae) at the upper and lower reaches of the river, but abundant levels in the meandering section of the river. The green algae, *Scenedesmus*, were found throughout the river in relatively high numbers. Schero[15] suspected that this may reflect the ability of the algae to survive in the turbid, organically enriched waters of the Buffalo River. [16] The Buffalo River RAC is currently developing a request for proposals for work

associated with the assessment and evaluation of beneficial uses #8 and #13. Data collection and analysis is expected to be completed by September 2008.

Aesthetic issues related to water quality continue to be a concern in the Buffalo River AOC. In addition to the problem with floatables and general litter/debris coming from the upper watershed, there continues to be a problem with organic, chemical and biological contaminants that are detected as visible sheen, film and/or discoloration on the surface, as well as odor and deposits on the shoreline.

RAC RECOMMENDATIONS

The Buffalo River RAC has recommended the following preliminary steps in order to make progress towards delisting. These recommendations will be further refined, expanded and prioritized as the updated Buffalo River Remedial Strategy is developed.

- Fully implement Stormwater Phase II regulations through the implementation of best management practices and pollution prevention strategies.
- Implement non-point source (agricultural and other runoff) pollution abatement practices in the upper watershed through a possible wet weather or stormwater project.
- Continue erosion control measures in the upper watershed (i.e. Cayuga, Buffalo and Cazenovia Creeks).
- Continue to address failing septic systems throughout the upper watershed.
- Complete assessment and evaluation of nutrients and possible eutrophication, algal populations and phytoplankton populations.
- Eliminate all SSOs in the Buffalo River watershed in accordance with the Clean Water Act (Town of Cheektowaga – Broadway and Union, Vern Lane near Joanne, and Vern Lane at Constance; Village of Depew – Borden Road at old wastewater treatment plant).

- Complete review and evaluation of BSA's LTCP.
- Adopt long-term CSO control programs consistent with EPA's National CSO Policy and the Great Lakes Strategy.
- Identify gaps in data and research and obtain funding or develop programs to fill these gaps.

PROJECT UPDATES

Water quality projects include those involving monitoring and restoration of overall water quality, as well as specific abatement of bacterial contamination by fecal coliform and *Escherichia coli* bacteria.

4.1.1 NYSDEC ROTATING INTEGRATED BASIN STUDIES (RIBS)

In 2000 and 2001, the rivers and streams of the Niagara River-Lake Erie basin were sampled as part of the Rotating Integrated Basin Studies portion (RIBS) of the Statewide Waters Monitoring Program.[17] The RIBS report was released in mid-2005.

The Buffalo River is one of three "permanent sites" in Region 9 sampled every year. The sampling of the Buffalo River takes place at the Ohio Street Bridge. Thirteen additional sites within the Buffalo River watershed were also sampled in 2001. The basin is next scheduled for monitoring during 2006. All data collected for this site and the thirteen sites within the watershed can be found in the 2005 RIBS report.

The RIBS report is a quantitative summary of the concentrations of chemical and physical constituents in the water column, sediments and biological tissue. These concentrations are compared to assessment criteria to determine if designated uses of the waterbody are supported.

The water quality data and information generated by the RIBS program are used to support many monitoring and assessment functions within NYSDEC Division of Water, including the development of the Waterbody Inventory/Priority Waterbody List.[18]

The 2005 RIBS Assessment Summary for the Buffalo River site is as follows:

- Water quality parameters of concern are iron, ammonia, water temperature and dissolved oxygen
- Macroinvertebrate sampling (in the water column) indicated a slightly impacted condition. The source of impacts is still considered to be from municipal and industrial inputs.
- There continues to be a fish advisory for carp (eat none) due to PCB contamination.
- No significant mortality or reproductive impairment of the Water Flea (*Ceriodaphnia dubia*) was detected at this site.
- No bed sediments or suspended sediments were collected.

4.1.2 2002 Niagara River/Lake Erie Basin Waterbody Inventory and Priority Waterbodies List

In order to fulfill requirements of the federal Clean Water Act, NYSDEC must provide regular, periodic assessments of the quality of the water resources in the state. The assessments reflect monitoring and water quality information drawn from a number or programs and sources, both within and outside NYSDEC. The Buffalo River AOC is part of the Priority Waterbodies List (PWL).

Released in summer 2005, the 2002 PWL utilized RIBS monitoring data

that had been collected in 2001, though macroinvertebrate sampling was conducted separately in 2000. The assessment of the Buffalo River AOC for the PWL is based on sampling conducted at the Ohio Street bridge.

Known pollutants include priority organics (PCBs), while dissolved oxygen, pathogens, and silt/sediment are considered to be suspected pollutants. Known sources of pollutants include contaminated sediments, habitat modification, hydromodification, and urban runoff. Suspected pollutant sources include combined sewer overflows, and possible pollutant sources include industrial sites, landfills, municipal and storm sewers. Fish consumption is considered to be "impaired", and aquatic life and recreation are considered "stressed".

4.1.3 MUNICIPAL & INDUSTRIAL WASTE WATER FACILITIES

Discharge permit monitoring and renewals are ongoing. Under the DEC's Environmental Benefit Permit System (EBPS), State Pollution Discharge Elimination System (SPDES) permits are periodically assessed and modified. A prioritized list of the permits to be evaluated during the year is published every April in the Environmental Notice Bulletin; no SPDES permits in the Buffalo River Basin are scheduled for technical review during the 2005-2006 fiscal year. There are 8 facilities with SPDES permits on the Buffalo River (see Figure 4-1 for locations).

These are:

- Worthington Business Center, Stormwater
- Buffalo & Pittsburg Railroad Buffalo Creek Yard (Norfolk and Western Railroad Company), Sanitary
- BOC Group, Inc., Cooling

- Buffalo Color Corporation, Cooling
- PVS Chemicals, Inc., Cooling
- Mobil Oil Corporation, Stormwater
- General Mills, Inc., Cooling (GM also holds a SPDES permit for groundwater discharge into the City Ship Canal)
- Pierce and Stevens Corporation, Cooling

4.1.4 MUNICIPAL SEWER SYSTEMS

4.1.4(A) BSA LONG TERM CONTROL PLAN

In accordance with the USEPA's 1994 CSO Control Policy, a Draft CSO Long Term Control Plan has been prepared by the Buffalo Sewer Authority (BSA) and is presently being reviewed by NYSDEC.

The BSA is required under the terms of its State Pollution Discharge Elimination System (SPDES) permit (Permit No. 9-1402-00154/00002) to implement Best Management Practices (BMPs) for CSOs and to develop a CSO Abatement Plan. The BMPs are equivalent to Nine Minimum Controls (NMCs) required under the USEPA CSO Control Policy.[19]

The LTCP was completed in three stages: system mapping, data collection and model development; district specific planning; and system-wide long term control plan development. As of June 2005, BSA has invested nearly $8 million in the development of the LTCP. It is expected that the plan will be publicly released by early 2006.

The BSA held at least two public hearings on the LTCP, one at the beginning of its development and another after preliminary results had been compiled. There will also be an opportunity for public comment on the plan following its release.

4.1.4(B) SEWER SEPARATION

Sewer separation in Kaisertown (the area of Buffalo near the West Seneca border) is almost complete. The project is part of an initiative that separates combined sewers into two separate sewers; one dedicated to stormwater, the other to waste water. The BSA will be adding 5,000 feet of new sewers ranging in size from 10-27 inches. The purpose of this separation work is threefold: 1) to reduce stormwater inputs to the wastewater treatment plant which increases the plants capacity to treat sanitary sewage, 2) reduce the frequency and volume of combined sewer overflow (CSOs) events, and 3) diminish the incidences of sewer back-ups into homes and other private properties.[20]

The Kaisertown separation project will redirect stormwater into the permitted CSO near the Sloan Drain (near South Ogden Street). The separation effort supports the current focus of the BSA, which is to maximize the performance of the existing sewer system infrastructure.[21]

In addition, the Barnard Street CSO (#034) has been converted into a stormwater only discharge. This will eliminate the amount of septic sewage that had previously entered the Buffalo River from this location.

4.1.5 STORMWATER

Non-point source pollution (from stormwater runoff, septic systems and CSO inputs) is the major source of contaminants generated in the upper watershed. Stormwater pollution from throughout the Buffalo River watershed contributes greatly to most of the BUIs for the river.

4.1.5(A) STORMWATER COALITION

Erie County Department of Environment and Planning (ECDEP) received a $500,000 grant from NYSDEC in 2004 for a Western New York Stormwater Pollution Prevention Implementation Project. ECDEP initiated a regional strategy to assist local municipal governments, in Erie and Niagara Counties, in understanding and complying with the U.S. Environmental Protection Agency's Stormwater Phase II regulations. This strategy includes formation of the Western New York Stormwater Coalition, a group consisting of representatives of Erie County, Niagara County, several local and state government agencies, 41 regulated municipalities and environmental consultants. For the past three years, the members of the Coalition have met on a monthly basis to collaborate on developing and implementing a comprehensive stormwater management program. The Coalition utilizes a workgroup format to address the six minimum controls that the regulations require. Each workgroup is responsible for developing their respective components of the stormwater management program. Erie County staff coordinates the activities of the Coalition, maintain an e-mail distribution list and perform administrative duties on behalf of the Coalition.

There are six minimum controls to the Phase II regulations:

1. Public education & outreach
2. Public participation & involvement
3. Illicit discharge detection & elimination
4. Construction site runoff control
5. Post-construction site runoff control
6. Pollution prevention & good housekeeping for municipal operations

When successfully implemented, these measures are expected to significantly reduce the volume of pollutants discharged into receiving bodies of water.[22]

4.1.5(B) Illicit Discharge Trackdown & Impervious Surface Modeling

Beginning in 2006, Buffalo State College-Department of Geography and Planning will begin an Illicit Discharge Trackdown project in conjunction with the Phase II Stormwater efforts with Erie County. Over 40 regulated municipalities in Erie and Niagara Counties are being evaluated as part of this project, which is expected to help establish stormwater parameters for all municipalities. As of September 2005, approximately 80% of the areas have been mapped, totaling approximately 3,600 outfalls. The project is divided into three stages: 1) identify stormwater outfalls, 2) prioritize the outfalls based on discharge location and surrounding land use, and 3) establish a rotating monitoring program to identify and track down any illicit dry weather discharges or illegal connections to the stormwater systems. This

monitoring, along with the identification of potential upstream sources, will allow participating municipalities to track down the sources of the illicit dry weather discharges. It is expected that all information and data generated from this project will be publicly available through Erie County's website in early 2006.[23]

Buffalo State College will be conducting an impervious surface assessment for the entire Niagara River Watershed beginning in 2005. A model application for a subset of the watershed will also be conducted, which most likely will be for the Buffalo River. The thesis work by a graduate student is expected to provide useful data on the percentage of impervious surfaces in the Buffalo River watershed, which will help the RAC develop delisting criteria and restoration targets for BUI #14- "Loss of Fish and Wildlife Habitat."

4.1.6 Buffalo River Improvement Corporation (BRIC)

Due to industrialization of the river, by the mid-1960's the river channel had expanded to hundreds of times its original volume, and the residence times for pollutants climbed proportionally. The resulting high temperatures and acidity prevented effective use of the river as a source of industrial cooling water. To alleviate these effects, a consortium of industries formed the Buffalo River Improvement Corporation (BRIC). The BRIC constructed a pumping station and service main so that Lake Erie water could be pumped (from approximately 2 miles south of the mouth of the Buffalo River) to the plants for cooling and then be discharged into the river to augment flow. Although the BRIC pump rate amounted to only 20% of total annual flow in the river, it is reported to

have contributed more than 90% of flow during summer low flow conditions (Sauer 1979).[24]

The BRIC system was designed to supply 120 million gallons per day (mgd) for industrial use. Due to industrial plant closures and process shutdowns, only one company continues to utilize as well as manage BRIC, and that is PVS Chemicals, Inc. PVS Chemicals estimates that the flows will not exceed 5-6 mgd during 2005, with an operational cost ranging from $24,000-$40,000 per month. It is yet unclear what impact, if any, this reduced flow will have on the Buffalo River.

The Buffalo River RAC Water Quality Technical Advisory Group has discussed flow modeling using hypothetical increased BRIC flows to address the low dissolved oxygen issue. The RAC agrees that no one company or entity should bear the burden of additional BRIC costs if flows are increased at some point in the future for the purpose of habitat or water quality improvement.

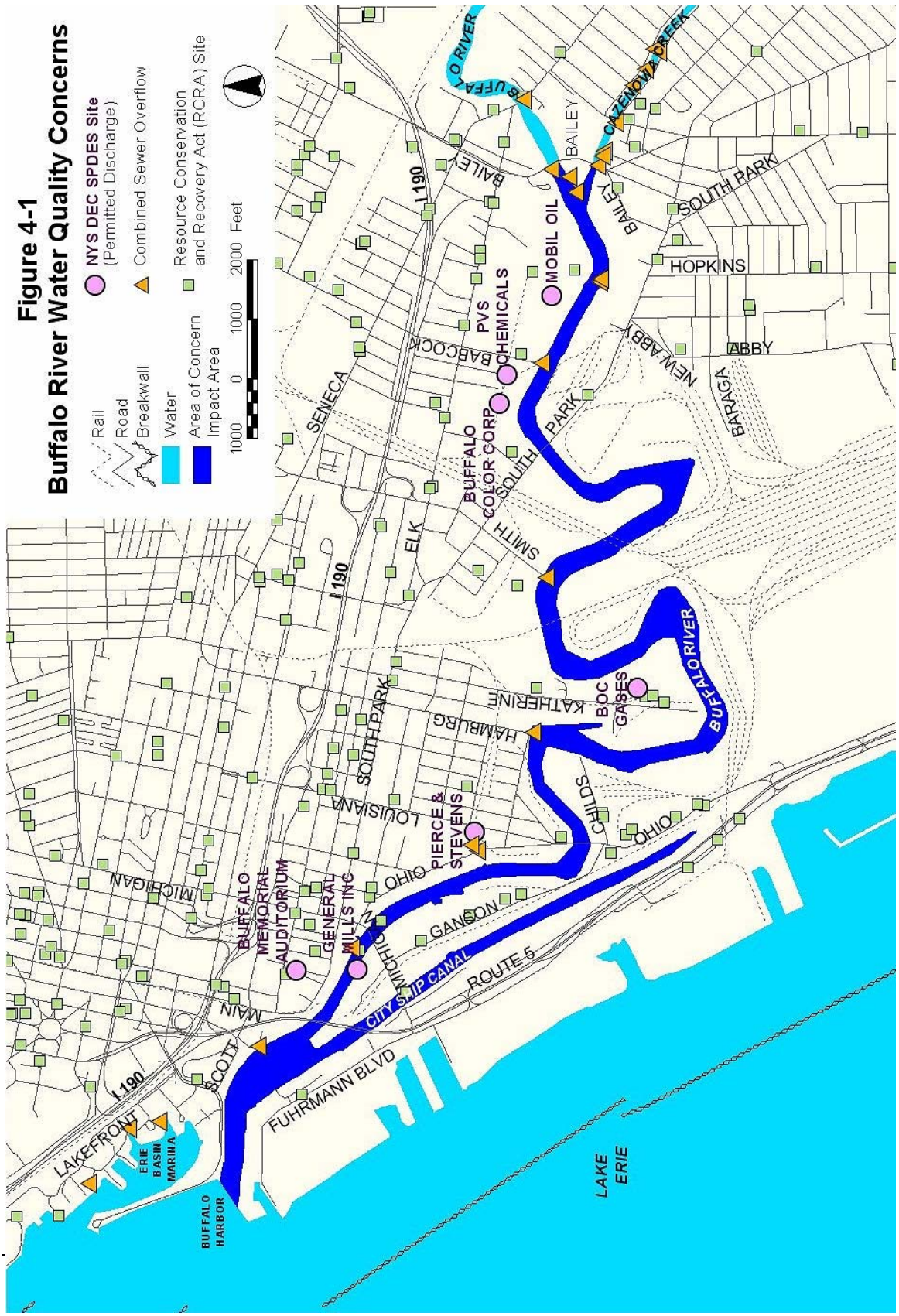
Figure 4-1
Buffalo River Water Quality Concerns
NYS DEC SPDES Site (Permitted Discharge)
Combined Sewer Overflow
Resource Conservation and Recovery Act (RCRA) Site
Rail
Road
Breakwall
Water
Area of Concern Impact Area
1000 0 1000 2000 Feet
BUFFALO RIVER
CAZENOVIA CREEK
BAILEY
SOUTH PARK
HOPKINS
MOBIL OIL
PVS CHEMICALS
BABCOCK
NEW ABB
ABBY
BARAGA
SENECA
I 190
BUFFALO COLOR CORP
SMITH
ELK
KATHERINE
BOC GASES
HAMBURG
CHILDS
OHIO
PIERCE & STEVENS
LOUISIANA
MICHIGAN
BUFFALO MEMORIAL AUDITORIUM
GENERAL MILLS INC
GANSON
CITY SHIP CANAL
ROUTE 5
MAIN
SCOTT
FUHRMANN BLVD
LAKEFRONT
ERIE BASIN MARINA
BUFFALO HARBOR
LAKE ERIE

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4.2 CONTAMINATION

The following beneficial use impairments, or likely impairments, are directly related to sediment and upland contamination in the Buffalo River AOC:

Impaired:

- *BUI #1 – Restrictions on Fish & Wildlife Consumption*
- *BUI #4 – Fish Tumors and Other Deformities*
- *BUI #6 – Degradation of Benthos*
- *BUI #7 – Restrictions on Dredging*
- *BUI #14 – Loss of Fish & Wildlife Habitat*

Likely Impaired:

- *BUI # 2 – Tainting of Fish and Wildlife Flavor*
- *BUI #3 – Degradation of Fish and Wildlife Populations*
- *BUI #5 – Bird or Animal Deformities or Reproductive Problems*

Two forms of contamination afflict the Buffalo River watershed- contaminated river bottom sediments and upland contamination associated with inactive hazardous waste sites or current industry. Recent research has indicated that the majority of the known beneficial use impairments within the Buffalo River AOC are either caused by or related to the presence of contaminated sediments.

PROGRESS AND CURRENT CONDITIONS

The industrial boom experienced by the City of Buffalo from the early 1900s through the 1950s resulted in a legacy of contaminated sediment in the Buffalo River. Grain elevators and lumber mills, coal, iron, steel and petroleum manufacturing facilities thrived along the river, utilizing the water supply for cooling, shipping and waste disposal. Combined with upper watershed sources,

this manufacturing activity resulted in contamination of sediments by metals, pesticides, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and industrial organic materials. Remnants of Buffalo's industrial heritage, including abandoned grain elevators, brownfields, and inactive hazardous waste sites, still dominate the landscape along the lower 6.2 miles of the river.[1]

SEDIMENTS

The Buffalo River is a navigable channel maintained by the US Army Corps of Engineers at a depth of 22 feet below low lake level datum. The USACE conducts navigational dredging every two to three years to facilitate lake vessel access to industry along the river. In 1986 commercial lake freighters made approximately forty trips up the Buffalo River and City Ship Canal.[2]

According to the shipping logs for the Michigan Street Lift Bridge, as of 2005 only two companies along the Buffalo River continue to receive lake shipments. (Shipping data could not be acquired for the City Ship Canal prior to the completion of this Status Report). LaFarge Corporation received 24 lake shipments of cement, and ADM Milling received 10 lake shipments of grain. Both of these companies are located in the lower Buffalo River downstream of the Ohio Street Bridge. In addition, BIDCo (Buffalo Industrial Diving Company) tug boats made approximately 10 round trips for the year, but their annual frequency is business dependent. Great Lakes Towing, which provides tug boats for lake freighters entering all of Western New York's navigable waterways, is also dependent on the maintenance of the navigation channel. Great Lakes Towing docks its tugs near the foot of Hamburg Street. Recreational usage of the Buffalo River that also depends on the navigation channel is from tours on the Miss Buffalo and Miss Buffalo II. These site-seeing vessels made approximately 12

round trips in 2005, and usually travel up to the first CSX Rail Bridge near the Concrete Central Peninsula.[3]

The USACE acknowledges that the need to dredge is based more on funding than the actual shoaling rates. The actual dredging itself can be "hit and miss" and the product of a variety of factors other than shoaling in the channel that develops above the authorized depth (22 feet).[4] Generally, there is more dredging needed than what can be removed and the volume is based on budget constraints. Specific locations of dredging are not routinely recorded.[5]

The navigational dredging information that is available includes frequency by channel reaches and total volume dredged per dredging cycle (see following tables).

Channel Reach	General Dredging Frequency*
Upstream limit to South Park Bridge	Every cycle (2-3 years)
Around Buffalo Color Peninsula	Every 2-3 cycles (4-9 years)
Buffalo Color Peninsula downstream to Ohio Street Bridge	Every 4-5 cycles (8-15 years)
Ohio Street Bridge downstream to river mouth	Every 2-3 cycles (4-9 years)
City Ship Canal	Every 2-3 cycles (4-9 years)
Outer Harbor Channels	Every 4-5 cycles (8-15 years)

Dredging Cycle	Volume (in cubic yards)**
1990	131,547
1992	118,000
1994	104,121
1997	199,432
1999	226,000
2003	223,770

*Information provided by Scott Pickard, USACE

**Information provided by Michael Asquith, USACE

The Buffalo River Environmental Dredging Feasibility Study currently underway will evaluate navigational dredging efforts, and the impact of contaminated sediments on the cost of dredging. More information regarding the Feasibility Study is found in section 4.2.1

Although newly deposited sediment in the Buffalo River is much cleaner than historical sediment, both the surficial and deeper sediments are known to be contaminated from industrial activity. Sediment contaminated with PCBs, PAHs, metals and industrial organic chemicals continues to be found throughout the River and within the dredged navigational channel. River sediments at some locations are also contaminated with cyanide and metals to levels that prohibit open lake disposal of dredge materials.[6] These dredge materials require controlled disposal in a local Confined Disposal Facility- hence the impairment of beneficial use #7, "Restrictions on Dredging".

Sources for this ongoing contamination remain unconfirmed. Some possibilities include sloughing of historical contamination from outside the dredge channel, contamination transported from immediately upstream or from within the upper watershed, or from leaching at inactive hazardous waste sites or existing industrial sites.

In 2004, a collaborative effort between the USACE and Buffalo State College resulted in the creation of a GIS-linked database of sediment data for the Buffalo River AOC impact area. Sediment sampling data from the past 20 or more years are organized in this database.

The University at Buffalo and Buffalo State College are completing a collaborative effort related to Buffalo River sediment transport which includes a

sediment trend analysis, side-scan sonar profiling and hydrodynamic profiling. The data generated from the project should give researchers additional insight in river-bottom sediment dynamics and sediment modeling applications. Interpretation and analysis is expected to be completed in early 2006.

The University at Buffalo and Buffalo State College have also collaborated on a sediment sampling and modeling effort that will attempt to identify pathways of sediment transport. The "Assessment of Contaminants in the Lower Buffalo River" project includes sediment coring at four sites on the River (Hamburg Cove, Blue Tower Turning Basin, Smith Street Restoration Site and near ExxonMobil). Suspended sediment samples were also taken upstream and downstream. In addition, a detailed model for sediment transport and deposition estimates for the Buffalo River AOC is being developed as part of a "Modeling of Sediment Transport and Deposition on the Buffalo River" project. This model is adopting a novel approach based on particle tracking to identify specific transport pathways, as a means of evaluating environmental dredging operations. The model will help identify the fate of sediment and associated contaminants entering the Buffalo River AOC. A preliminary model was completed in September 2005 and final results are expected in early 2006.

Although numerous studies of sediment quality, transport and deposition have been performed since 1986, no comprehensive study and analysis has been conducted nor have remedial alternatives been identified.

On April 8, 2005, the USACE and Riverkeeper signed a landmark $2.1 million cost share agreement that will define the nature and extent of sediment contamination within the AOC impact area and assess remedial alternatives for River sediment. Known as the "Buffalo River Environmental Dredging

Feasibility Study" (FS), this 3-year study is the last step necessary prior to any sediment remediation within the AOC impact area. Depending on the results of the FS, the intention of the Remedial Advisory Committee is to pursue sediment remediation funding from either the USACE's 312 Program or USEPA's Great Lakes Legacy Act in FY 2008.

UPLAND CONTAMINATION

Since the inception of the Buffalo River RAP in 1989, some 45 inactive hazardous waste sites within the Buffalo River AOC have been identified. These include sites from the upper watershed along the three tributaries, Cayuga Creek, Buffalo Creek and Cazenovia Creek.

New York State DEC has enacted an Inactive Hazardous Waste Disposal Site Program (State Superfund program), in addition to the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund, to ensure the identification, investigation and clean up of sites where significant amounts of hazardous waste may exist. New York State utilizes the Environmental Restoration Program, which provides funding under the Clean Water/ Clean Air Bond Act of 1996 for remedial efforts. Also, the Brownfield Clean Up Program and the Voluntary Clean Up Program create private-public partnerships to promote remedial efforts of contaminated lands on a volunteer basis. Ultimately, NYSDEC-Region 9 or USEPA-Region II coordinate the clean up of all inactive hazardous waste sites within the Buffalo River AOC.

To date, all Phase I & II site investigations have been concluded for the 45 sites. Remedial Investigations (RI), Feasibility Studies or Interim Remedial Measures (IRM) were completed at 42 of the 45 sites. The remaining three are undergoing restoration planning or entered voluntary clean-up agreements.

Delisting has occurred at 21 sites. A site is delisted if "no consequential quantity of hazardous wastes are present". ("No consequential quantity" is an amount of hazardous waste that does not create a significant threat to the environment.) Delisting occurs when one of two conditions are present: 1) either a consequential quantity of hazardous waste was never present at the site or, 2) an inconsequential amount of hazardous waste is all that remains at the site as a result of remediation. Ultimately, if the site is delisted, it is deemed clean by NYSDEC or USEPA.[7]

Nine sites have been "closed" with continued management. Remedial activity continues at 5 sites (Steelfields LTD, Tifft & Hopkins Street, Buffalo Color Plant Site, 90 Hopkins Street and Boone Park). Long-term operation and maintenance continues at eight sites including Bern Metal, Sovereign Chemical, and Buffalo Color Area D.

RAC RECOMMENDATIONS

The Buffalo River RAC has recommended the following actions regarding contamination within the Buffalo River AOC in order to make progress towards delisting. These recommendations will be further refined, expanded and prioritized as the updated Buffalo River Remedial Strategy is being developed.

- Complete the Buffalo River Environmental Dredging Feasibility Study by April 2008;
- Apply to the Great Lakes Legacy Act or use USACE's 312 Program for funding by FY-2008 for contaminated sediment remediation in the Buffalo River AOC;
- Support NYSDEC efforts to complete remediation of all 45 inactive hazardous waste sites and continue monitoring leaching potential at sealed or remediated sites;
- Track down illegal connections or illicit discharges to storm sewer lines;

- Implement non-point source (agricultural and other runoff) pollution abatement practices in the upper watershed through a possible wet weather or stormwater project;
- Continue erosion control measures in the upper watershed (i.e.; Cayuga Creek, Buffalo Creek and Cazenovia Creek).

4.2.1 BUFFALO RIVER ENVIRONMENTAL DREDGING FEASIBILITY STUDY

The U.S. Army Corps of Engineers, Buffalo District performed a reconnaissance level study from 2001-2003, which determined that there was federal interest in initiating a cost-shared feasibility study of environmental dredging in the Buffalo River from Hamburg Street to the confluence of Cazenovia Creek.

Section 312 of the Water Resources Development Act (WRDA) of 1990, entitled: "Environmental Dredging," authorizes the Secretary of the Army to remove contaminated sediments from the navigable waters of the United States. Section 312(a) provides for removal of contaminated sediments outside the boundaries of and adjacent to a Federal navigation project as part of the operation and maintenance of the project. Section 312(b) provides for removal of contaminated sediments for the purpose of environmental restoration and water quality improvement if such removal is requested by a non-federal sponsor and the sponsor agrees to pay 35 percent of the cost of removal and disposal. Section 205 of WRDA 1996 amended Section 312 by stating that priority of work be given to five locations, one of which being the Buffalo Harbor and Buffalo River, Buffalo, NY.[8] The non-federal sponsor for the feasibility study is Buffalo

Niagara Riverkeeper, who has agreed to cost share half of the $2.1 million feasibility study which is expected to take three years.

A Feasibility Cost Share Agreement was signed between the Corps Buffalo District and Riverkeeper on April 8, 2005. The expected outcomes of the feasibility study include the following:

- Identification and quantification of potential Operation & Maintenance (O&M) benefits
- Identification and quantification of potential environmental restoration benefits
- Formulation of alternative plans that are consistent with the RAP
- Evaluation of alternative plans
- Coordination with stakeholders concerning the findings of the study
- Identification of a National Economic Development Plan and National Ecosystem Restoration Plan
- Development of an Environmental Impact Statement (EIS)
- Development of a project cost estimate
- Identification of a reasonable construction schedule for the recommended plan.[9]

A major project partner in the Feasibility Study, NYSDEC-Region 9 conducted a comprehensive sediment sampling program in the Buffalo River AOC from Hamburg Street to the confluence of Cazenovia Creek in August-September 2005. The 400 samples collected will be used to define the nature and extent of sediment contamination within the AOC and the data will be provided to the USACE to be used in the assessment of remedial alternatives for River sediment.[10]

The FS is a necessary last step prior to actual sediment remediation. Depending on the results of the FS, the intention of the Remedial Advisory Committee is to either pursue sediment remediation funding through the USACE 312 Program or to request federal funding from USEPA's Great Lakes Legacy Act in FY 2008.

The Buffalo River RAC believes that in combination with the complete clean up of inactive hazardous waste sites, the remediation of contaminated sediments is required to delist most of the beneficial use impairments or suspected impairments (BUIs #1, #2, #3, #4, #5, #6, #7, #14) and to make substantial progress towards delisting the entire Buffalo River Area of Concern.

4.2.2 Remediation of Inactive Hazardous Waste Sites

The following pages provide a detailed summary of all 45 Inactive Hazardous Waste Sites within the Buffalo River AOC and watershed. Note that Buffalo Color is broken down into 5 segments (Areas A through D and the Plant Site), and each has its own site code.

Table 4-1 consists of basic information describing inactive hazardous waste site clean up progress and the remaining chemical contaminant concerns. This information was derived from the Environmental Site Remediation Databases maintained by the NYSDEC Division of Environmental Remediation. Additional information was supplied by the NYSDEC Division of Environmental Remediation and the 2002 RAP Status Report.

The information is categorized by sites according to the proximity to

either a river or creek, and alphabetically within each respective watercourse. The classification (or class) codes are based on the NYS classifications in the Inactive Hazardous Waste Disposal Site Program 6 NYCRR Subpart 375-1.8, with the exception of those letters referencing programs other than the Inactive Hazardous Waste Disposal Site Program such as Voluntary Clean Up Programs. Table 4-2 provides a glossary of all class codes and important acronyms found within Table 4-1.

Detailed information about the remediation status of sites that are **not** delisted is readily available on the *Environmental Site Remediation Database*. The database is accessible on-line at the NYSDEC Environmental Remediation Databases web page, www.dec.state.ny.us/apps/derfoil/index.cfm/. Click on the link for "search environmental site remediation database" and enter a five-digit site code. (Site codes can be found in Table 4-1).

The following highlights progress made on remediation of the 45 inactive hazardous waste sites as of August 2005:

- 21 sites have been "delisted";
- 1 site is "properly closed";
- 8 sites are "closed with continued management";
- 3 sites, action may be deferred because they do not present a significant threat to the environment or human health;
- 6 sites continue to be a significant threat to environment, considered "class 2";
- 1 site is only temporarily classified because of lack of data;
- 1 site has not yet received a classification

- 2 sites are currently undergoing remediation under the NYS Voluntary or Brownfield Clean Up Programs
- 2 sites are currently undergoing remediation under the Environmental Restoration Program.

Consult Appendix C for a thorough discussion on DEC's Inactive Hazardous Waste Disposal Site Program and a detailed update of sites located within the AOC impact area. See Figure 4-1 for locations of all sites that are not "delisted" within the entire watershed.

TABLE 4-1 REMEDIATION STATUS OF HAZARDOUS WASTE SITES IN THE BUFFALO RIVER WATERSHED

	Site Name (Site Code)	Class Code	Remediation Status	Date of Delisting	Contaminant Concerns
BUFFALO RIVER	Allied Chemical Industrial Chemical Division (915004)	D	Phase II investigation completed.	February 1993	Investigation did not indicate the presence of hazardous waste on site.
	Ameron (915133)	4	Volatile organics remain beneath the floor slab of the building. Subsequent inspection of the facility prior to closeout revealed 11 unregistered USTs on site. All tanks were removed under an IRM CO as of 12/2004. CO requires further investigation and completion of any necessary remediation.	NA	Collection of contaminated groundwater and soil vapor was discontinued in 2000. Further site investigation is necessary to determine if any additional contamination is present on site. Exposure through direct contact is unlikely because the drum disposal area is capped.
	Behringer Property (915155)	D	Remedial action completed.	September 1996	All contaminated soils removed.
	Bengart & Memel (915115)	4	PCB oil was spilled on the site contaminating the soil. Remedial actions included excavation of contaminated soil, installation of a groundwater collection and treatment system, and chemical treatment of contaminated soils. Remediation has occurred under CO.	NA	Exposure to PCBs has been eliminated by the asphalt cap area. Ground water collection and treatment continues. Also, public access is controlled.
	Bern Metal Corporation (915135)	2	Remediation consisted of demolition of the site buildings, waste consolidation, and backfilling excavated areas with clean fill, capping the waste on Bern Metals site, construction of drainage ditches, and fencing. The site is being monitored and maintained under a long term O&M Plan by the City of Buffalo.	NA	Elevated levels of lead, up to 176,000 milligrams per kilogram, are present on-site in subsurface soil. The USEPA is working with the responsible parties to purchase the homes adjacent to the site. Once the agreement has been completed, the homes will be demolished and disposed of.
	Boone Park (B00196)	E	The park was closed in 2001. Field work was completed in April 2004. Results of supplemental sampling and Preliminary IRM contract documents were presented at a public meeting in December 2004. Removal of contaminated soil through the IRM is expected to be conducted in early 2005.	NA	Low levels of arsenic have been documented in surface and subsurface soils in the area of the baseball fields to a depth of 18". Plans call for removal of all contaminated soils and then restore property back to recreational use.

	Site Name (Site Code)	Class Code	Remediation Status	Date of Delisting	Contaminant Concerns
BUFFALO RIVER	Bristol Street (915170)	D	Site remediated. Soil removed.	March 1999	Site contained PCB's in soil. Removal action complete.
	Buffalo Color Plant site (915184)	NA	Interim Remedial Measure by Consent Order. Remedial work to be completed in 2006.	NA	The Interim Remedial Measure consists of the installation of groundwater pumping wells and the installation of a groundwater cut-off wall to prevent flow of site contaminants to the Buffalo River.
	Buffalo Color A & B (915012A&B)	2	ROD issued. Remedial Action completed.	NA	Remediation action has mitigated migration issues.
	Buffalo Color C (915012C)	D	Deep well has been properly closed.	1989	NA
	Buffalo Color D (915012D)	2	A remedy consisting of containment of waste by a slurry wall and cap, extraction and treatment of groundwater, removal of contaminated sediments from the Buffalo River, and protection of its shoreline from erosion. Long term monitoring is underway, and a study of sediments is under review.	NA	Contamination of groundwater and Buffalo River sediments by organic chemicals and metals had occurred. There is the potential for exposure through inhalation of contaminated dust and direct contact with contaminated surface water, sediments, and soil. Remedial actions should eliminate potential for human exposure.
	Clinton-Bailey (915126)	D	Phase I & II investigation completed.	March 1995	Data indicates the presence of heavy metals (arsenic) and organic compounds in soil samples at site. Potential for contaminant migration limited. Drum removal completed in 1991.
	ENRX (915150)	3	Inventory removal of waste drums. Significant concentrations of TCA, TCE and PCE detected in the sumps and structures in the basement and first floor levels. Older portion of building demolished and toxic materials disposed off- site.	NA	Elevated levels of organic and inorganic compounds inside the vacant building, Exposures to the general public are not expected because the building is secured.
	Erie Lackawanna RR (915021)	D	Phase I investigation completed.	1989	Investigation indicated no hazardous waste disposal on site.
	90 Hopkins St. (E915181)	E	The City of Buffalo has committed to the removal of 30,000 cubic yards of lime material from the 8.9 acre site.	NA	Run-off from the piles has caused significant rises in pH in local waterways.

	Site Name (Site Code)	Class Code	Remediation Status	Date of Delisting	Contaminant Concerns
BUFFALO RIVER	Houdaille - Manzel (915037)	D	Negotiations for Remediation Consent Order failed. State funded RI/FS completed.	March 1994	Data does not indicate hazardous waste present on site.
	Houghton Park (915059)	D	Phase I & II investigation completed. Buffalo Urban Renewal Agency investigated site in 1983.	March 1996	Analytical data shows contamination of soil and groundwater with heavy metals and phenols. No significant contamination migration indicated.
	Lehigh Valley RR (915071)	2	Removal of 3,400 cu yards of contaminated soil complete. Site restored to natural state.	NA	NA
	Madison Wire Indian Church Road (915036)	D	Removal action for drums and liquids completed by EPA. Remedial action completed.	December 1995	Contaminated soil and sediment were removed as part of the remedial action.
	MacNaughton – Brooks (915034)	D	Phase II investigation completed.	March 1991	Investigation did not indicate presence of hazardous waste on site.
	Mobil Oil Corporation (915040)	3	Phase I & II investigation completed. Groundwater collection system installed and is in operation on entire property.	NA	Soil is contaminated with lead, which may in part be due to tetraethyl-lead. Oily seeps are visible along the Buffalo River. Absorbents are placed in the seeps areas.
	Mollenberg-Betz (915041)	D	Phase I investigation completed. Supplemental Sampling completed.	May 1991	Investigation did not indicate presence of hazardous waste on site.
	Niagara Transformer (915146)	4	Post remedial sampling found that the storm-water drainage system had been recontaminated with PCBs. An IRM was completed, diverting on-site storm-water flow from the current storm drainage system.	NA	Difficulties in excavation have led to PCB concentrations above cleanup goals for on-site subsurface soils. Additionally, PCBs in concentrations above cleanup goals remain off-site, in the adjacent cemetery and portions of the drainage ditches.
	Sovereign Chemical (V00215)	V	Entered voluntary clean-up agreement with DEC. Remedial work removed contaminated soils and tank farm. Replacement of the equipment with a state of the art chemical storage facility.	NA	Groundwater is contaminated with volatile organic chemicals from leaks from the former storage tank area. Pumping groundwater as part of a long term O and M plan. However, there is marginal off site contamination.

	Site Name (Site Code)	Class Code	Remediation Status	Date of Delisting	Contaminant Concerns
BUFFALO RIVER	Steelfields LTD (V00619) Formerly Republic Steel and Donner-Hanna Coke sites (915017)	V	RI/FS completed. Voluntary clean-up agreement with NYS to remediate the site. Some 300,000 cubic yards of contaminated soil and fill will be excavated. Remedial work expected to be complete by 2007.	NA	Groundwater and surface water is contaminated with volatile and semi-volatile organic compounds and heavy metals. Removal of pipelines etc has greatly minimized possibilities for migration of contaminants to the Buffalo River.
	Tifft-Hopkins St. (915131)	2A	Interim Removal Measure by Consent Order to remove up to 35,000 cu yards of contaminated soil. To be complete in summer 2005.	NA	Subsurface soil is contaminated with PAHs, benzene, toluene, and chlorobenzenes. Groundwater quality is threatened by this waste material.
	Tifft Nature Preserve (915072)	5	Low levels of contaminants still remain in the area of Tifft Farm. Drum removal completed. A clay cover was placed over the mounds area. A clay barrier wall has been installed in conjunction with the leachate collection system. Supplemental Sampling completed.	NA	Higher than background levels for polycyclic aromatic hydrocarbons and metals, however, not at levels which represent a significant threat to users of the nature preserve.
	Times Beach (915080)	D	Phase I investigation completed. USACE has undertaken sampling of surface and groundwater sediment, flora and fauna.	September 1991	A potential for contaminant movement to Outer Harbor exists.
	US Steel Eastern Division (915113)	D	Phase I investigation completed. Supplemental sampling program completed.	April 1995	Investigations did not indicate the presence of hazardous waste on site
	West Seneca Transfer Station (915039)	D	Phase I & II investigation completed.	December 1992	Data does indicate hazardous waste present.
BUFFALO CREEK	Northern Demolition (915088)	D	Phase I investigation completed.	1989	Data does not indicate hazardous waste onsite.

	Site Name (Site Code)	Class Code	Remediation Status	Date of Delisting	Contaminant Concerns
CAYUGA CREEK	ARO Corporation (915147)	4	A soil vacuum extraction system was installed in remove TCE from soil and sediment underneath facility. In 2004, additional work was completed to enhance system performance. O&M continues to date.	NA	Sampling has indicated that groundwater, on-site, contains TCE at concentrations exceeding NYS Groundwater Standards. Residential homes near sight have had sumps tested for TCE vapor accumulation. Remedial action mitigates migration potential.
	Dresser Industries (9151064)	D	Phase I & II investigation completed.	July 1994	Potential for contaminant migration is considered to be unlikely due to extremely low levels of contaminants found at site.
	Lancaster Reclamation (915069)	D	Phase I & II investigation completed.	February 1991	Groundwater analyses indicate that site is impacting groundwater quality. Surface water results do not indicate that significant contamination exists.
	Land Reclamation (915070)	4	Currently, the site is operated by BFI as a municipal waste transfer station. A new cap was placed over the landfill under a Consent Order with the NYS Division of Solid Waste. Capping was completed in August 1997. A long term O&M plan is in effect.	NA	PCBs and organic compounds were detected in the storm sewer water that flows under the landfill and into Cayuga Creek. Private wells tested by NYSDOH in 2000 and in 2001 were not impacted by site contaminants. New cap on the landfill and access to the site restricted by a fence.
	Old Land Reclamation (915129)	3	Supplemental Phase II investigation completed. An additional six groundwater monitoring wells were installed to further assess the groundwater quality. All the existing and new wells were tested for chemical contamination. The data collected indicates that the groundwater quality has not appreciably changed since the last assessment in 1991	NA	Surface water in drainage ditches and leachate seeps contains elevated barium, lead, zinc, analine and phenols. Elevated concentrations of inorganic compounds (metals) in surface water and semi-volatiles in sediment found directly downstream indicate the site is contributing to the contamination of Cayuga Creek.
	Scott Aviation (915149)	4	Construction of a groundwater collection trench with the excavation and soil/vapor extraction of contaminated soil to address approximately 2800 cu/yds. A long term monitoring program is underway. Additional contamination has been uncovered and is currently being treated under the O&M strategy.	NA	Groundwater contamination confirmed. NYSDOH and NYSDEC will evaluate the need for additional investigations to determine the potential for soil vapor intrusion into structures on or near the site.
	Stocks Pond (915082)	D	Phase I & II investigation completed.	March 1995	This site has slightly elevated levels of metals and phenols.

	Site Name (Site Code)	Class Code	Remediation Status	Date of Delisting	Contaminant Concerns
CAYUGA CREEK	Town of Marilla (915093)	D	Phase I & II investigation completed.	December 1992	No hazardous waste confirmed at this site.
CAYUGA CREEK	Union Road (915128)	4	The containment of waste with a subsurface barrier and cap, excavation of soils and sediments in select areas and consolidation of this material within the containment area; extraction and treatment of groundwater within the containment area; and the covering of select areas with clean fill and vegetation has been completed. Periodic sampling of the groundwater monitoring wells is included in the long-term O&M.	NA	Remedial actions have addressed tar like wastes containing lead in leachable form which were disposed in an unlined pit near a marsh which drains to Slate Bottom Creek which then drains into Cayuga Creek. A residential development is within 600 feet of the site.
CAYUGA CREEK	Village of Depew Borden Road (915105)	D	Phase I investigation completed. Supplemental sampling completed.	October 1990	Site contains foundry sands with phenolic based binders. A portion of the site has been excavated. Investigations indicate no hazardous waste present.
CAZENOVIA CREEK	CID (Chafee Landfill) (915062)	4	Remedial measures include monitoring wells, leachate collection system, cover, seeding, and grading. Leachate generated in portion of the landfill that allegedly received hazardous waste is separated from leachate collected in the remaining area of the landfill. This landfill now meets current regulations and is monitored by the DEC.	NA	The site is fenced, which limits site access and eliminates potential direct contact exposure by the public. Residential property with a private well contaminated with benzene was purchased by the CID Landfill. The Town of Sardinia samples some area private wells on an annual basis.
CAZENOVIA CREEK	Hi View Terrace (915130)	D	Phase I investigation completed. USEPA removal action performed.	NA	Data indicated presence of total cyanides in material. Site remediated.

	Site Name (Site Code)	Class Code	Remediation Status	Date of Delisting	Contaminant Concerns
CAZENOVIA CREEK	Mr. C's Cleaners (915157)	2	Sewer and well samples revealed exceeding levels of tetrachloroethylene. A treatment facility is currently being operated and the site is being monitored by the DEC under the facility's O&M plan. The Dry cleaning business remains in operation.	NA	PCE and breakdown products originating from past disposal practices of a dry cleaning operation have contaminated groundwater at the site. An analysis on indoor air samples collected in 1992 from a nearby church showed elevated levels of tetrachloroethylene. A ventilation system was installed in the church to reduce odors and to lessen the potential for exposure by inhalation.

TABLE 4-2 INACTIVE HAZARDOUS WASTE SITE CODES, ACRONYMS & DEFINITIONS

Class Codes: Statutory or Administrative Classification of an Inactive Hazardous Waste Site, which represents both a measure of threat to the environment and/or public health posed by existing site conditions, and the status of remedial efforts at the site.

1= Site is causing or presenting an imminent danger of causing irreversible or irreparable damage to the public health or environment. Immediate action required.
2 = Site is a significant threat to the public health or environment.
2A = Temporary classification assigned to sites for which there is inadequate data to assign them to the other classifications.
3 = Site does not present significant threat to the public health or environment. Action may be deferred.
4 = Site is properly closed. Requires continued management.
5 = Site is properly closed and there is no evidence of potential adverse impact. No further action is required.
D = Site is delisted. There is no hazardous waste present on the site.
V = Voluntary clean up (remediation funded privately through New York State's Voluntary Clean Up Program)
E = Environmental Restoration Project (remediation funded through the Clean Water/Clean Air Bond Act of 1996)

Glossary of Acronyms[i]

CO - Consent Order, or Order on Consent, an enforceable order of the New York State Commissioner of Environmental Conservation.
DEC - New York State Department of Environmental Conservation.
DOH - New York State Department of Health.
EPA - United States Environmental Protection Agency (synonymous with USEPA)
IRM - Interim Remedial Measure, a remedial action that can be conducted without extensive investigation and evaluation; may be used for both emergency and non-emergency situations.
O & M – Operation and Maintenance, a plan devised after remedial efforts to maintain desired clean up goals.
PAHs - Polynuclear (or polycyclic) aromatic hydrocarbons, organic chemicals formed during the combustion of fossil fuel. A partial list of PAH compounds includes: benz[a]anthracene; benzo[a]pyrene; benzo[b]fluoranthene; benzo[ghi]perylene; benzo[j]fluoranthene; benzo[k]fluoranthene; dibenz[a,h]anthracene; fluoranthene; indeno[1,2,3-cd]pyrene; and pyrene.
PCBs - Polychlorinated biphenyls (synonymous with Aroclor; Chlorextol; Dykanol; Pyranol; and other Trade names), a group of synthetic organic chlorinated compounds. Variable blends of PCBs were formerly used in many applications, including as fluid in heat transfer systems and hydraulic systems; as plasticizer in the manufacture of adhesives, textiles, and carbon-less copy paper; as dielectric fluid in capacitors and transformers.
PCE - An irregular acronym for 1,1,2,2-tetrachloroethylene (synonymous with carbon bichloride; carbon dichloride; ethylene tetrachloride; perchloroethylene; perclene; tetrachloroethene; and tetrachloroethylene). This solvent is commonly used as a dry cleaning agent or degreaser.
RI/FS - Remedial Investigation / Feasibility Study, a publicly-available document prepared by DEC to document the investigation determining the nature and extent of contamination at the site and feasible methods for remediation.
TCE - Irregular acronym for trichloroethylene (synonymous with acetylene trichloride; ethylene trichloride; trichloroethene; 1,1-dichloro-2-chloroethylene; and 1,1,2-trichloroethylene), a solvent commonly used as a degreaser; as a dry cleaning agent; as an agent to remove caffeine from coffee; and as an ingredient in the manufacture of some pesticides, resins, paints, and varnishes.
UST – Underground Storage Tank.
VOCs - Volatile Organic Compounds.

[i] From the NYS DEC Glossary of Environmental Site Remediation Terms.
www.dec.state.ny.us/website/der/ihws/ihwsglossary.html

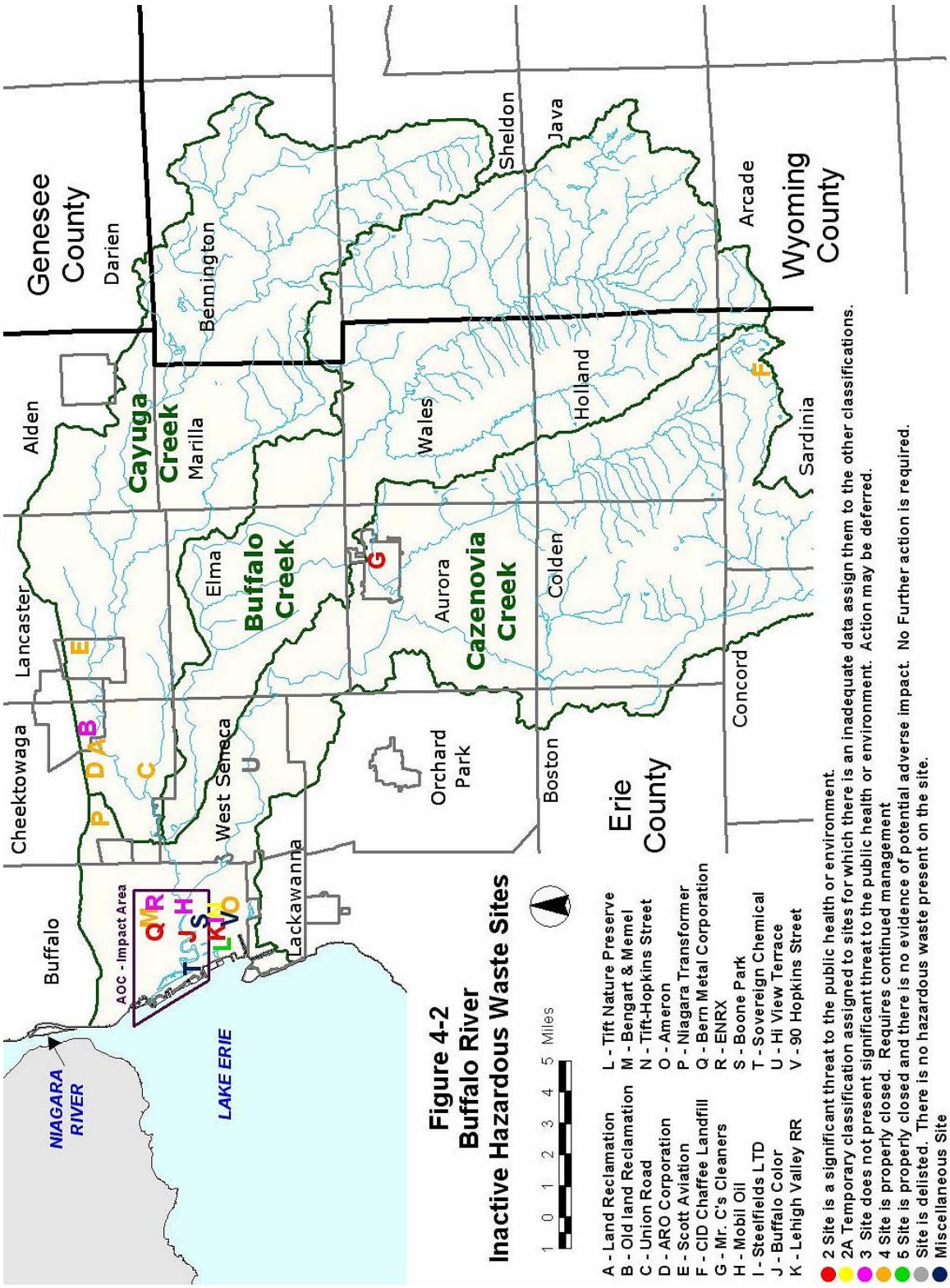

Figure 4-2
Buffalo River
Inactive Hazardous Waste Sites

SECTION 4.2 – REFERENCES

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[2] NYSDEC, Buffalo River Remedial Action Plan (1989).
[3] Larry Parks, Bridge Operator, City of Buffalo Office of Public Works, Personnel communication, 12/15/05
[4] Scott Pickard & Byron Rupp, USACE, Personal communications, 3-10-05.
[5] Michael Asquith, USACE, Personal communication, 11-5-05.
[6] Sutton, Gregory, P.E., for NYSDEC-Region 9, Division of Environmental Remediation, Draft Field Sampling Plan for the Buffalo River Sediment Study (May 2005).
[7] NYSDEC website, 2005 http://www.dec.state.ny.us/website/der/ihws/faqs.html#q21.
[8] Rupp, Byron, for USACE, Buffalo River Fact Sheet (January 2005).
[9] USACE, Draft Management Plan and Feasibility Study Scope of Work- Buffalo River Environmental Dredging/Ecosystem Restoration (December 16, 2004).
[10] Sutton, Gregory, P.E., for NYSDEC-Region 9, Division of Environmental Remediation, Draft Field Sampling Plan for the Buffalo River Sediment Study (May 2005).

4.3 FISH, WILDLIFE & MACROINVERTEBRATES

The following beneficial use impairments, or likely impairments, are directly related to the health of fish, wildlife, and macroinvertebrate populations in the Buffalo River AOC:

Impaired:

- *BUI #1- Restrictions on Fish & Wildlife Consumption*
- *BUI #4- Fish Tumors and Other Deformities*
- *BUI #6- Degradation of Benthos*
- *BUI #14- Loss of Fish and Wildlife Habitat*

Likely Impaired:

- *BUI #2- Tainting of Fish and Wildlife Flavor*
- *BUI #3- Degradation of Fish and Wildlife Populations*
- *BUI #5- Bird or Animal Deformities or Reproduction Problems*

Fish and wildlife issues related to the Buffalo River AOC not only include population numbers, diversity and overall health, but also habitat, corridors and relationships to humans. For the purposes of this Status Report, a discussion on macroinvertebrates (benthic organisms and those found in the water column) will be included in this section.

The Buffalo River ecosystem once provided plentiful habitat for reproduction, feeding and growth, and a migratory route for a myriad of fish, birds and wildlife. Writings from the 1600s describe the Buffalo River as an extensive marsh with temporary hunting and fishing camps built by native peoples along its shore. It is believed that the quality of the river during this period must have been such as to sustain a diverse and abundant warmwater fishery and wildlife community.[1]

Throughout the 1800s and into the 1900s the average resident times of sewage and other pollutants in the river increased. By the 1920s, the Buffalo River had become one of the most polluted rivers in the United States. It was described as a "septic basin", with 0% dissolved oxygen and high carbon dioxide (Wagner 1929), and "no fish were found in the river at this time" (Greeley 1929).[2] It had been noted that the benthic community was so impacted that not even sludge worms were present.

PROGRESS AND CURRENT CONDITIONS

Fish consumption in the Buffalo River and Harbor is impaired due to a NYS DOH health advisory that recommends eating no carp because of elevated PCB levels. The sources of PCBs are attributed to contaminated sediment and previous industrial inputs.[3]

In 2003, NYSDEC awarded FBNR funding for a 2-year aquatic habitat assessment project. Researchers from Buffalo State College and Youngstown University conducted research on water quality, fish health and populations, benthic organism health and populations, adjacent land use, and recreational use of the waterway. The data interpretation and the final report released in October 2005 have confirmed that the leading environmental obstacle for restoration of most of the beneficial uses in the Buffalo River is contaminated sediments. (See Section 4.3.1 for a detailed discussion of the project results.)

Prior to 2004, there had been little information regarding bird, mammal and herpetological health and populations within the AOC. In spring 2005, a RAC Advisor who is also a member of the Buffalo Ornithological Society (BOS), coordinated an effort with Canisius College to conduct a bird survey and seasonal population assessment throughout the AOC impact area and upper watershed.

This effort is being conducted entirely by BOS volunteers and Canisius students under staff and will provide much needed baseline data of bird populations and health within the AOC. Project completion is expected in spring 2007. Similar volunteer assessment projects for mammal and herpetological populations are being investigated.

The Buffalo River RAC is currently prioritizing projects based on the need to complete all beneficial use assessment and evaluation. Identified gap areas include: generating conclusive and updated data on tainting, wildlife populations, bird and animal deformities, and habitat quantification. (These are in addition to the data gap areas described in the water quality section- eutrophication and phytoplankton populations). With the 5-year extension of the RAP Coordination grant and expanded budget for scope of work, the RAC, with the assistance of Buffalo Niagara Riverkeeper, will be able to use these resources to leverage additional funds and partnerships to finally complete these assessments. Once these assessments are finalized, delisting criteria and restoration targets can be developed for the confirmed use impairments.

Buffalo Niagara Riverkeeper also received USEPA-Region II FY-'06 funding for a habitat assessment and evaluation of the Niagara River watershed. The Buffalo River and its watershed is a major tributary to the Niagara River system. Information regarding habitat type and quantification will be generated from this project during 2006-08. Once completed, the data generated from this study will be synthesized with other beneficial use assessment results. It will be evaluated and analyzed by the RAC and Riverkeeper, which will use the data to complete the development of delisting criteria and restoration targets for the AOC.

RAC RECOMMENDATIONS

The Buffalo River RAC has recommended the following preliminary steps in order to make progress towards delisting. These recommendations will be further refined, expanded and prioritized as the updated Remedial Strategy is developed.

- Complete assessment and evaluation of mammal and herpetological populations, and bird health throughout the AOC.
- Support NYSDEC and NYSDOH efforts for fish contaminant testing, with recommendations to increase number of species tested and frequency of testing to at least every 5 years.
- Complete an updated assessment of tainting in fish and wildlife through PAH testing and angler surveys.
- Complete assessment, evaluation and quantification of habitat throughout the AOC.
- Implement projects/programs to preserve open space and increase wetland areas and aquatic habitat.
- Implement invasive species eradication efforts.
- Prioritize sites identified in the Buffalo River Greenway Plan and identify funding or programs to protect critical lands and improve/increase habitat.

PROJECT UPDATES

The following is a list of ongoing or recently completed fish and wildlife projects by various agencies, organizations, and stakeholders that will either 1) provide data that will help fill some of the information gaps identified in the Buffalo River RAP, or 2) make progress towards delisting.

4.3.1 ASSESSMENT OF POTENTIAL AQUATIC HABITAT RESTORATION SITES WITHIN THE BUFFALO RIVER AREA OF CONCERN

In 2003, Buffalo Niagara Riverkeeper (formerly FBNR) received a grant

from the NYSDEC Great Lakes Protection Fund for assessing potential aquatic habitat sites that complements the USACE Feasibility Study for sediment clean-up options. Researchers from Buffalo State College and Youngstown State- Ohio obtained and evaluated data on fish and benthic populations; conducted water quality analysis; and surveyed vegetative cover and community/recreational use.

The data generated will be used in the Feasibility Study and provide useful data bases for decisions on remedial options. The characterization matrix that has been developed for the 10 potential sites will assist decision makers and stakeholders by providing a comprehensive assessment tool regarding prioritization of potential restoration sites, including decisions regarding sediment removal and/or stabilization. The study fully documents the biological and physical characteristics of 10 potential sites for the following (see Figure 4-4):

- Benthic features (Number of Benthic Families, Oligochaete Density, EPT, Chironomid Density, Genera of Chironomid, Genus/species Biotic Index of Chironomid, Chironomid Deformity)
- Fishery features (Larval and Juvenile Species Diversity, IBI, DELT)
- Limnological features (Water Temperature, pH, Turbidity, Dissolved Oxygen, Conductivity)
- Physical characteristics (Bank Characteristics, Adjacent Land Use)
- Vegetation (% Overhanging Cover, Terrestrial/Aquatic Species Richness, Terrestrial/Aquatic Exotic Species)
- Community river use

The project results, when synthesized with other bird/mammal and habitat data, will offer updated information for the RAC to complete assessments of beneficial uses (i.e.; degradation of fish and wildlife populations, and loss of fish and wildlife habitat) by the end of 2008 and will ultimately be used in the development of quantifiable delisting targets and an updated remedial strategy.

The final report was completed in October 2005. The report and data can be accessed on Riverkeeper's website at www.fbnr.org. The following summarizes some of the major fish and wildlife findings of the project:

- Larval fish sampling showed similar species diversity and abundance in 2003-04 as compared to 1993 (8-10 species found). No site-specific trends were observed. The adult/juvenile fish sampling showed similar species diversity and abundance in 2003-04 compared to 1993 (15-20 species across all sites). The lowest species diversity occurred at the sites in the upper-most and lower-most reaches of the AOC impact area.
- For the river as a whole, DELT (Deformities, Eroded fins, Lesions, and Tumors) anomaly scores in fish averaged 37%, which is much higher than what would be expected for a moderately impacted (2-5%) or unimpacted (<2%) river. The rate varied greatly among species, with a low of 14% in pumpkinseed to an extremely high of 87% in brown bullhead. The other most commonly found species had the following DELT scores: common carp 67%, gizzard shad 51%, largemouth bass 34%, and golden shiner 22%.
- The Buffalo River AOC continues to be dominated by a low diversity benthic invertebrate community that is broadly tolerant of pollution and environmental degradation. High densities of tubificid

oligochaetes (though lower than historic maxima), and their numerical dominance of the benthos suggest poor environmental health. Oligochaete densities were higher in the channel than at shoreline habitat restoration sites. Fewer invertebrate families were collected in this study than in the 1990s, possibly even indicating some reversal of biotic recovery. Substantially more families occurred at shoreline sites than in the navigational channel, although the habitat restoration sites were still dominated by pollution-tolerant oligochaetes and chironomids. Likewise, chironomid taxonomic richness was markedly higher at the habitat sites than in the channel, but species largely constituted pollution-tolerant species and genera. Chironomid mouthpart deformities remain very high within the navigational dredge channel, but interestingly, all of the rather limited number of larvae from shoreline sites had developed normally.

- More than 50 plant species were collected from the Buffalo River shoreline and herbaceous vegetation was well-developed at all sites. The 10 restoration sites differed considerably in their development of overhanging cover, ranging from 0-80%. Submerged macrophyte beds are not extensive, but are present at most sites. The presence of invasive plant species, including tree-of-heaven, Japanese knotweed, purple loosestrife, and submerged Eurasian watermilfoil degrades many of the potential restoration sites.
- Ecological integrity, as reflected by biota and water quality, certainly has improved in the Buffalo River AOC, as compared to 1970's conditions. However, there does not appear to be any improvement since the early 1990s. Habitat restoration measures such as improved overhang cover, macrophyte plantings, eradication of exotic plant species, removal of old dock pilings, naturalization of shorelines, or

removal of contaminated bed sediment could improve ecological integrity at selected sites. Constraints on ecological integrity that may prove more challenging to overcome include warmer water temperatures and low dissolved oxygen levels.[4]

4.3.2 FISH HEALTH & POPULATIONS

4.3.2(A) FISH CONSUMPTION, TUMORS, AND DEFORMITIES

The following NYSDOH fish consumption advisories exist for the Buffalo River AOC:

- Eat no carp from the Buffalo River or Harbor (due to PCB contamination);
- Women of childbearing age and infants and children under the age of 15 should not eat any species from the Buffalo River or Harbor;

The following fish consumption advisories exist for Lake Erie and may apply to fish found in the Buffalo River:

- Women of childbearing age and infants and children under 15 are advised to eat no more than one meal per week of Chinook salmon less than 19 inches, burbot, freshwater drum, lake whitefish, rock bass and perch.
- Women of childbearing age and infants and children under 15 are advised to eat no more than one meal per month of all other fish from Lake Erie.
- Other people should eat no more than one meal per week of any Lake Erie fish species.[5]

Delisting criteria/restoration targets have been developed for the Buffalo River AOC for BUI#1- Restrictions on Fish and Wildlife Consumption and BUI #4- Fish Tumors and Other Deformities (see BUI Chart, Table 3-1). Recommendations and advice were gathered from numerous local and statewide fish and wildlife experts during the development of these criteria/targets. Tainting of fish and wildlife flavor, and degradation of fish and wildlife populations (#2 and #3) are considered "likely impaired" but further assessment is needed. The following paragraphs summarize the research and discussions that took place in order to establish the delisting criteria, as well as some of the decisions to be made during the development of monitoring protocol and the updated remedial strategy.

In April/May 2004, NYS DEC- Region 9 took carp samples from the Buffalo River. As of summer 2005, these fish samples have not yet been analyzed and no contaminant results are available.[6] The NYS Department of Health (NYSDOH) coordinates fish sampling with NYSDEC and noted that prior to 2004, the last testing of Buffalo River carp for PCB contamination was over 10 years ago. There is no systematic monitoring protocol in place. NYSDOH also asserted that in order for an advisory to be removed, fish must show low levels of contaminants for at least 2 years (but could be from 1-5 years depending on quality and consistency of data); furthermore, data and samples must have adequate numbers and diversity. As removal of an advisory is arbitrary and determination is made on a case-by-case basis, there is no established protocol or timeframe. Citizens groups, or the

RAC, can put in requests to NYSDOH for specific sampling, but NYSDOH cannot guarantee any response to comments or requests.[7]

Species to be analyzed for consumption health concerns are chosen based on past health advisories only (i.e., carp in the Buffalo River). Other species that may be consumed, including walleye, bass, bluegills, perch, eels and pike, were tested in 1993-94 and determined not to pose a threat to human health. Other species can be tested in the future if the NYSDOH changes criteria or begins assessing levels of other contaminants, such as mercury. Frequency of monitoring depends upon funding and staff availability; historically, the Buffalo River has been sampled every 10-11 years. However, the ideal testing time frame would be every 5 years. NYSDEC agrees with RAC recommendations that brown bullhead and suckerfish are best used as indicator species for tumor studies.[8]

During August/September of 1997, composites of young-of-year (y-o-y) fish were collected by NYSDEC from 35 near-shore locations in New York's Great Lakes basin, including the Buffalo River. Composite y-o-y fish samples were analyzed for PCBs (Aroclor 1016/1248, Aroclor 1254/1260 and PCB congeners), organochlorine pesticides and mercury.[9] The bluntnose minnows sampled from the Buffalo River did not reflect changes or improvements in contaminant levels from previous years' samples.[10]

The Cornell Fish Pathology Project (CFPP) advised that causal relationships between fish tumors and contaminants are difficult to prove scientifically; a majority of fish tumors are caused by viruses and genetics. CFPP suggests using a "reference community" instead of a "control site" for sampling, and using "power of a test" as a statistical reference in place of timeframes of incidences. Enough fish should be collected from both the impaired waterbody and a chosen reference community to make a statistically significant comparison. CFPP also advises surveying fish tumors in the waterbody and categorizing them accordingly: 1) tumors caused virally; 2) tumors thought to be caused virally; and 3) those with no known cause. Such a survey process will help to develop baseline information.[11]

4.3.2(B) BUFFALO RIVER WALLEYE RESTORATION PROJECT

The information associated with the Walleye Restoration Project will be used to assess and evaluate beneficial use #3- degradation of fish and wildlife populations, and may be used to establish delisting criteria/restoration targets (i.e.; the establishment of a self-sustaining walleye population within the Buffalo River AOC).

In 2002, NYSDEC Lake Erie Fisheries Unit and Region 9 Fisheries Unit staff organized an advisory team including representatives from Bison City Rod and Gun Club, ECDEP, Erie County Federation of Sportsmen's Clubs, Erie County Fisheries Advisory Board and Southtowns Walleye Association. The advisory team has assisted with developing project goals/objectives and has helped with logistical support for project

operations. This team's goal, the Buffalo River Walleye Restoration Project, is to restore a naturally reproducing, self-sustaining walleye population in the Buffalo River. The project aims to restore walleye abundance in order to create a high-quality, springtime walleye sport fishery in the Buffalo River and enhance summertime walleye sportfishing opportunities in adjacent areas of Lake Erie and the Upper Niagara River.

The Buffalo River was selected as a candidate site for walleye restoration principally because it is a large tributary to Lake Erie, and on a lake-wide scale, other existing Lake Erie walleye spawning stocks appear to use very large tributaries or open lake shoals as spawning sites. DEC's Lake Erie Fisheries Unit recently completed a similar walleye project on Cattaraugus Creek with some accompanying evidence for success.

Fish surveys in the Buffalo River during the 1980s and 1990s indicated presence of walleye, but at relatively low levels of abundance. However, directed surveys to detect presence of spawning-phase adult walleye had not been performed. Spring baseline monitoring to detect spawning-phase walleye by boat shocker began in the Buffalo River in 2003 (2003-04 baseline catches = zero adults detected), and will continue annually for the duration of the project. Future presence/absence of spawning walleye surveys will be the principle evaluation measure of the success of this restoration effort.

Implementation of the plan continued in spring 2004, with DEC

Lake Erie Unit staff collecting a sufficient number of ripe adult walleyes from Cattaraugus Creek and harvesting eggs and milt for the restoration project. The main reason to use adjacent Lake Erie walleye spawning stocks as an egg source is the concern for maintaining genetic integrity of locally adapted walleye spawning stocks where there are known, adjacent, self-sustaining walleye populations and identifiable genetic stock structure in Lake Erie.

The fertilized eggs from Cattaraugus Creek were incubated at DEC's Prendergast Hatchery (Chautauqua County). In May 2004, approximately 105,000 available "surplus" Cattaraugus Creek walleye fry from the Hatchery were stocked in the Lower Buffalo River near the Seneca Street Bridge.

NYSDEC expects the surplus sac fry component to be stocked annually during May, along with the scheduled pond-reared fingerlings in June. Surviving stocked fish should return to spawn in the Buffalo River as early as 2008. Walleye stocking will take place annually for the next four to six years, with the goal of establishing an adult population of 5,000 walleye by 2010. Over the course of this stocking and monitoring effort, DEC might identify other limiting factors for walleye restoration, and perhaps recommend accompanying opportunities for habitat restoration.[12]

4.3.2(C) GOBY SURVEY- BUFFALO RIVER AND TRIBUTARIES

A U.S. Fish & Wildlife project will investigate goby presence in the Buffalo River, Buffalo Creek, Cayuga Creek, and Cazenovia Creek drainages. For the initial year of the goby project, an

exploratory survey was conducted to see how far upstream the fish are located and determine their feeding habits. (USFWS has already been collecting that type of data from Lake Erie tributaries and the Erie Canal). Initial sampling began on May 31, 2005 and extended through August. The pace of this project and the individual creeks surveyed will depend upon the extent of the gobies' presence in the upper watershed.[13]

Several sampling techniques will be explored as water depth within the system varies drastically. These may include bottom trawls, beach seines, minnow traps, and electrofishing. Researchers will note what type of habitat is present at each of the sites sampled, if possible. Any juvenile walleye that are sampled by researchers will also be reported to the NYSDEC for the Buffalo River Walleye Restoration Project.

4.3.3 HABITAT RESTORATION

In December, 1993, the USFWS- Lower Great Lakes Fishery Resources Office, and ECDEP cooperatively implemented a multi-year "Fish and Wildlife Habitat Restoration Project". The mission of the project was to:

- To protect, conserve, enhance, and restore the aquatic and terrestrial ecosystems of the Buffalo River to support a healthy diversity and distribution of fish and wildlife communities and their habitats; and
- To increase community appreciation and use of the Buffalo River.

Goals and objectives were also established for the Project, and are summarized below:

Goal #1: Increased area of habitat capable of supporting a healthy diversity and distribution of fish and wildlife communities, with emphasis on self-sustaining native biota;
Goal #2: Heightened community awareness and appreciation of natural resources;
Goals #3: Enhanced recreational opportunities for use of fish and wildlife resources.

Five habitat restoration sites were identified; of which three "pocket parks" have been completed (Ohio Street boat launch, foot of Smith Street, Bailey Avenue peninsula); one is nearing completion (Seneca Bluffs); and one is targeted for future restoration (Katherine Street peninsula). (See Figure 4-3).

Though the four restoration projects have been successful in protecting valuable habitat and public access to the River, they only represent 22 acres of land throughout the entire AOC. During the last decade, hundreds of acres of public land, vacant land, or open space have been identified for possible habitat and public access. In the past, many sites were chosen based upon the premise of public ownership and public support, not necessarily habitat or flood management value.

Two projects that are both near completion as of October 2005- the "Assessment of Potential Aquatic Habitat Restoration Sites Project" and the Buffalo River Greenway Implementation Plan- identify parcels and lands that, if protected, can provide for an ecosystem-based approach towards habitat restoration. However, quantification and a complete assessment of habitat types within the AOC have not been completed and

will be addressed through an EPA-funded Habitat Assessment grant to Buffalo Niagara Riverkeeper (see Section 4.3 for discussion). Combined with an impervious surface analysis to be conducted by a Buffalo State College graduate student, it is expected that all habitat assessment and evaluation work for the AOC will be completed by the end of 2008. It is then expected that delisting criteria/restoration targets will be completed for BUI #14- Loss of Fish and Wildlife Habitat, and suspected BUI #3- Degradation of Fish and Wildlife Populations.

4.3.3(A) "POCKET PARK" HABITAT RESTORATION PROJECTS

Recent activity at the three "pocket parks" (Ohio Street, Smith Street and Bailey Avenue) consist of utilizing the County's Inmate Work Program to clean up the sites and to conduct invasive species removal, particularly Japanese knotweed. Invasive species like knotweed, purple loosestrife, phragmites, and mugwort, dominate much of the riverine and upland landscape. There is no quantification of acreage covered by invasive species in the AOC, however species such as knotweed are present at nearly 100% of the parcels identified for open space conservation or restoration. Invasive species management has already been identified as a qualitative delisting target for BUI #14- Loss of Fish and Wildlife Habitat (see Table 3-1). In addition, several specific sites have been identified (i.e.; the proposed Katherine Street Peninsula pocket park) as potential sites for a pilot project to remove invasives and implement a phyto-remediation program.

In 2004, approximately 50 trees at the Smith Street Habitat Restoration site were wrapped with wire mesh fencing to protect

them from imminent beaver damage. Some 40 other trees were destroyed by beavers at the site. Beaver management may be considered part of a qualitative restoration criteria, as the presence of beavers and subsequent damage is being seen along the Buffalo River- particularly at the habitat restoration sites. [14]

4.3.3(B) SENECA BLUFFS HABITAT RESTORATION PROJECT

The Erie County Department of Environment and Planning (DEP) has completed Phase I of a natural habitat restoration effort in south Buffalo at a location known as "Seneca Bluffs." Currently, funding is being sought for Phase II. Seneca Bluffs consists of 12.5 acres of floodplain located along the Buffalo River. Access to the site is near the Seneca Street Bridge, between Elk Street and Avon Place. (See Figure 4-3).

Seneca Bluffs was identified in 1994 as one of five unique and critical habitat areas in need of protection. The site provides habitat for a wide variety of flora and fauna, and is part of a larger wildlife corridor along the river. Seneca Bluffs is also part of the Buffalo River Greenway Trail and is one of the few critical habitat areas (i.e., floodplain forest) that has been directly included in the Greenway Trail design. Seneca Bluffs also is located within the Great Lakes migratory bird flyway and less than 2 miles from Tifft Nature Preserve and Times Beach. Site assets include distinct habitat types such as floodplain island, emergent wetland, forested floodplain, upland meadow, ~800 feet of eroding bluff, and 2500 linear feet of shoreline. A large diversity of migratory birds, wading birds, and waterfowl make use of the site. Recreational

opportunities abound for local residents, including such activities as fishing and hiking. Problems include the domination of ~85% of the site by invasive and non-native plants. Unauthorized access and abuse by off-road vehicles contributes to invasive species and erosion problems. Illegal dumping of construction and demolition debris, stolen cars, and general litter also contribute to the pollution issue.

The Seneca Bluffs site consists primarily of an upper and lower terrace. The Seneca Bluffs Habitat Restoration Project targeted 5 acres of the upper terrace for invasive species removal (Japanese knotweed, mugwort, phragmites, garlic mustard, and purple loosestrife) and restoration plantings. Removal of invasive plants was achieved through brush hogging, tilling of surface material and removal of plant and root wads. Seeding was conducted in August 2004; planting and landscape restoration was completed in October 2004 and includes 397 trees and 630 shrubs.

The project also included construction of an ADA trail, three fishing access locations, a scenic overlook, a seasonal aquatic habitat, improved parking facilities and site security measures. A baseline survey of the site that included species identification was completed.

4.3.3(C) NYSDEC Managed Sites- Buffalo Color Peninsula and Alltift Wetlands Restoration

Remediation of the Buffalo Color site which was previously owned by Allied Signal, commenced in 1995 and included fish and

wildlife habitat restoration both upland and along the Buffalo River shoreline. The site is immediately adjacent to the Smith Street Habitat Restoration site (See Figure 4-3). The remediation included the removal of 44,000 cubic yards of contaminated sediment from the Buffalo River channel, placement of 42,000 tons of riprap for shoreline protection, nesting and feeding areas for waterfowl, the installation of nine "fish pods" in the river to allow for spawning and protection of fish and the planting of 3,800 pounds of special seed mixture to enhance wildlife habitat.[15] NYSDEC conducts ongoing operations and maintenance activities as part of the grasslands restoration project.

Current NYSDEC restoration work at the Alltift site (See Figure 4-3) includes a wetlands project consisting of 12.5 acres of mixed wetland habitat, including shallow emergence, deep emergence and open water habitat. Plantings have been designed to enhance native non-invasive wildlife. The landfill has also been designed for future recreational opportunities. There is no official timetable for the site. Currently the property will remain vacant but will be maintained in accordance with the Department's approved long-term operation and maintenance plan. Remediation activities are expected to be completed by the fall of 2005.[16]

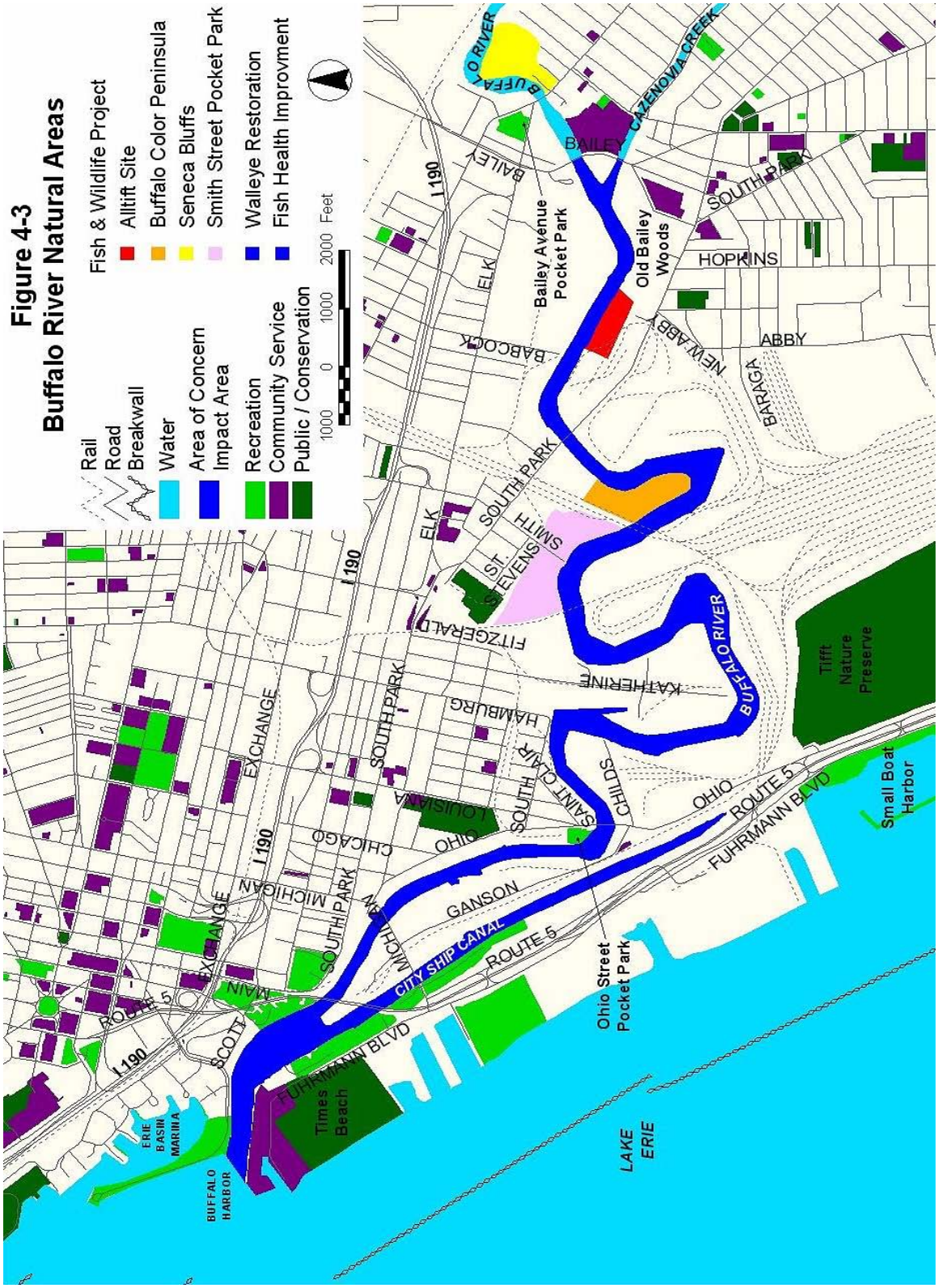


Figure 4-3
Buffalo River Natural Areas
Rail
Road
Breakwall
Water
Area of Concern Impact Area
Recreation
Community Service
Public / Conservation
Fish & Wildlife Project
Alltift Site
Buffalo Color Peninsula
Seneca Bluffs
Smith Street Pocket Park
Walleye Restoration
Fish Health Improvment
1000 0 1000 2000 Feet
Bailey Avenue Pocket Park
Old Bailey Woods
Ohio Street Pocket Park
Tifft Nature Preserve
Small Boat Harbor
Times Beach
ERIE BASIN MARINA
BUFFALO HARBOR
LAKE ERIE
BUFFALO RIVER
CAZENOVIA CREEK
CITY SHIP CANAL
I 190
ROUTE 5
FUHRMANN BLVD
BAILEY
ELK
BABCOCK
SOUTH PARK
SMITH
ST. STEVENS
FITZGERALD
KATHERINE
HAMBURG
SAINT CLAIR
CHILDS
OHIO
LOUISIANA
CHICAGO
MICHIGAN
EXCHANGE
MAIN
SCOTT
GANSON
HOPKINS
ABBY
NEW ABBY
BARAGA

Figure 4-4
Buffalo River Habitat Restoration Sites
Bioaccumulation bedsediment
hydro-lab sites
In-Channel sites
Benthic sample sites
Potential Restoration sites
Fish sample sites
0.3
0
0.3
0.6 Miles

SECTION 4.3 - REFERENCES

[1] Poole, E. Ann, E. Kozuchowski, C. Lowie for the Erie County Department of Environment and Planning, Fish and Wildlife Habitat Restoration on the Buffalo River, Buffalo, NY (August, 1994).
[2] J. Hickey and Diane Mann-Klager for the USFWS, Assessment of Potential Habitat Restoration Areas Within the Buffalo River AOC (October 1993).
[3] NYS DOH, 2002-03 Health Advisories (October 2002).
[4] Kim Irvine, R. Snyder, T. Diggins, B. Sinn, C.F. Chuey, J. Jedlicka, J. Barrett O'neill, Assessment of Potential Aquatic Habitat Restoration Sites in the Buffalo River AOC, October 2005.
[5] NYS DOH, 2005-2006 Health Advisories: Chemicals in Sportfish and Game, 2005 http://www.health.state.ny.us/nysdoh/fish/fish.pdf
[6] Tim Preddice, NYSDEC-Albany, Personal community, 2005.
[7] Tony Forti, NYSDOH, Personal communication, 2005.
[8] Dr. Larry Skinner, NYS DEC, Personal communication, 2005.
[9] Preddice, T., S. Jackling, and L. Skinner for NYS DEC, Contaminants in Young-of-Year Fish from Near-shore Areas of New York's Great Lakes Basin (1997).
[10] Tim Preddice, NYS DEC, Personal communication, 2005.
[11] Dr. Paul Bowser, CFPP, Personal communication, 2005.
[12] Don Einhouse and Mike Wilkinson, Fisheries Biologists at NYS DEC, Personal communication, 2005.
[13] Mike Goehle, Aquatic Nuisance Species Coordinator, USFWS- Lower Great Lakes Fishery Resources Office, Personal communication, 2005.
[14] Mary Rossi, ECDEP, Personal communication, 2005.
[15] NYSDEC, 2002 Buffalo River RAP Status Report Update (2002).
[16] Gregory P. Sutton, NYSDEC, Personal communication, 2005.

5 COMPLEMENTARY PROJECTS

The following section includes information regarding public access, environmental education, public participation and land use and development in the Buffalo River AOC. These activities have not been identified as specific RAP goals, nor are they directly related to the 14 Beneficial Use Impairments. However, each of these activities plays an integral role in RAP implementation. Public access projects as well as land use and development frequently correspond with habitat restoration; environmental education is key to addressing non-point source pollution; and public participation is frequently a requirement for studies and environmental actions (i.e.: Feasibility Study). Therefore, a separate section has been included in the 2005 RAP Update for complementary projects that may have direct or indirect impacts on the implementation of the Buffalo River RAP.

The following beneficial use impairments, or likely impairments, may be directly or indirectly impacted by complementary projects in the Buffalo River AOC :

Impaired:

- *BUI #7- Restrictions on Dredging*
- *BUI #11- Degradation of Aesthetics*
- *BUI#14- Loss of Fish and Wildlife Habitat*

Likely Impaired:

- *BUI # 3- Degradation of Fish and Wildlife Populations*

5.1 PUBLIC ACCESS AND RECREATION

Public access and recreation projects include enhancement of public access to the Buffalo River and tributary creeks as well as improvement of the aesthetics of the river and adjacent riparian areas.

5.1.1 TIMES BEACH PUBLIC ACCESS PROJECT

The Times Beach Public Access Project is a collaborative effort, with the US Army Corps of Engineers conducting ecosystem restoration; Erie County, in cooperation with the City of Buffalo, providing public access; and the Times Beach Oversight Committee serving in an advisory capacity. Project highlights include elevated boardwalks, ground-level paths, bird watching blinds, overlook platforms and a bulletin-board style information kiosk. The Times Beach Project provides safe public access to one of the best birding areas in the Northeastern United States (see Figure 4-3 for location).

The first phase of the Times Beach project restored the southeast portion of the site. Improvements included a 6' wide by ~750' long stone path trail, a 12' x 28' overlook platform; one bird watching blind, a parking lot for 10 cars, an information kiosk, and limited fence repairs. Phase I was completed in 2004. The second phase of the project encompasses the majority of the site, stretching to the northwest boundary. Proposed improvements include a system of 6' wide stone trails and elevated boardwalks totaling ~4,000 linear feet, two bird watching blinds, one minor overlook platform, and complete fence repairs. Phase II has recently received funding commitments and commenced in Fall 2005.[1]

5.1.2 OHIO STREET PARK

A partnership of public officials, private businesses and investors, government agencies and community organizations plan to acquire ~4 acres of land along Ohio Street near Michigan Avenue for public access to the Buffalo River. The park, which would include a pavilion, would be the new home of the annual Buffalo Riverfest and other outdoor events,

and trails would connect the park to points on Buffalo's waterfront.[2] Riverkeeper has been a leading participant in this effort since its inception. New York State has committed $500,000 to the creation of the park, and Erie County will contribute $200,000 for land acquisition.[3]

SECTION 5.1 - REFERENCES

[1] Mary Rossi, ECDEP, Personal communication, 2005.
[2] Habuda, Janice, "Parks Proposed Along the Buffalo River," The Buffalo News 14 July 2005.
[3] "Buffalo River Project Moves Forward," Front Page- West Seneca Edition 20 July 2005, Vol. 46, No. 47.

5.2 ENVIRONMENTAL EDUCATION AND PUBLIC INVOLVEMENT

Environmental education and public involvement projects include development of public awareness and appreciation of the watershed, education of the public in non-point source pollution issues and concerns, and encouragement of environmental stewardship in local communities.

5.2.1 BUFFALO RIVER PUBLIC OUTREACH EFFORTS

Since 2004, Buffalo Niagara Riverkeeper has conducted three public forums on the status of the Buffalo River. These community meetings were held at the Peter Machnica Center in Kaisertown (May 2004), Valley Community Center in the Valley (October 2004), and Old First Ward Community Center in the First Ward (May 2005). Community members were invited to take these opportunities to learn about progress on the Buffalo River and offer their vision for Buffalo River restoration. Individuals interested in fishing, birding, hiking, boating or otherwise enjoying the Buffalo River waterfront attended. Outreach efforts also included door-to-door discussions with community members. Community feedback and input has been and will continue to be included in the process to develop delisting criteria/restoration targets and as the RAC updates the Remedial Strategy.

5.2.2 BUFFALO RIVER REPORT CARD

In 2004, the Remedial Advisory Committee prepared the baseline information for a "Buffalo River Report Card", an outreach piece designed to give the general public a snapshot of the health and status of the Buffalo

River AOC, including the upper watershed. The Report Card has been distributed to local government agencies and community leaders, and is available for viewing as a .pdf file at **www.fbnr.org.** A complementary document, the Buffalo River Citizen's Report Card, encourages public participation in the RAP process by allowing individuals to "grade" the river and offer comments.

5.2.3 EDUCATION AND STEWARDSHIP PROGRAMS

The Valley Community Association has partnered with several organizations to conduct education and stewardship programs on the Buffalo River.

- Nature Ed-ventures will provide learning opportunities using the Valley Nature Park and Habitat Trail on the Buffalo River.
- VCA uses the park to instill citizenship and character development in program participants through cleanups and plantings.
- VCA also partners with Praxair, who conducts annual improvements of the shoreline and park and has donated numerous trees.
- Ford Motor Company union UAW 897 has also joined the effort, conducting cleanups, repairing the guardrail, and painting benches.
- Neighborhood residents have been encouraged to adopt the area, and as a result, vandalism has been greatly reduced.[1]

Since 2003, Riverkeeper has conducted semiannual neighborhood cleanups at 15 sites along the Buffalo River to encourage community stewardship of the waterfront. The Buffalo River RAP and AOC are also promoted as part of the annual Earth Day events and various festivals, community events and community meetings throughout the watershed.

5.2.4 ADDITIONAL PUBLIC INVOLVEMENT

There will be numerous opportunities in 2006 for public involvement in decision-making related to Buffalo River planning and policy. These include public meetings for the Buffalo Sewer Authority's Long-Term Control Plan, Good Neighbor Planning Alliance, City of Buffalo Brownfields Opportunity Area planning and Remedial Action Plan implementation. Riverkeeper will continue to post information on public meetings on its website and encourage stakeholder involvement.

SECTION 5.2 - REFERENCE

[1] Peg Overdorf, Executive Director, Valley Community Association, Personal communication, 2005.

5.3 LAND USE AND DEVELOPMENT

Although no specific actions have been taken regarding land use and development during this reporting period, numerous projects are in the planning stage. (See Figures 5-1 and 5-2 at the end of this section for a breakdown of current property class codes and industrial usage of land surrounding the Buffalo River AOC impact area). The following summarizes some of the current and active land use/development activities within the AOC impact area:

- **Buffalo River Greenway Implementation Plan**- A final draft of the Buffalo River Greenway Implementation Plan, a proposal to preserve and celebrate the environmental and industrial heritage of the river, will be completed in December 2005. The Plan will outline Greenway principles and guidelines, summarize existing conditions and identify site-specific opportunities and projects, as well as give detailed implementation procedures. The Buffalo River Greenway Implementation Plan is being updated by Buffalo Niagara Riverkeeper in conjunction with the RAP coordination project.
- **Ohio Street Bicycle/Pedestrian Path**- The "Greenway Trail" is a 2.5 mile bicycle/pedestrian path that begins at Gallagher Beach on Buffalo's outer harbor and continues north to the US Coast Guard Base. Construction is being completed in Fall 2005 on extension of the path from the NFTA DL&W facility on South Park Avenue to Ohio Street, along the Buffalo River. The trail will connect Ohio Street to the outer harbor without traversing the Skyway. Project costs are $1.7 million.[1 2]
- **Erie Canal Harbor Restoration**- A waterfront infrastructure project which includes reconstruction and restoration of historic and cultural features, a transit plaza, waterfront esplanade, maritime facilities, access infrastructure and a new Naval and Servicemen's' Park. Status of Project: Funding is secured and construction of Naval Basin and Veteran's Park in Buffalo Harbor is completed. Supplemental EIS and re-design of remaining project

elements also are underway. New Naval Basin & Relocation of Vessels, Veteran's Park, and SEIS Scoping Report have all been completed. Construction began in Fall 2004 with completion expected by Fall 2007[3]

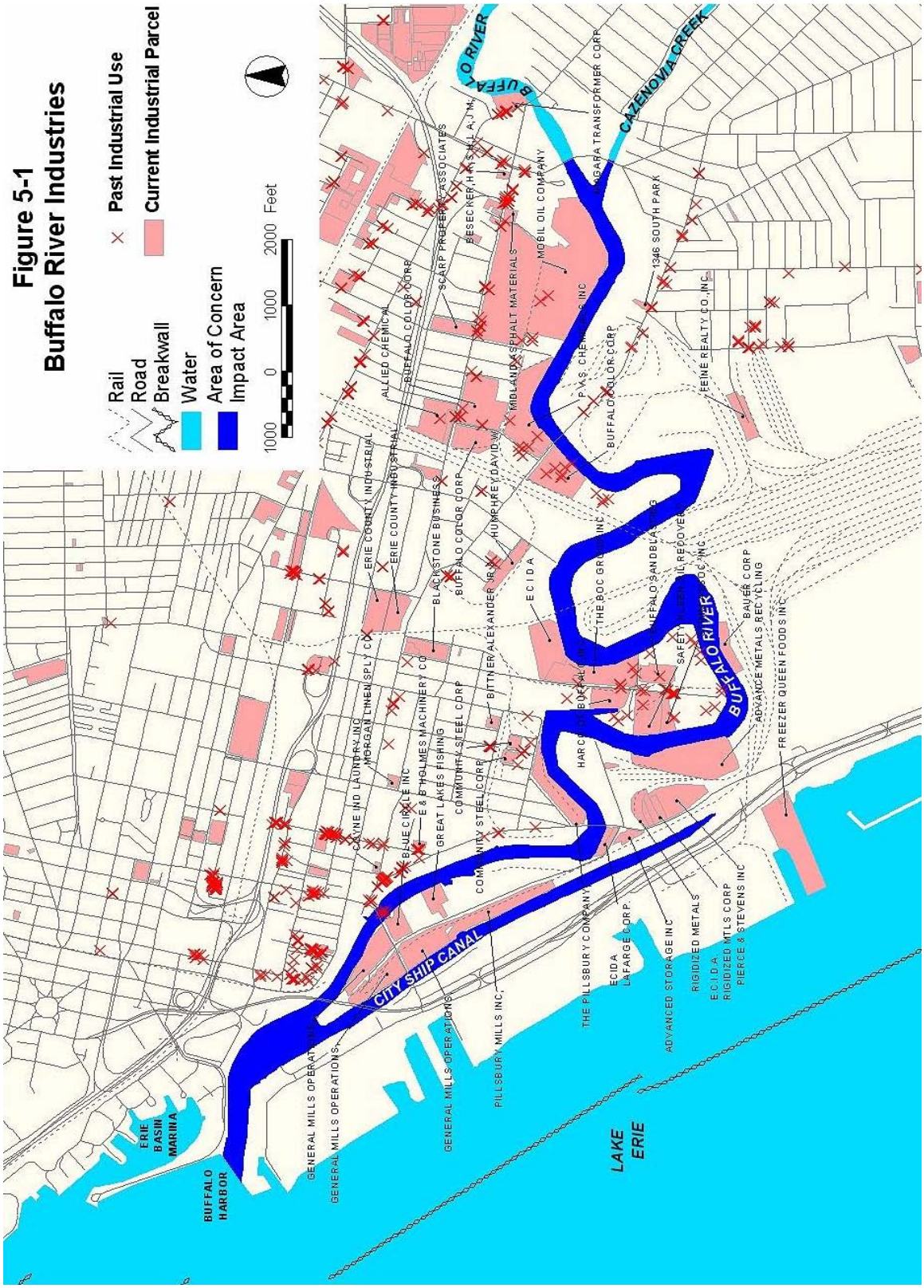
- **Brownfields Opportunity Area (BOA) planning**- A planning grant has been awarded to the City of Buffalo from NYSDOS for a master plan development for a portion of south Buffalo. The BOA includes 1800 acres from the Buffalo River south to the Lackawanna border, east to Hopkins Road and west to Lake Erie. The project is expected to last 18 months and is set to begin in Fall 2005.[4]
- **Local Waterfront Revitalization Plan (LWRP)**- The City of Buffalo's LWRP is aimed at restoring and revitalizing the deteriorated and underutilized areas of the waterfront by promoting development and redevelopment that will meet the City's goals and objectives for the waterfront.[5] A Draft LWRP was completed in May 2005 and is currently under review by various stakeholders. The LWRP addresses economic development, tourism, public access, conservation, water quality and brownfields redevelopment on the City's various waterways, including the Buffalo River and City Ship Canal.
- **Bass Pro-** A Bass Pro Outdoor World Store is being planned for the old Memorial Auditorium as a key component to the Erie Canal Harbor Restoration. The $100+ million project includes a Great Lakes/Erie Canal Museum, with the entire project located adjacent to Buffalo Harbor. The proposed project is anticipated to break ground in 2007, with an estimated draw of 3-5 million patrons per year.
- **Niagara Greenway-** In September 2004, New York State created a 14-member Niagara River Greenway Commission to facilitate the creation of a Niagara River Greenway – "a linear system of state and local parks and conservation areas linked by a network of multi-use trails within the greenway area". The commission must develop a plan and generic environmental

impact statement for the creation of the greenway designed to enhance waterfront access, complement economic revitalization of the communities along the river, and ensure the long-term maintenance of the greenway.

The Commission began meeting in July 2005, and in November 2005 issued a Request for Proposals for development of the Greenway Plan. According to the legislation, the plan must be submitted to the New York State Commissioner of Parks no later than September 2006 after having been endorsed by all of the municipalities within the Greenway area. Of interest to the Buffalo River RAP, the Niagara River Greenway Plan will define how far the Greenway extends up into the Buffalo River Area of Concern from the River's outlet at the mouth of the Niagara.

At least 17 environmental, sportsmen, and boating organizations with tens of thousands of members have joined forces through the Niagara River Greenway Campaign to ensure that the recently created Niagara River Greenway fulfills its potential to safeguard the Niagara River ecosystem and develop a sustainable, 21st century regional economy. The Campaign mandates that the Greenway be ecologically sustainable, provide ample public recreational access to the River, support heritage and marine based businesses and actively involve local interests in the planning and management effort.

Complementary Projects: Land Use & Development



SECTION 5.3 - REFERENCES

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[2] City of Buffalo website, 2005 http://www.ci.buffalo.ny.us/Files%5C1_2_1%5CBuffaloWaterfront%5CGreenway.pdf)
[3] City of Buffalo website, 2005 http://www.ci.buffalo.ny.us/document_1786_186.html
[4] Sandy Nasca, City of Buffalo, Personal communication, 2005.
[5] City of Buffalo Office of Strategic Planning, Queen City in the 21st Century - Local Waterfront Revitalization Program (Draft LWRP) (May 2005).

6 NEXT STEPS AND COMMITMENTS

The following summarizes the next steps and commitments as discussed in previous sections. Wherever possible, timelines, responsible parties and funding sources have been identified.

BENEFICIAL USE IMPAIRMENTS

TASK: Complete the assessment of three "likely impaired" uses (BUI #2- Tainting of Fish and Wildlife Flavor; BUI#3- Degradation of Fish and Wildlife Populations; and BUI#5- Bird or Animal Deformities or Reproductive Problems).

RESPONSIBLE PARTIES: Riverkeeper, RAC and other project partners to be identified.

TIMELINE: To be completed by 2008.

FUNDING SOURCE: USEPA RAP Coordination grant to Riverkeeper has resources dedicated to this task and will be leveraged to generate local match or in-kind as needed.

TASK: Complete the assessment of the two "unknown" use impairments (BUI#8- Eutrophication or Undesirable Algae; and BUI#13- Degradation of Phytoplankton).

RESPONSIBLE PARTIES: Riverkeeper, RAC and other project partners to be identified.

TIMELINE: To be completed by 2008.

FUNDING SOURCE: USEPA RAP Coordination grant to Riverkeeper has resources dedicated to this task and will be leveraged to generate local match or in-kind as needed.

TASK: Complete the assessment of BUI#14- Loss of Fish and Wildlife Habitat.

RESPONSIBLE PARTIES: Riverkeeper, RAC and other project partners to be identified.

TIMELINE: To be completed by 2008.

FUNDING SOURCE: USEPA RAP Coordination grant and USEPA Niagara River Watershed Habitat Assessment Grant to Riverkeeper will be leveraged to generate

local match or in-kind as needed. Buffalo State College graduate student will conduct impervious vs. pervious surface analysis of the AOC as in-kind.

DELISTING CRITERIA/RESTORATION TARGETS

TASK: Upon completion of BUI evaluation and assessment, if necessary develop criteria/targets for BUIs #2, #3, #5, #8, and #13.

RESPONSIBLE PARTIES: Riverkeeper and the RAC.

TIMELINE: Estimated completion by 2008.

FUNDING SOURCE: USEPA RAP Coordination grant to Riverkeeper.

TASK: Development of quantitative criteria/targets for BUI#14- Loss of Fish and Wildlife Habitat.

RESPONSIBLE PARTIES: Riverkeeper and the RAC.

TIMELINE: Estimated completion by 2008.

FUNDING SOURCE: USEPA RAP Coordination grant to Riverkeeper.

TASK: Develop monitoring methods and protocols for the delisting of BUIs.

RESPONSIBLE PARTIES: Riverkeeper and the RAC.

TIMELINE: Commence in 2005 for known impairments. Estimated completion by 2008 for all determined impairments.

FUNDING SOURCE: USEPA RAP Coordination grant to Riverkeeper.

TASK: Develop updated remedial strategy for delisting or restoring BUIs.

RESPONSIBLE PARTIES: Riverkeeper and the RAC.

TIMELINE: Commence in 2005 for known impairments. Estimated completion by 2008 for all determined impairments.

FUNDING SOURCE: USEPA RAP Coordination grant to Riverkeeper.

WATER QUALITY

TASK: Conduct 2006 RIBS sampling.

RESPONSIBLE PARTY: NYSDEC-Region 9

TIMELINE: Sampling in 2006. Report expected by 2008.

FUNDING SOURCE: Statewide Waters Monitoring Program- NYSDEC

TASK: Discharge Permit Monitoring and Renewal

RESPONSIBLE PARTY: NYSDEC-Region 9

TIMELINE: Annually.

FUNDING SOURCE: Environmental Benefit Permit System- NYSDEC

TASK: Long-Term Control Plan implementation

RESPONSIBLE PARTIES: BSA, NYSDEC-Region 9

TIMELINE: Sampling in 2006. Report expected by 2008.

FUNDING SOURCE: Statewide Waters Monitoring Program- NYSDEC

TASK: Phase II-Stormwater Regulations implementation

RESPONSIBLE PARTIES: NYSDEC, Erie County DEP, local municipalities

TIMELINE: Ongoing.

FUNDING SOURCE: NYSDEC and local municipalities.

TASK: Illicit Discharge Trackdown & Impervious Surface Modeling

RESPONSIBLE PARTIES: Buffalo State College, Erie County DEP

TIMELINE: Commence in late 2005. Expected completion by 2007.

FUNDING SOURCE: NYSDEC grant to Erie County DEP and USEPA grant to Buffalo State College and ECDEP.

TASK: Maintain BRIC to augment flow of Buffalo River

RESPONSIBLE PARTY: PVS Chemicals, Inc.

TIMELINE: Annually.

FUNDING SOURCE: PVS Chemicals, Inc.

CONTAMINATION

TASK: Implement intensive sediment sampling and analysis for lower Buffalo River.

RESPONSIBLE PARTIES: NYSDEC-Region 9, USACE, USEPA-GLNPO

TIMELINE: Summer 2005 – Spring 2006

FUNDING SOURCE: NYSDEC, USEPA-GLNPO

TASK: Implement Buffalo River Environmental Dredging Feasibility Study

RESPONSIBLE PARTIES: USACE, Riverkeeper

TIMELINE: Expected to be completed in 2008.

FUNDING SOURCE: USACE 312 Program, and Riverkeeper

TASK: Complete Mobil Oil Corporation (915040) remediation.

RESPONSIBLE PARTIES: Mobil Oil Corporation and NYSDEC-Region 9

TIMELINE: Not available.

FUNDING SOURCE: Undetermined.

TASK: Complete Steelfields LTD (915017) remediation.

RESPONSIBLE PARTIES: Steelfields LTD and NYSDEC-Region 9

TIMELINE: Expected completion in 2007.

FUNDING SOURCE: Undetermined.

TASK: Complete remedial work at Buffalo Color Plant (915184) site.

RESPONSIBLE PARTIES: Honeywell Corporation and NYSDEC-Region 9

TIMELINE: Expected completion in 2006.

FUNDING SOURCE: Undetermined.

TASK: Complete Tifft-Hopkins St. (915131) contaminated soil removal.
RESPONSIBLE PARTIES: Honeywell Corporation and NYSDEC-Region 9
TIMELINE: Expected completion in 2005.
FUNDING SOURCE: Undetermined.

TASK: Complete remedial and park restoration activities at Boone Park (B00196).
RESPONSIBLE PARTY: NYSDEC
TIMELINE: Expected completion in 2005.
FUNDING SOURCE: Clean Water/Clean Air Bond Act Environmental Restoration program.

TASK: Commence 90 Hopkins St. (E915181) lime material removal.
RESPONSIBLE PARTIES: City of Buffalo and NYSDEC
TIMELINE: Expected completion in 2006.
FUNDING SOURCE: Clean Water/Clean Air Bond Act Environmental Restoration program.

FISH & WILDLIFE

TASK: Complete remediation and restoration work at Alltift site.
RESPONSIBLE PARTY: NYSDEC
TIMELINE: Expected completion in Fall 2005.
FUNDING SOURCE: NYSDEC

TASK: Bird Survey and Seasonal Population Assessment
RESPONSIBLE PARTY: Buffalo Ornithological Society, Canisius College
TIMELINE: Spring 2005 – Spring 2007.

FUNDING SOURCE: In-kind through BOS and Buffalo State College.

TASK: Conduct annual fish stocking and electroshocking as part of the Buffalo River Walleye Restoration Project.

RESPONSIBLE PARTY: NYSDEC-Region 9

TIMELINE: Annually through 2010.

FUNDING SOURCE: NYSDEC

TASK: Implement Goby Survey- Buffalo River and Tributaries project

RESPONSIBLE PARTY: USFWS-Lower Great Lakes Fishery Resources Office

TIMELINE: Commence in 2005.

FUNDING SOURCE: USFWS

COMPLEMENTARY PROJECTS

TASK: Complete Phase II of Times Beach Restoration

RESPONSIBLE PARTIES: Erie County DEP, USACE, City of Buffalo, NYS Office of Parks, Recreation and Historic Preservation (OPRHP)

TIMELINE: Commence in 2005.

FUNDING SOURCE: NYS OPRHP secured $350,000 from the federal Land and Water Conservation Fund which is administered by US Department of the Interior (DOI), and the National Parks Service.

TASK: Ohio Street Park project

RESPONSIBLE PARTIES: NYS Assemblyman Mark Schroeder, Valley Community Center, Erie County, City of Buffalo, Riverkeeper

TIMELINE: Commence in 2005.

FUNDING SOURCES: New York State, Erie County

TASK: Environmental Education and Public Involvement (including public meetings, forums, presentations, and clean-ups)

RESPONSIBLE PARTY: Riverkeeper

TIMELINE: Ongoing.

FUNDING SOURCES: Riverkeeper

TASK: Buffalo River Greenway Implementation Plan

RESPONSIBLE PARTY: Riverkeeper

TIMELINE: Ongoing.

FUNDING SOURCES: Undetermined.

TASK: Ohio Street Bicycle/Pedestrian Path

RESPONSIBLE PARTIES: NFTA, City of Buffalo, Erie County

TIMELINE: Expected completion by late 2005.

FUNDING SOURCES: Responsible parties.

TASK: Erie Canal Harbor Restoration

RESPONSIBLE PARTY: City of Buffalo

TIMELINE: Expected completion by Fall 2007.

FUNDING SOURCES: Responsible parties.

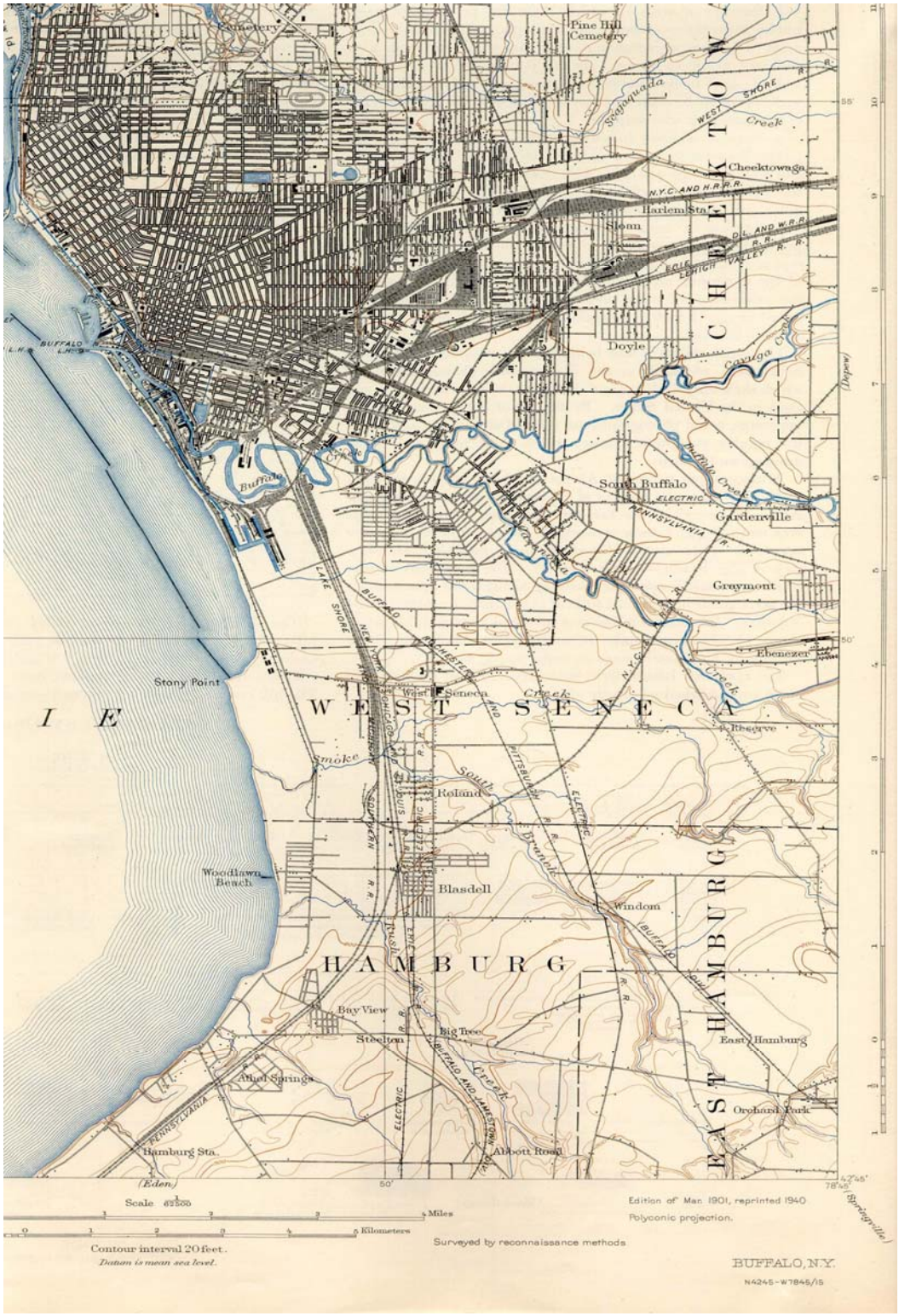
TASK: BOA and LWRP Planning

RESPONSIBLE PARTY: City of Buffalo

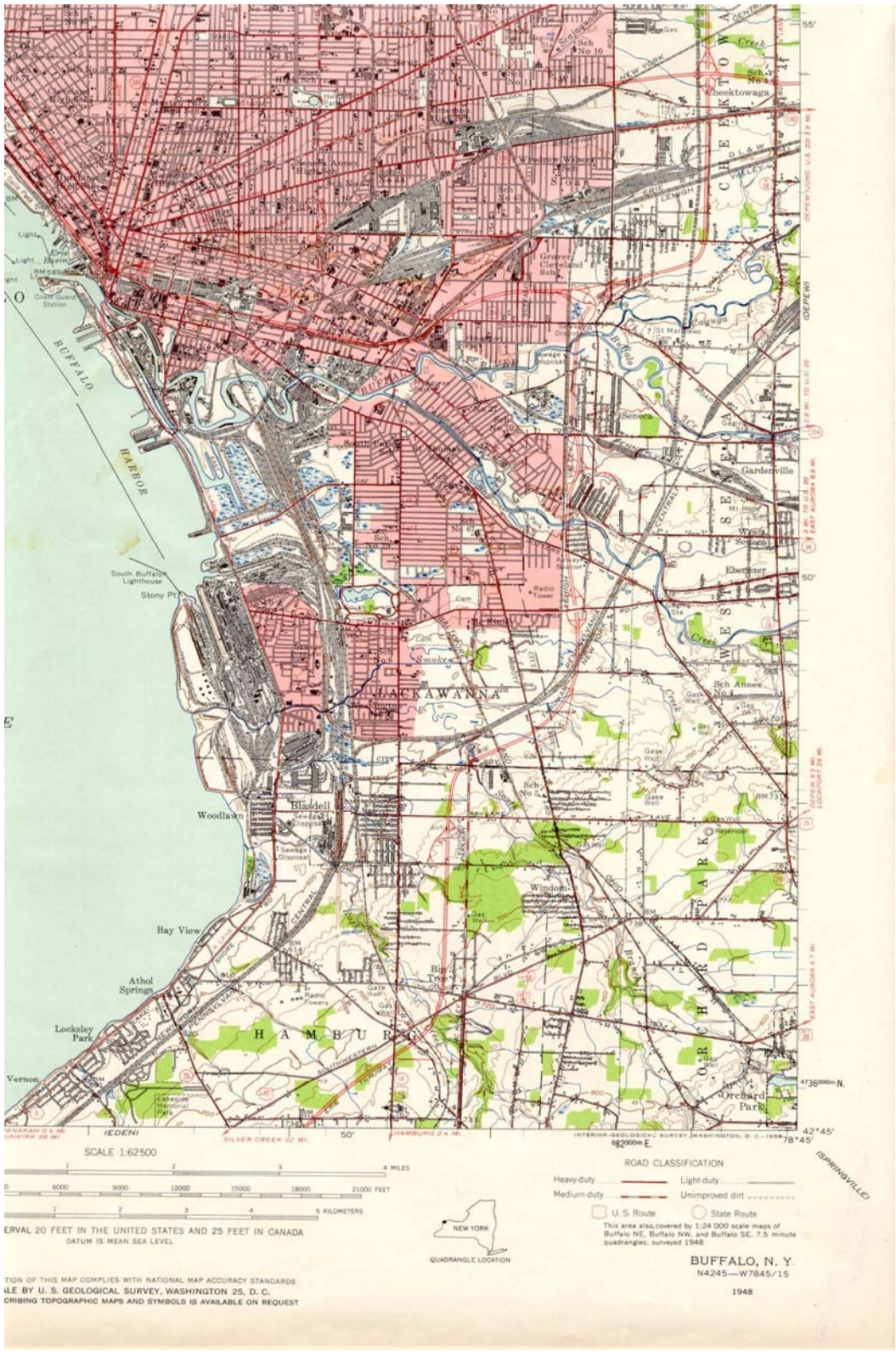
TIMELINE: Ongoing

FUNDING SOURCES: City of Buffalo, NYSDOS

APPENDIX A HISTORICAL MAPS OF THE CITY SHIP CANAL



Appendix A


BUFFALO
HARBOR
South Buffalo Lighthouse
Stony Pt
Woodlawn
Blasdell
Bay View
Athol Springs
Lockley Park
Vernon
Seneca
Gardenville
Ebenezer
Cheektowaga
Windom
Orchard Park
(EDEN)
(SPRINGVILLE)
SCALE 1:62500
ROAD CLASSIFICATION
Heavy-duty
Light-duty
Medium-duty
Unimproved dirt
U. S. Route
State Route
NEW YORK
QUADRANGLE LOCATION
BUFFALO, N. Y.
N4245—W7845/15
1948

APPENDIX B STREAM CLASSIFICATION SYSTEM – HIGHLIGHTS OF CLASSIFICATION DIFFERENCES

Parameter	"B" Classification	"C" Classification	"D" Classification
Taste, color, odor, etc.	None that will adversely affect the parameter	Same	Same
Turbidity	No increase will cause a substantially visible contrast to natural conditions	Same	Same
Solids- all	None that will impair the waters for their best usages	Same	Same
Oil and floatables	No residue or oily film	Same	Same
Phosphorus and Nitrogen	None that will allow growth that will impair best usages	Same	Same
Thermal Discharges	No specific differences between classifications with the exception of trout waters.	Same	Same
pH	Not less than 6.5, not higher than 8.5	Not less than 6.5, not higher than 8.5	Not less than 6.0, not higher than 9.5
Dissolved Oxygen	For non-trout waters, the min daily average shall not me <5.0 mg/L, and at no time shall the concentration be <4.0 mg/L	For non-trout waters, the min daily average shall not me <5.0 mg/L, and at no time shall the concentration be <4.0 mg/L	Not less than 3.0 mg/L at any time.
Dissolved solids	Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/L	Same	None listed.
Total coliforms per 100ml	Monthly median value and more than 20 percent of samples, from min of 5 samples, shall not exceed 2400 and 5000 respectively.	Same	Same
Fecal coliforms per 100 ml		The monthly geometric mean, from min of 5 samples, shall not exceed 200.	Same
Various chemical parameters (metals, pesticides, PAHs, etc)	Usually the same for B and C classifications.	Usually the same for B and C classifications.	Usually the same as B and C, however some parameters have lower standards for a D classification.

APPENDIX C INACTIVE HAZARDOUS WASTE SITES WITHIN THE BUFFALO RIVER AOC

BACKGROUND

New York State has enacted the Inactive Hazardous Waste Disposal Site Program to ensure the identification, investigation and clean up of sites where significant amounts of hazardous waste may exist. Within the Department of Environmental Conservation the Division of Environmental Remediation, alongside the Divisions of Health and Law, are responsible for ensuring the cleanup of inactive hazardous waste disposal sites across New York State.

The remediation process begins with a Preliminary Site Assessment (PSA). The PSA determines whether a site meets the state's definition of an inactive hazardous waste disposal site. (Inactive hazardous waste disposal sites are defined by the confirmed presence of on-site hazardous waste.) The responsible agency must also make a determination of a public health and/or environmental risk.

When the presence of hazardous waste and the environmental/public health threat have been confirmed, the site is then added to the State's official list of sites and is given a classification code: Class 1 - imminent danger; Class 2 - significant threat; and Class 3 - no significant threat. If no hazardous waste is documented, a site is delisted.

Class 1or 2 sites undergo a detailed investigation known as a remedial investigation (RI). Through a process of sampling and laboratory analyses, the RI identifies the threat to public health and the environment. Threats are determined by scope of contamination, including the defined pathways of migration and the degree of contamination in surface water, groundwater, soils, air, plants, and animals. A Feasibility Study (FS) is then

produced which uses RI information to develop a strategy that will eliminate the site's threat to public health or the environment.

In some situations Interim Remedial Measures (IRM) are taken in lieu of the extensive RI/FS stage. An IRM is a distinct set of planned actions for both emergency and non-emergency situations that accelerates the entire remediation process.

After all studies have been completed a Record of Decision (ROD) is approved. The ROD delineates the proposed remedial action plan. Remedial design and remedial construction can begin. Eventually, after remedial work has been completed a hazardous waste site may be reclassified. Sites either undergo continued maintenance and operation or are delisted.

2002 Buffalo River RAP Status Report

The 2002 update demonstrated significant progress in the area of inactive hazardous waste remediation. By the time of the completion of the 2002 report, all Phase I & II site investigations have been concluded for currently identified inactive hazardous waste sites. Furthermore, the Remedial Investigations and Feasibility Studies were completed at 38 sites.

Current Status of Sites Tributary to the Buffalo River[1]

Steelfields LTD (Site No. V00619): This 218 acre site includes the former Republic Steel Plant, Donner-Hanna Coke Plant, the Republic Steel Maintenance Facility and the Donner-Hanna Coke Storage area (DEC site No. 915017). The RI/FS was completed in January 2000. Steelfields Ltd took ownership of the site in 2000 as part of the bankruptcy proceeding of the LTV Steel Corporation. At that time Steelfields also entered into a Voluntary clean-up agreement with NYS to remediate the site for later development. As part of the remediation approximately 300,000 cubic yards of contaminated soil and fill

will be excavated and either, treated, contained, recycled or disposed of off-site. Remedial work is currently underway at the site and expected to be complete by 2007.

Tifft & Hopkins Street Site (Site No. 915131): Honeywell Corporation has entered into a Consent Order with the NYSDEC to conduct a Interim Removal Measure to remove up to 35,000 cubic yards of contaminated soil containing residues from the local dye making industries. Work is expected to be completed by the summer of 2005.

Lehigh Valley Railroad (Site No. 915071): Honeywell Corporation has completed removal of 3,400 cubic yards of contaminated soil containing residues from the local dye making industries. The site is adjacent to the Tifft nature preserve and was restored to a natural state.

Buffalo Color Plant Site (Site No. 915184): Honeywell Corporation has entered into a Consent Order with the NYSDEC to perform a Interim Remedial Measure at the site. The IRM consists of the installation of groundwater pumping wells and the installation of a groundwater cut-off wall to prevent flow of site contaminants to the Buffalo River. Remedial work is expected to be complete within one year.

Buffalo Color Area D (Site No. 915012): Remedial work was completed in 1998. The activities consisted of the installation of a groundwater collection and treatment system combined with a cap and barrier wall system. Remedial activities also included the removal of approximately 40,000 cubic yards of impacted sediment from the Buffalo River. Long term operation and maintenance of the property is currently being performed.

90 Hopkins Street (Site No. E915181): The City of Buffalo has committed to the removal of 30,000 cubic yards of lime material from the 8.9-acre site. The lime is a waste

product from former acetylene production industries that were located in the area. Run-off from the piles has caused significant rises in pH in local waterways. Work is being performed under the NYS 1996 Clean Water/ Clean Air Bond Act Environmental Restoration program and is expected to be completed by 2006.

Sovereign Chemical (Site No. V00215): Sovereign Chemical entered into a voluntary clean-up agreement with the NYSDEC to remediate their chemical storage area at the Pierce and Stevens Facility on Ohio Street. The remedial work consisted of the removal of the old tank farm, removal of contaminated soil and replacement of the equipment with a state of the art chemical storage facility. As part of the work approximately 5,800 tons of contaminated soil containing solvents was excavated and properly disposed off-site in 2003. The facility is currently pumping groundwater as part of a long term operation and maintenance plan.

Boone Park (Site No. B00196): This 3 acre site consists of a public park that contains surface soil contaminated with arsenic. Remedial and park restoration activities are being performed under the NYS 1996 Clean Water/ Clean Air Bond Act Environmental Restoration program and will be completed in the spring of 2005.

Bern Metal (Site No. 915135): The 3.5-acre site was remediated in 2002. The work consisted of a cap system. Long-term operation and maintenance is currently underway.

Mobil Oil (Site No. 915040): The site is a 77 acres petroleum distribution and storage facility. A groundwater collection system has been installed and is in operation on the entire property. The Company has proposed additional remediation that is under review by NYSDEC. A specific clean up schedule is not yet available.

APPENDIX C - REFERENCE

[1] Marty Doster, NYS Department of Environmental Conservation, Region 9, Personal communication, 2005.