

A photograph of the Chicago skyline across a body of water. The Willis Tower is the most prominent skyscraper. In the foreground, there are green bushes and a fence with yellow wildflowers. The sky is clear and blue.

Friends of the Chicago River

Action Plan for the Chicago River: Getting Specific

**Strategies for a Cleaner, Healthier,
More Vibrant Chicago River**

Action Plan for the Chicago River: Getting Specific

- I. Report Summary 3
- II. Detailed Document 8
 - A. Charrette Series Process 8
 - B. Charrette Participants and Their Vision 8
 - C. Charrette Summaries 11
 - 1. Riverbank Habitat 11
 - 2. Aquatic Habitat 13
 - 3. Land Protection 15
 - 4. Riverbank Naturalization 21
 - 5. Water Quality 23
 - 6. Public Access 2
 - D. Research Findings from the “Strategies for a Clean Chicago River” Project 27
- III. Tool Kit 31
 - A. Open Space Categories Specific to the Chicago River Watershed 31
 - B. List of Aquatic Habitat Parameters 32
 - C. Process to Identify Effective Methods to Protect Land 33
 - D. Land Protection Methods 35
 - E. Process to Design Riverbank Naturalization Projects 36
 - F. 12 Guiding Principles of Clean Water for the Chicago River 38
 - G. Resources and Regional Success Stories 39
 - H. Explanation of Chicago River Matrix 44
- IV. Clean Water Reference Kit 45
 - A. Overview of the Clean Water Act 45
 - B. National Pollutant Discharge Elimination System (NPDES) Program Overview 46
 - C. Nine Minimum Controls for Combined Sewer Overflows 48
- V. Appendices 49
 - A. 2006 Paddling Survey 49
 - B. Equalized Assessment Value Survey on Properties Adjacent to the Chicago River 51

Acknowledgements

Friends of the Chicago River would like to thank all participants in Friends' 25th Anniversary Chicago River Charrette Series and the many people who reviewed the work and research of the "Strategies for a Clean Chicago River" project. In addition, we especially acknowledge the following for supporting this project by providing data and information on several of the topics covered in this report:

- Center for Neighborhood Technology
- City of Chicago Department of Planning and Development
- Friends of the Chicago River Technical Advisory Committee
- Illinois Environmental Protection Agency
- Office of Mayor Richard M. Daley
- Office of Attorney General Lisa Madigan
- Office of Lt. Governor Pat Quinn
- The Metropolitan Water Reclamation District of Greater Chicago
- The Openlands Project
- United States Environmental Protection Agency

A Letter from Mayor Richard M. Daley



OFFICE OF THE MAYOR
CITY OF CHICAGO

RICHARD M. DALEY
MAYOR

July 24, 2007

Dear Friends of the Chicago River:

As Mayor and on behalf of the city of Chicago, I am writing to commend you for your work on Friends' *Action Plan for the Chicago River: Getting Specific*.

Your report provides a detailed analysis of the complex issues facing our river system and thoughtful recommendations for continued work to improve our river.

The city of Chicago is committed to fully reclaiming the Chicago River as a vital natural and cultural resource for our city. The *Action Plan for the Chicago River* will undoubtedly prove useful as we continue to move forward together in this important work.

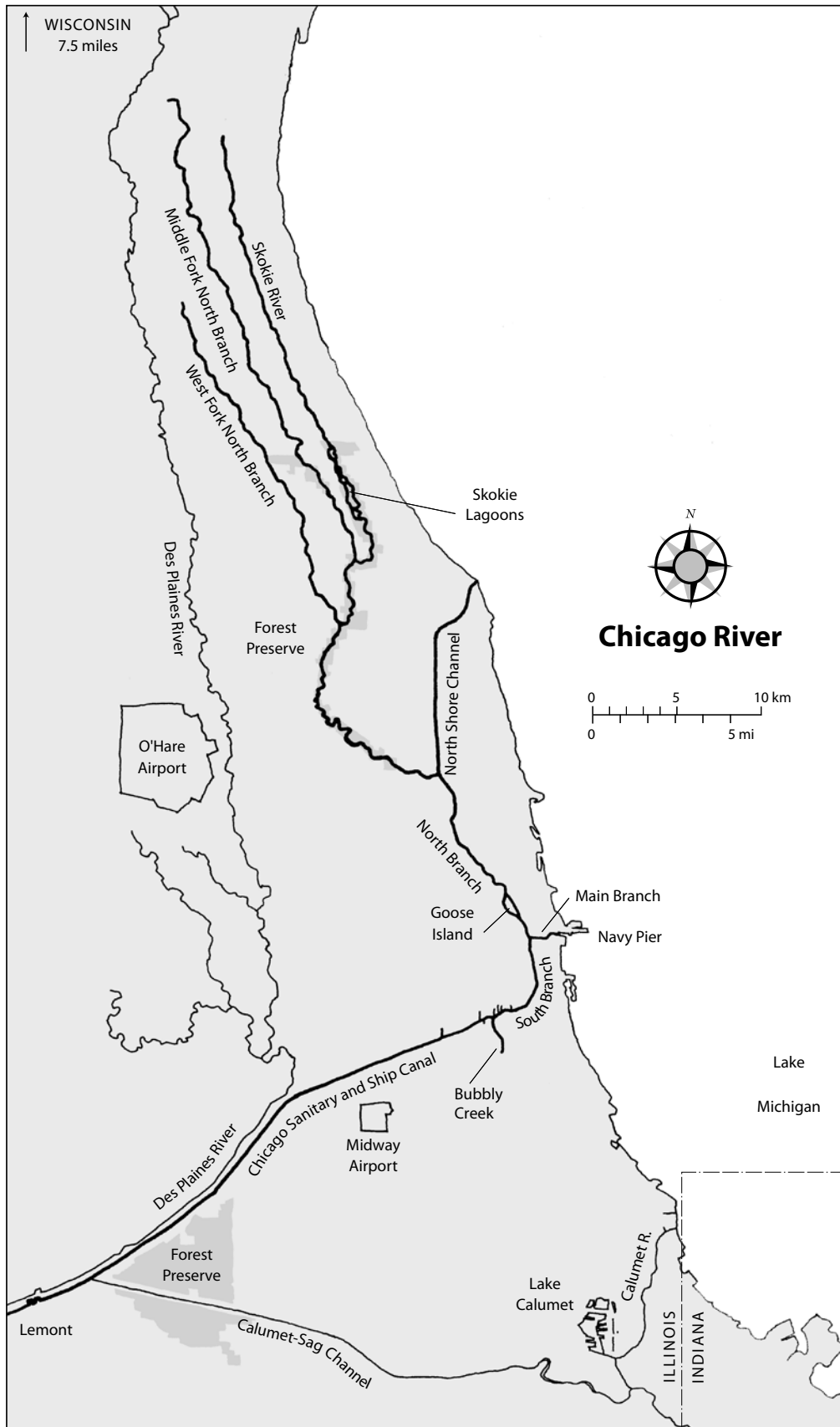
Sincerely,

A handwritten signature in black ink that reads "Richard M. Daley". The signature is stylized and written in a cursive-like font.

Mayor

Friends of the Chicago River
c/o Kristie Willis
407 South Dearborn
Suite 1580
Chicago, Illinois 60605

Map of the Chicago River



I. Report Summary

When Robert Cassidy published “Our Friendless River” in *Chicago* magazine in 1979, the Chicago River was truly a lost resource, rarely used for recreation and inhospitable for wildlife. In his piece, Cassidy defined the problems facing the Chicago River and suggested strategies or an “action plan” that he felt would improve it. This helped lay the foundation for Friends of the Chicago River and through our efforts, the Chicago River has been truly transformed.

Recognizing the value in leveraging information, data, and research gained from exemplary river projects in the Chicago region over the past 25 years, and understanding the need to move forward with interdisciplinary strategies for the Chicago River, Friends of the Chicago River identified an opportunity to redefine the context within which to think about and plan ongoing and future work for river improvement. This opportunity was a six-month, six-meeting charrette series entitled “Action Plan for the Chicago River: Getting Specific.”

Because the Chicago River and its problems are so complex and the watershed is so geographically broad, Friends of the Chicago River identified six of the most pivotal topics for study during the charrette process. These topics - riverbank habitat, aquatic habitat, land protection, riverbank naturalization, water quality, and public access - reach across municipal boundaries. Furthermore, the topics can be interwoven to capture the context for an interdisciplinary framework that Friends of the Chicago River believes is imperative to moving forward with our work.

While Friends of the Chicago River is the only organization that is dedicated to improving the river within the context of the entire watershed, many other agencies and groups have contributed to its improvement. Thus, creating a vision for the river requires collaboration across subject disciplines, agencies, and geographic boundaries. In this spirit, Friends of the Chicago River assembled a knowledgeable group of over 50 subject matter experts to participate in the “Action Plan for the Chicago River: Getting Specific” 25th anniversary charrette series and additional water quality research. The experts represented a variety of nonprofit groups, public institutions, private sector consulting groups, and state agencies.

With the help of these experts, we defined ecological parameters specific to the Chicago River’s geographic features, land ownership and land use patterns, water

quality regulation framework and existing projects, knowledge, and resources. We developed a tool kit, compiled from data at each charrette that outlines the way experts think about our chosen topics, and we aim to generate interdisciplinary solutions by synthesizing these tools into one place. The tools assembled in the tool kit will not only guide Friends of the Chicago River’s work, but also will hopefully be utilized by others working on river improvement projects.

In addition to the charrette series, Friends of the Chicago River conducted intensive and extensive research on water quality improvements needed in the Chicago River prior to and during, the charrette project and coinciding with the 2003 Use Attainability Analysis by the Illinois EPA. This research, part of the “Strategies for a Clean Chicago River” project, focused on policy initiatives and tools of the Clean Water Act as it pertains to the water quality of the Chicago River. A section on in-depth recommendations to improve water quality and preliminary data that supports that a cleaner river will bring economic benefits to the region is included in this document. We have also included a clean water reference kit to provide background on the Clean Water Act so that readers may better understand Friends of the Chicago River’s recommendations.

The Chicago River is at the center of quality of life improvements for plants, animals, and humans in the watershed. Offering habitat and recreational amenities, strong economic benefits linking manufacturing with other commercial industries, and providing property taxes from new residential developments—the Chicago River connects people beyond just those who visit the river’s edge. Interconnections within the watershed—ecological connections, but also social, economic, and infrastructure connections—link every citizen to the Chicago River. A new vision for the Chicago River must be an integrative

vision that (1) utilizes knowledge from different disciplines, (2) acknowledges the protection of land-based and aquatic habitat in conjunction with active and passive outdoor recreation space throughout the watershed, and (3) provides ample room for a collaborative community of people to work on the Chicago River.

The information gathered in the following pages documenting Friends of the Chicago River's charrette series, "Action Plan

for the Chicago River: Getting Specific," and Friends of the Chicago River's research from the "Strategies for a Clean Chicago River" project, ultimately reaffirms Friends of the Chicago River's mission to preserve, protect, and foster the vitality of the Chicago River for the plant, animal, and human communities within its watershed.

Ten Unifying Ideas for Improvement of the Chicago River

- The developing Chicago River watershed warrants the pursuit of two types of protection: protection of land and open space and protection of public access to the Chicago River. Strategies and partnerships need to be developed in order to accomplish both types of protection. Smaller parcels of land adjacent to protected lands or lands that buffer the river's edge from existing development are often overlooked but are key to increasing land protection in the region. A method for protecting (or managing) these smaller parcels of land should be invented and implemented. A system that adds value to land where stormwater best management practices (BMPs) have been implemented should be developed.
- Efforts should be made to achieve consistency in the type and quality of habitat projects and to link habitat projects all along the river. While there are some patches of high quality land-based habitat in the watershed, there is a general lack of quality habitat. Likewise, there is a lack of variety of habitat in and along much of the Chicago River system. Therefore, by undertaking projects that connect habitat sites where site-specific habitat improvement projects are already occurring, much could be accomplished to enhance the quality and quantity of what currently exists. Also, connecting habitat sites provides a corridor for species (including humans) to move more freely along the Chicago River.
- Because of the continued urbanization of the watershed, it is increasingly important to consider the river in the context of its watershed, including both its man-made and naturally occurring surface and groundwater connections. River initiatives and projects should be evaluated by both site specific criteria and within the existing context of the function of the ecology of the river system (hydrology, morphology, aquatic habitat) and the existing human systems (political, social, economic).
- The river and its riverbanks should be viewed as a habitat "mosaic" that includes meanders, side channels, backwaters, marshes, ponds, different soil substrates, a variety of plant species, and woody debris to create habitat and increase habitat diversity. Habitat at the river's edge could be aided by or adapted with built solutions, to achieve "mosaic" properties.
- Recreation opportunities on the Chicago River should include all users – casual adventurers, organized rowing groups, canoe and kayak liveries, morning birders, evening anglers, bicycle commuters, and people who desire to dwell in public spaces and observe life on the river. Physical and civic infrastructure on the Chicago River should support a variety and choice of continuous public access opportunities that allow people to see, experience, and interact with life on the river. Planning for human activity along the river should always be considered in coexistence with planning for land-based and aquatic habitat.
- The Chicago River is a unique, urban river system. Successful models for river improvement can be leveraged from other rivers around the country for use on the Chicago River, but we may also need to invent our own solutions because of the river's grade, surrounding geography, relationship to sewage infrastructure, and historical modifications to the waterway.
- All river improvement projects should be implemented alongside a commitment to ongoing stewardship, land management, and site maintenance. These areas of a project are often overlooked and the hardest to finance in the long term, but are required for any river project's long-term success.
- The establishment of key partnerships is crucial for implementing projects that achieve multiple objectives and enhance communication between groups working on similar projects. Partnerships with individual large landowners in the region offer a particular opportunity for influencing land acquisition (of smaller adjacent parcels or other unprotected open space), affecting management of existing lands, and integrating the knowledge and work of disparate groups, including other land management plans,

regional trail plans, and so forth. Partnerships between environmental groups and government agencies encourage more transparency and more accountability with regard to water quality issues.

- Water quality indicators that measure the river's health should include human perception-based indicators and an assessment of healthy habitat. In addition, policy improvements should be made in the regulatory process governing water quality, including setting higher standards for water treatment, improving the permitting process, and improving enforcement.
- Strategic priorities for each section of the river should be identified, and site specific projects should be prioritized based on goals for each section. When prioritizing projects, it is important to leverage funding that has already been

invested or that will be spent locally by numerous public and private entities. This information can be used to identify patterns and opportunities, coordinate related but independent activities, and appeal for federal funding and protective legislation to complement tens of millions of dollars in local expenditures.

PROJECT SUPPORT

Friends of the Chicago River's Action Plan for the Chicago River: Getting Specific charrette series was facilitated by Susan Parks of Parks Consulting Group. It was supported by Prince Charitable Trusts, The Boeing Company, The Joyce Foundation, and The Richard H. Driehaus Foundation.

II. Detailed Document

A. CHARRETTE SERIES PROCESS

Overview of 25th Anniversary Charrette Series “Action Plan for the Chicago River: Getting Specific”

Friends hosted six sessions in a charrette series to develop a strategic action initiative for the Chicago River. Through the charrette sessions, Friends was able to:

- Bring together experts on topics ranging from turtle habitat to riverbank engineering to nonprofit land trusts.
- Pose new research questions.
- Create a framework for analysis based on the geographic features of the Chicago River and land use on surrounding properties.
- Identify strategic priorities for the Chicago River.
- Discuss roles and opportunities for Friends of the Chicago River.

Process

Prior to the first charrette session, Friends’ project manager, Marta Nelson, collected data and compiled existing information about the Chicago River. This framework was used to define an initial set of discussion questions and identify regional experts in each topic area of study. The topics of study for the charrette series included: riverbank habitat, aquatic habitat, land protection methods, riverbank naturalization, water quality, and public access. Each topic was covered at one all-day session. Experts were identified based on areas of expertise, region of work, and reputation in their particular field.

As part of the initial project work, characteristics that were of high importance in defining a particular segment of the river were identified. The characteristics were land use, condition of the riverbank, existing setback, land ownership, water quality challenges, sewage infrastructure, municipal agencies involved, existing resources (stormwater ordinance, volunteers, protected land), constraints, and opportunities. Information regarding each of these characteristics was compiled for different stretches of the river. Sources included internal knowledge and experience, published plans on the river, and personal communication with subject matter experts. As this data was collected, a prototype of a Chicago River information matrix was created. The Chicago River matrix was expanded to include new information

collected during the charrette sessions. It is included in the tool kit section. However, it is also be a living document that Friends can use and add to on an ongoing basis as changes occur to the Chicago River and its watershed.

A professional facilitator, Susan Parks of Parks Consulting Group, was hired in January 2006 to help design an effective process for participants, create work session agendas, and fine-tune discussion questions. Parks facilitated the charrette sessions, captured the participants’ comments, and submitted notes on the session to Friends. Friends reviewed the notes internally and then sent them out to the participants for review and feedback. The goal of this type of review process was to ensure accuracy and maximum consensus on the charrette session results.

B. CHARRETTE PARTICIPANTS AND THEIR VISION

Over 50 subject matter experts participated in the 25th Anniversary Chicago River Charrette project. Experts participated by attending a charrette session or by reviewing the material after the charrette occurred.

Riverbank Habitat

Jerry Garden; Paul Labus, The Nature Conservancy; Joni Marin, Friends of the Chicago River; Marta Nelson, Friends of the Chicago River; Joan O’Shaughnessey, Chicago Botanic Garden; Stephen Packard, Audubon Chicago Region; John Quail, Friends of the Chicago River; Doug Stotz, The Field Museum.

Aquatic Habitat

Tom Anton, The Field Museum; Shawn Cirton, U.S. Fish and Wildlife, Chicago Field Office; Margaret Frisbie, Friends of the Chicago River; Sasha Kerlow, Friends of the Chicago River; Roger Klocek, John G. Shedd Aquarium; Don Hey, Wetlands Initiative; Todd Main, Friends of the Chicago River; Marta Nelson, Friends of the Chicago River; Steve Pescitelli, Illinois Department of Natural Resources; Bob Rung, Illinois Department of Natural Resources; Frank Veraldi, U.S. Army Corps of Engineers; Phil Willink, The Field Museum.

Land Protection Methods

Mike Doyle, Neighborspace; Margaret Frisbie, Friends of the Chicago River; Tim Grimscheid, Shirley Heinze Land

II. Detailed Document (continued)

Trust; Jim Jerozal, Nicor; Dan Lobbes, The Conservation Foundation; Bob Megquier, Corlands; Marta Nelson, Friends of the Chicago River; Gary Papke, Clarion Associates; John Quail, Friends of the Chicago River; Debra Shore, Chicago Wilderness; Ed Zotti, Friends of the Chicago River.

Riverbank Naturalization

Bram Barth, WRD Environmental; Doug Eppich, Applied Ecological Services; Dave Frigo, Hitchcock Design Group; Margaret Frisbie, Friends of the Chicago River; Ted Gray, Living Waters Consultants; David Jones, Northeastern Illinois University; Marta Nelson, Friends of the Chicago River; Tom Price, Conservation Design Forum; Tim Pollowy, Hey and Associates; John Quail, Friends of the Chicago River; Andrew Selle, Inter-Fluve, Inc.; Sean Widell, Lake County Stormwater Management Commission; Steve Zimmerman, Applied Ecological Services.

Water Quality

Michael Adam, Lake County Health Department; Paul Anderson, Illinois Institute of Technology; Dale Bryson, Alliance for the Great Lakes; Glynnis Collins, Prairie Rivers Network; Albert Ettinger, Environmental Law and Policy Center; Jim Filippini, Friends of the Chicago River Technical Advisor; Rob Flood, North Shore Sanitary District; Margaret Frisbie, Friends of the Chicago River; Danielle Green, US Environmental Protection Agency, Great Lakes Program Office; Kerry Leigh, Chicago Metropolitan Agency for Planning; Susan Lannin, Sierra Club; Todd Main, Friends of the Chicago River; Tom Murphy, Friends of the Chicago River Technical Advisor; Marta Nelson, Friends of the Chicago River; Cindy Skrukud, Sierra Club; Sean Widell, Lake County Stormwater Management Commission.

Public Access

Laura Barghusen, Openlands Project; Paul Gobster, USDA Forest Service, North Central Research Station; Nick Jackson, Chicago Bicycle Federation; Bob Long, Mayor Daley's Fish 'n Kids; Mario Longoni, The Field Museum; Francis Mennone, Chicago Rowing Foundation; Bill Pomerantz, Chicago River Rowing and Paddling Center; Mike Wallin, Lincoln Park Juniors; Susan Urbas, Chicago River Rowing and Paddling Center.

Friends of the Chicago River's Technical Advisory Committee

Paul Anderson, Illinois Institute of Technology; Erin Argylan, Indiana University Northwest; James Filippini; Thomas Murphy, DePaul University; John R. "Jack" Sheaffer, Sheaffer International, Ltd.; David Solzman; A. Dan Tarlock, Chicago-Kent College of Law.

Participant Priorities and Vision

With participants coming from so many different areas of expertise, it was important to capture their initial perspective. At each charrette session, participants were asked to state their vision or goals for the Chicago River. The following themes emerged.

1. **The geography and morphology of the Chicago River is unique.** As we work to improve the Chicago River, we must acknowledge that it is an urban river system. A high incidence of impervious surfaces, heavy and active urban and industrial land use, hydrological modifications that occurred throughout time, and the current artificial control of the flow of the Chicago River away from Lake Michigan by hydraulic structures managed by the Metropolitan Water Reclamation District of Greater Chicago (MWRD) contribute to the uniqueness of the Chicago River. To address the unique geography and morphology of the Chicago River, we need to leverage examples from successful projects within our own river system.
2. **The Chicago River is a complex system that requires a balance of many factors.** The river's natural elements, especially in the riparian areas, should be maximized in a comprehensive way. Habitat should be improved and increased, but also continuously managed during improvement projects so there is a continuum of available habitat as improvements are being made. Habitat areas for plants and animals should be increased in conjunction with an increase in opportunities for how humans interact with the river, and consideration of maintenance of riverbank structure and stability. A balance is needed between increased habitat, protected public access, and new development; between passive and active recreational uses along the river; and between public use of the river and safety and security issues.

II. Detailed Document (continued)

- 3. Increased public access to the Chicago River is desirable.** The water quality of the Chicago River should be improved so that people can eat fish from it and swim in the water. There should be more access with clearly marked signage. People should be able to access the river without cars such, as by walking, riding bikes, and taking public transit. It should be a commuter trail for human-powered travel. Bike, canoe, kayak, and rowing equipment rentals should be available. Public access should include a variety of opportunities to experience nature, including bird watching, bat watching, and fishing. More amenities for safety should be added to access points, including ladders on retaining walls and bathroom facilities.
- 4. Stormwater management is an important issue.** The root causes of stormwater need to be addressed. There should be stricter regulatory controls over the volume, content, and duration of combined sewer overflow discharges into the Chicago River.
- 5. Habitat should be increased.** Vegetative communities should be enhanced all along the river to provide a base of habitat, bank stability, and erosion control. Habitat improvements should be focused on creating environmental buffers; contributing to stabilization; and providing fish, turtle, invertebrate and bird habitat. Invasive species need to be monitored and managed. Achieving a goal of a thriving wildlife corridor would be a good indicator of water quality improvements.
- 6. Projects implemented on the Chicago River create an impact.** Many people mentioned the importance of implementing projects as a way to make improving the river a reality within our grasp. Thus, brainstorming about project opportunities became part of the work we did for the charrettes.



Snowy egrets and other herons, including black-crowned, yellow, green, and great blue, thrive in a variety of land types along the Chicago River from high quality natural communities to abandoned industrial sites.

II. Detailed Document (continued)

C. CHARRETTE SUMMARIES

1. RIVERBANK HABITAT CHARRETTE

Definition, Scope, and Context

Friends is concerned about preserving habitat and protecting open space as sites redevelop along the river and in the watershed. The group of experts that attended the riverbank habitat charrette determined it important to identify habitat potential and to target specific types of organisms for habitat protection based on the land's potential.

Riverbank habitat was identified as not just the riverbanks or land adjacent to the Chicago River, but all the land available for restoration or potential habitat in the watershed. The Chicago River watershed has a variety of land use patterns, including preserved/managed natural areas, suburban areas, and heavily urbanized areas. Due to the variation in land use, there are potential habitat opportunities in areas outside of sites identified by the charrette experts as preserved or managed natural areas. Possible habitat areas also include areas within suburban and urban land-use sections if proper strategies, such as native landscaping, are used. It was useful to categorize these lands specific to the Chicago River watershed, organized by characteristics of the type and quantity of vegetation, land use, level of public activity, and ownership of the land. Given these categories, it is logical that some parcels of land in the watershed have different habitat targets and management needs.

By setting different habitat targets based on the existing conditions of the land, a number of goals are achieved. Specifically the goals of increasing riverbank and aquatic habitat diversity within all areas, increasing connectivity between the land and water, and encouraging built solutions for habitat when they might be the best solutions, can be realized.

Tools Developed

Open Space Categories Specific to the Chicago River
(Tool kit – B)

Land Types in the Chicago River Watershed and Associated Restoration Strategies

A hierarchy of habitat types found in the Chicago River watershed was created based on their potential for habitat creation, restoration, or preservation.

A) High quality natural communities.

These are defined as areas with a flora indicative of a remnant native ecosystem, available habitat for endangered and threatened species, and limited public use. High quality natural communities can be sub-categorized to designate high (the most intact and ecologically functional natural areas), medium (high quality remnants with endangered species), and lower quality areas within this category. These communities occur primarily along the North Branch of the Chicago River and its tributaries.

Restoration strategies include:

- Use of comprehensive habitat restoration as a way to improve the areas of high quality remnants with endangered species. For many of these areas, conservation goals and restoration plans already exist.
- Lower quality habitat that is adjacent to higher quality natural communities should be connected through large-scale land planning and design.

B) Unmanaged, recovering, or degraded natural communities.

These are defined as areas with a high level of vegetation, a degraded quality of vegetation, and limited public use. Examples of these existing habitat types include oak woods, floodplain woods, wetlands and marshes, unassociated woody growth, and woods with red oak, maple, and basswood. These areas are either undergoing restoration or have not benefited from past management.

Restoration strategies include:

- Applying restoration plans to these areas with the goal of connecting them to *high quality natural communities*. This will increase the overall size of the high quality areas, strengthen and enhance the buffer to high quality areas, and reduce barriers to animals and other organisms.

C) Created natural areas.

These are defined as areas with created or altered vegetation including areas of turf grass for public activities, smaller native landscape features, and high public use. These areas have a high potential for use by migrating birds. Created natural areas occur throughout the Chicago River, generally on lands owned by municipal park districts.

Restoration strategies include:

- Enhancing habitat for animals with the goal of increasing animal diversity.

II. Detailed Document (continued)

- Providing additional habitat for migrating birds.
- Educating the public about these places and encouraging people to experience and enjoy these landscapes.
- Minimizing ongoing land management requirements and costs.

D) Unprotected, large-scale open space areas.

These are defined as areas with turf grass, with no attempt to create a natural environment or native landscape area.

These areas include golf courses, cemeteries, corporate campuses, and vacant lots. They are usually privately owned and are found along every reach of the Chicago River.

Restoration strategies include:

- Protecting the land as open space if the ownership makes the land vulnerable to development.
- Evaluating the level and permanence of any restoration project proposed for these areas before committing resources there (ranging from no action to encouraging temporary or partial restoration).

E) Small scale, private spaces.

These are defined as small parcels of land that may have some vegetation, or soil that could support vegetation. Soil remediation may be required on some sites. Ownership is usually private.

Restoration strategies include:

- Working with the landowner on a site-by-site basis to create restoration or habitat projects.
- Encouraging Planned Development (PD) zoning, a zoning tool that allows for more flexibility in site design and for additional amenities (public river path, restoration goals for the site) in a legally documented way. In Chicago, river-edge properties automatically have PD zoning. Opportunities exist in the PD process to request some habitat considerations.
- Working with homeowners to develop restoration projects that include stormwater best management practices, especially if there are flooding problems on site.

F) Abandoned industrial sites and built environment areas.

These are defined as sites that are built-out, highly impervious, and contain no vegetation or natural riverbank. These areas are primarily found in downtown Chicago, along industrial corridors, and in brownfields.

Habitat opportunities include:

- Providing input when a site is redeveloped to include vegetation and habitat.
- Creating “temporary forests” on vacant land could provide some soil remediation benefits and air quality improvements. Cottonwood trees grow quickly (10 year timeframe) and provide habitat, serving as the first step in an “urban succession community” until the site is redeveloped with more planned and managed landscaping.
- Partnering with the City of Chicago Department of Environment to create a land management plan for these sites.
- Creating a habitat plan for the Chicago Sanitary and Ship Canal because no such plan exists.

BIGGEST OPPORTUNITIES FOR AFFECTING LAND HABITAT CHANGE ALONG THE CHICAGO RIVER

- Work with existing large landowners such as forest preserve districts to better manage and maintain high quality habitat areas.
- Target smaller scale properties adjacent to forest preserve lands and work towards protecting those properties.
- Undertake political advocacy for forest preserve land, and collaborate specifically with Forest Preserve District of Cook County commissioners and staff to enhance ecologically sound areas and improve unmanaged areas.
- Conduct a habitat assessment in the North Branch and integrate existing data for this area.
- Propose an environmental vision plan for the South Branch and Chicago Sanitary and Ship Canal region (both highly industrial areas, some vacant or not used intensively) to create more habitat.

II. Detailed Document (continued)

C. CHARRETTE SUMMARIES

2. AQUATIC HABITAT CHARRETTE

Definition, Scope, and Context

Because of the history of man-made alterations to the Chicago River's hydrologic system, including channelization, construction of dams and other barriers, periods of effluent chlorination and release, and water level fluctuations that occur during rain events, there is a lack of existing habitat and a lack of a variety of habitat in the Chicago River. Thus, aquatic habitat in particular needs to be created, improved, and diversified along the Chicago River.

To accomplish this effort, areas for habitat improvement should be targeted. Species that are identified as "gauges of progress" should be introduced or cultivated in the river system and research programs should be implemented in order to capture the additional data needed to create a complete picture of aquatic habitat in the Chicago River. In addition, connectivity between aquatic habitat and the adjacent land should be enhanced and strengthened to support, protect, and increase habitat areas, land and aquatic habitat alike, along the river.

Tools Developed

List of Aquatic Habitat Parameters (Tool Kit – C)

System-wide Objectives That Could Vastly Improve Aquatic Habitat Throughout the Chicago River

Aquatic habitat characteristics and factors that should be considered when assessing the habitat potential for a reach of the river include: (A) hydrology, (B) hydraulics,



Found along the river bottom in portions of the upper North Branch of the Chicago River, native mussels like the white heelsplitter, need clean water and fish to thrive.

(C) stream morphology, (D) biotics, and (E) water and sediment quality (see Took Kit, Section D for more detail). Targeted strategies for aquatic habitat improvement are listed for each category below.

A) Hydrology

- Reduce hydrology disruption caused by stormwater runoff, combined sewer overflows, and industrial water discharges (which also cause temperature changes in the water) for example.

B) Hydraulics

- Reduce volume and frequency of combined sewer overflows.
- Diversify hydraulic conditions (force of moving water) by creating areas of woody debris and riffles to increase macroinvertebrate diversity.

C) Stream morphology

- Improve the substrate for macroinvertebrates.
- Reduce erosion and resulting sedimentation.

D) Biotics

- Increase food sources for a variety of organisms, especially macroinvertebrates.
- Increase nesting habitats.
- Designate river-adjacent land use that is friendly or neutral to living organisms.
- Increase potential species range by reducing isolation or providing travel corridors.
- Increase concentration and variety of species; diversify species that exist as monotypes; acknowledge that an increase of one species is improvement.
- Restrict invasive species (focus on a few species, like the round goby and Eurasian milfoil).
- Create and enhance habitat "mosaic" in lands that are already protected.

E) Water and sediment quality

- Eliminate combined sewer overflows. If they cannot be immediately eliminated, the volume and frequency of combined sewer overflows should be reduced.
- Eliminate the use of chemicals in the wastewater treatment process.
- Increase dissolved oxygen levels.

II. Detailed Document (continued)

- Regarding nutrient levels, current nutrient loads from the treated effluent that is discharged into the river are high enough for plant growth and survival of invertebrates. However, current nutrient levels are not good for the oxygenation of the river, or for fish or mussels. Nutrient levels should be reduced.

Target Species That Would Indicate Progress in Aquatic Habitat Improvements

An increase of one or more species in the Chicago River would indicate an improvement in aquatic habitat. If an abundance or concentration of a specific species occurs in a particular area of the river, that area could be studied as an indicator of improved aquatic habitat, or of a habitat type that should be duplicated in other parts of the Chicago River. Specific species targets include:

- Existence of eastern spiny soft-shelled turtles or map turtles.
- The return of otters, minks, muskrats, and beavers.
- Thriving insects like mayflies, stoneflies, and caddisflies.
- A greater variety and tolerance of invertebrates.
- Indicators of connectivity for fish passage like the blunt-nose minnow.
- Establishment of emergent and submergent plants such as lizard's tail or waterwillow.

Target Areas for Aquatic Habitat Restoration Projects

Target areas for aquatic habitat are primarily areas lacking in habitat where innovative technologies and techniques could be used to enhance the existing situation. Target areas for aquatic habitat include:

- Areas that are "headwaters" for the next section of the river.
- Data "dead zones" (generally located in the more industrial zones of the river) where not much about existing aquatic species is known or catalogued.
- Transitional areas of the river, such as the segment of North Shore Channel that connects to Lake Michigan, could be a focus area for carp control, emergent plants, turtle habitat, and invasive species tracking.
- The North Branch Canal (east of Goose Island) is a project area to increase the velocity of water flow, reduce nutrients, stabilize banks, provide diverse wetland vegetation, and provide a high potential for wildlife.

- The South Branch, Bubbly Creek, and existing slips like Collateral Channel.

Research Needs

The experts unanimously agreed that more data is needed. In particular, there are not enough inventories of species outside of fish species, and no way to track changes over time. In addition, there are several key questions that need to be answered in order to make better decisions about habitat restoration potential and options. The following initial list emerged:

- Current inventories (physical, cultural, biotic) should be conducted for all reaches of the river. Museums have rich collections of past species but not much in terms of current collections. In addition, there are very few studies of the more industrial areas of the river, so very little is known about these areas.
- Timelines should be constructed that include the original river's morphology, when changes in structure or conditions occurred, and when changes in species inventory occurred.
- Epidemiological studies should be conducted on the effects of exposure to the water of the Chicago River on humans and nonhuman organisms.
- Flat marsh or mudflat pilot projects could be implemented to study what organisms can thrive in the conditions provided by the Chicago River, what nutrients organisms absorb, the applicability and cost/benefit of the results of the pilot.
- The nitrogen and nutrient loads should be charted as they pertain to past regulatory changes.
- Further sediment analysis should be conducted for each reach of the Chicago River and existing sediment data should be compiled into one place. Sources of existing data include a study by Chicago Metropolitan Area Planning (formerly Northeastern Illinois Planning Commission) from the 1970s and studies by the Metropolitan Water Reclamation District of Greater Chicago (commissioned by Dick Lanyon and Irwin Pols).
- The biomagnification effects of metals, organic chlorines, phosphates, etc., on invertebrates and aquatic species should be studied. This is especially important for indicator species like insects and apex predators like snapping turtles. (Note: some studies already exist and these studies should be compiled.)

II. Detailed Document (continued)

C. CHARRETTE SUMMARIES

3. LAND PROTECTION CHARRETTE

Definition, Scope, and Context

In the past, Friends worked on land protection as advocates, but not as land purchasers or landowners. Friends' work has focused on negotiating directly with developers on a site-by-site basis for a public access easement at the river's edge in the area of the 30' setback.

This work was done primarily within the boundaries of the City of Chicago. In addition, Friends worked in partnership with other environmental organizations and regional agencies to release the Open Space Plan (OSP) in 2005. The OSP focuses on the 96-square mile upper North Branch Chicago River subwatershed. One of the fundamental goals of the OSP is to protect the integrity of key parcels in the watershed that are currently slated for development. The plan aims to discourage development, or at the very least, encourage site development plans that include practices that will minimize the impact of development on the health of the watershed.

Based on this work, Friends has recognized a need for more protected land in the Chicago River watershed, for purposes of land and water conservation and for guaranteed public access to the river into perpetuity. The purpose of the land protection charrette was to explore the methods and tools for land protection more deeply. When applied to the Chicago River watershed, land was categorized by ownership type, because it was determined that land protection opportunities are dependent upon the initiative of and agreement with the landowner.

Tools Developed

Process to Identify Effective Methods to Protect Land
(Tool kit – D)

Land Protection Methods (Tool kit – E)

REGIONAL TRENDS IN LAND PROTECTION

- A trend from channelization to meandering of rivers, including stream naturalization and historical re-meandering.
- Growing recognition that plants alone are not the answer. Hybrid solutions including plants and hardscapes seem to be more successful.
- Continued focus on stormwater and water quality.



Previously held as a privately owned working agricultural property, efforts to preserve and protect this 40-acre parcel along the Chicago River began in 1993. Over 10 agencies collaborated to restore the site as a wetland and oak savanna.

NPDES Phase 2 compels municipalities take actions to improve water quality in their jurisdiction, though it does not really set hard standards. Total Maximum Daily Load (TMDL) studies are being funded to determine the pollutant load in streams.

- Using stormwater utilities as mechanisms for funding, such as “impervious fees.”
- The impact of LEED standards on developers and the interest in getting LEED certification.

CATEGORIES AND CHARACTERISTICS OF LAND OWNERSHIP AND OPPORTUNITIES TO APPLY LAND PROTECTION STRATEGIES ALONG THE CHICAGO RIVER

Types of land ownership emerged as the most important factor in providing opportunities to protect land, since land protection opportunities arise on a site-by-site basis. The categories of land ownership in the Chicago River watershed included public ownership: (A) Forest Preserves, (B) Parks, (C) Municipalities and Townships, and (D) Metropolitan Water Reclamation District of Greater Chicago (MWRD).

Categories of private ownership include: (E) Industrial and Commercial – river-oriented and non-river-oriented, (F) Residential, (G) Corporate/Industrial (colleges, hospitals), (H) Land Conservancies, (I) Utilities, and (J) Golf Courses.

Characteristics of different types of land ownership and opportunities to protect the land are outlined below.

II. Detailed Document (continued)

A) Forest Preserve Land Ownership and Land Use.

Forest preserves operate on a county-wide scale and own large parcels of land, including corridors, trail connections for river-oriented recreational uses, and natural areas including wetlands. Forest preserves may have conflicting objectives for land use because their missions include conservation, recreation, access, and education. Forest preserves have specific budget line items for acquisition, and funds come from grants and voter-approved increases in funding. They have staff resources, which include expertise in conservation and land protection. Once land is protected by the forest preserve districts, it is presumably protected to perpetuity. However, leadership and elected officials' visions are important because "political whim" can, and does, influence how resources are allocated.

Opportunities to apply land protection strategies in areas of forest preserve ownership include:

- Target buffer areas around core forest preserve lands. These areas tend to have community support because neighbors share a feeling of community ownership of forest preserve land.
- Forest preserve districts can often leverage their resources through grants. In 2006, there were fewer federal dollars but more state money than in previous years. A clear and compelling vision for the Chicago River might be a path to federal funding.

B) Park Land Ownership and Land Use.

Park districts are often separate governing and funding entities from municipalities. Their highest priorities include open space and recreational opportunities. Easements can be used as an effective tool for ongoing protection and maintenance, but are rarely utilized among government entities. The Chicago Park District has invested substantial resources in riverside planning, including standardizing a riverside trail profile. Some river edges in parks may be fenced off due to liability concerns. With only a few existing public canoe launches and no marinas, there is an opportunity for the river to be a greater recreational focus. Some continuous river trails have been introduced in recent years, mainly in far North Side parks.

Opportunities to apply land protection strategies in areas of park ownership include:

- Principles for managing land and land use should

include opportunities for passive recreation in addition to, or instead of, active recreation.

- Replicate Gompers Park case study where land protection occurred as a result of collaboration between federal and local government agencies, the local park advisory council, and local schools. Land has maintained by the Chicago Park District, who excavated the fill and developed the park area in response to the context of the flood plain.
- Use easements as a match for funding.
- Identify an agency, the Chicago Park District for example, that will accept donations of riverside parcels contiguous to existing parks. When several adjacent parcels are assembled, the Chicago Park District could take over management of the contiguous parcels and manage the river's edge as a park.

C) Municipalities and Townships Land Ownership and Land Use.

Municipalities and townships have a great deal of leeway in selling property that they own, and thus properties are not protected. Governing bodies can have competing interests for budget allocations – schools, police, and fire protection versus maintaining open spaces. Municipalities and townships are the "gatekeepers" for conservation developments. In Chicago, city-owned riverside parcels are commonly used for industrial processes such as waste transfer, vehicle storage at ward yards, and such, and usually do not allow public access and have no immediate likelihood of establishing any. Departments that oversee riverside parcels, Streets and Sanitation for example, generally have no mandate to increase public recreational opportunities. There is no public review process for changes in use or ownership of municipally-owned river parcels.

Opportunities to apply land protection strategies in areas of municipal or township ownership include:

- Incorporate conservation development into municipal code and zoning code. If development must happen, encourage it or require it to be a sustainable or conservation-friendly development.
- Utilize opportunities to create best management practice partnerships, like Chicago's ownership of North Park Nature Preserve, which is permanently protected by a conservation easement held by

II. Detailed Document (continued)

CorLands and managed by the Chicago Park District. In this case, land preservation, education, and management goals are accomplished simultaneously.

- When a village and park district are not connected organizationally, a third party (nonprofit, stormwater management agency) can work with both to achieve land protection.

D) MWRD Land Ownership and Land Use.

The primary mission of the MWRD is to protect Lake Michigan as the source of drinking water, to collect and treat municipal wastewater, and to manage stormwater in Cook County. They own a significant amount of river-edge land in Cook County and the Chicago metro area. Most of their land leases are short-term (five years), which is not very useful in providing an open space lessee the time and motivation to perform natural resource focused site restoration activities. Short-term leases also do not offer much protection.

The MWRD owns the riverbank in some residential areas that could provide areas for land protection, open space, public access, and recreational activities. Some areas of land owned by the MWRD have extensive residential encroachment on the river-edge, for example, residential lots in Ravenswood Manor, Chicago. However, publicly-owned property is not subject to forfeiture under adverse possession rule. (The adverse possession rule is a doctrine that states that if one openly and notoriously takes a portion of another's land for his use over time, and the previous owner does not take any action, the land becomes the property of the current land user.)

Opportunities to apply land protection strategies in areas of MWRD ownership include:

- Increase leases from five years to 50-100 years.
- Provide forest preserve districts and park districts with a “right of first refusal” to ensure that properties stay in the public domain (note that forest preserves or park districts then need to be in a position to act quickly and acquire the land).
- Create a clause to only sell land to an entity that will maintain it as open space (note a potential problem that land may not be worth much from a conservation standpoint).
- Enact legislation to allow agencies to “trade” land between them, in ways that benefit both (to avoid

the issue of tax funded property of one agency being bought with tax-funded money from another agency).

- Never sell land to private sources.

E) Industrial and Commercial Land Ownership and Land Use.

These lands tend to be intensely developed to maximize use. The land and river-edge often require extensive remediation as toxic waste, debris from fly dumping, collapsing seawalls, and eroding riverbanks are often found in industrial areas. Outside of downtown Chicago, the price of the land is generally lower than other areas. Some property is abandoned or vacant. On the north side of Chicago, much former industrial property adjacent to river has been converted to other uses, chiefly commercial and residential. There are fewer conversions on the South Side except for Bubbly Creek. Heavy industry is still prevalent on much of the South Branch south of Ping Tom Memorial Park in Chinatown. The City of Chicago has strong programs to retain industry in PMDs (Planned Manufacturing Districts) and many parcels along the river are within these PMDs.

Lot sizes are often smaller; 100-300 feet of river frontage is typical, a half mile or more would be rare (half mile parcels are usually the minimum that the Forest Preserve District of Cook County would want to manage.) Industrial land ownership is often local, though commercial land ownership may not be (their business headquarters could be located in another city). There are often minimal recreational land use opportunities in industrial areas as owners may have security and liability concerns about public access. Development of riverside industrial property for large scale commercial use is problematic because often developers do not consider the river an amenity. Riverside trails near large commercial centers typically abut parking lots, truck docks and service entrances.

Opportunities to apply land protection strategies in areas of industrial or commercial ownership include:

- In Chicago, changes in ownership and land use on both the North and South Branch triggers a public review through the planned development process. This process provides an opportunity to request public access or conservation easements. Apply this model elsewhere.
- Approach current owners because they may be open to restore some level of amenity to the land.

II. Detailed Document (continued)

- Current owners might be receptive to “getting rid of the liability of the river’s edge,” through a donation or small fee. The river-edge property could then be used for conservation or some other public purpose.
- Create a river TIF (tax increment financing) district.
- Proactive acquisition of abandoned industrial lands. Two potential owners would be the Forest Preserve District of Cook County or the Chicago Park District, since the parcels contribute to their long-term goals of increased public river access and connected trails and paths.
 - The constraint is that negotiating several small parcels is expensive and time-consuming. Help from the Forest Preserve District of Cook County and the Chicago Park District could solve this problem.
 - If there was a separate entity that could deal with the complexity of the task, it might be more attractive to existing government agencies. Land trusts are a type of entity that can assemble properties.
 - Functions of this entity might include purchasing, providing legal and liability protection, securing, monitoring, improving, and managing land.
 - Create a critical mass of property assembly to get a visible public project off the ground, like connecting existing paths (example: connecting Wacker and the South Loop; “Circle the Circle,” or Harrison Street south of downtown).
 - Create a “riverbank bank,” to piece isolated plots together and “hold” them in semi-protection mode until a larger entity could manage or develop them.

F) Residential Land Ownership and Land Use.

These properties tend to be very small and are numerous along the Chicago River. Each piece of property needs to be negotiated individually, and thus a lot of effort is required for each. In Chicago, residential buildings are often quite close to the river. Public access tends to be the biggest issue for homeowners, and they can be vocal in expressing concerns about privacy and trespassing, and in protesting river trails near their homes. Privatization of the river-edge is a frequent concern with new multi-family residential projects, despite an ordinance to the contrary. Some developments limit public access through gates or no-trespassing signs, or they provide inadequate separation between public and private space. Chicago ordinances

exempt residential property with three units or less from having to submit to public review or provide public access. Often, additional political considerations are incorporated into the process when multi-family developments occur; for example, a Chicago alderman may advocate for affordable housing as part of a development. Residential river design treatments are not yet standardized.

Opportunities to apply land protection strategies in areas of residential ownership include:

- Request conservation easements or public access easements (for the portion of the land next to the river) because they are a potentially useful tool for securing public access to the river-edge and street access, although as of yet there is no entity to accept them.
- Formalize design options such as grade changes to visually separate public rivertrail from homeowner line of sight to help reduce the tendency toward privatization. The next edition of the City of Chicago’s *Chicago River Corridor Design Guidelines and Standards* needs to address such matters in detail.
- Utilize the river is as a potential neighborhood amenity and the local residents as potential allies in river protection efforts. Communities such as Albany Park in Chicago may be able to redefine their identity through greater attention to the river.

H) Corporate and Institutional Land Ownership and Land Use.

These lands are large parcels of land that include corporate campuses, colleges, hospitals, churches, and Boy Scout and Girl Scout camps. The land is low density and is often planted with turf grass. Landowners do their own management and land stewardship. On corporate properties, access is usually limited to employees, though at institutions, there can be more public access. Some organizations may share values of open space, community service, and being a “good neighbor” to the rest of the community, which can provide an opportunity to discuss a desire for long-term conservation and public access on a site. However, some corporate or institutional landowners are unwilling to prohibit future options for land use because they have a business need to stay flexible.

II. Detailed Document (continued)

Opportunities to apply land protection strategies in areas of corporate or institutional ownership include:

- Tax benefits of easements may not apply to these institutions. Finding ways to compensate them could include non-financial incentives, like building community goodwill.
- Show corporate or institutional owners how to voluntarily “do the right thing” and the subsequent benefits to the corporation or institution. Include this in a cost-benefit analysis.
 - Benefits can include positive public relations, spaces for employees to enjoy and walk, lower maintenance costs, tax breaks, public accolades (like Conservation Land Registries, a database of conserved lands).
 - An ecological resource could support part of the landowner’s mission, for example, Girl Scout camps are places for experiencing environmental and outdoor education.
 - A savings in maintenance costs can be achieved when native landscaping is used because prairie plantings need less management than turf grass and provide more environmental benefits.
- Use a strategy of “work with what you can.” Naturalize the area first and if possible explore the possibilities of easements for some of the property. Additional opportunities may arise after a relationship with a landowner is established.
- Utilize opportunities to work with Openlands’ Corporatelands program to convert turf grass areas to natural landscapes and involve the landowners’ employees in the process.
- Innovative conservation landscape design can be an education opportunity. Examples include Northside College Preparatory High School in Chicago, Deerfield High School in Deerfield, and Loyola Academy in Wilmette.

D) Land Conservancies or Land Trusts Ownership and Land Use.

Land conservancies or land trusts generally exist to own land or to hold easements. They usually manage the land they own long-term and sometimes manage (or have input on the management) of land where they hold conservation easements. They are able to facilitate ownership for government entities.

They sometimes sell less desirable land to fund more strategic conservation efforts on another property. People on the governing board of land conservancies can influence the priorities of the land trust. Funding for acquisition is always a challenge. There is reliance on high-worth individuals, government funds, and foundations for funding.

Opportunities to apply land protection strategies in areas of land conservancy or land trust ownership include:

- Accreditation requirements provide a standard that ensures proper use of protected land. Requirements will include guidelines for land monitoring in the future.
- Some smaller land trusts may merge with or be absorbed by larger ones to ensure continuity of land protection over time.

J) Utility Companies, Including Gas, Electrical, and Railroads.

Utilities companies own a lot of land throughout region. They are perceived to be very conservative and extremely protective of their facilities. They need to maintain maximum flexibility and reliability to provide their services without fail. Any encroachment or limitation of utility property that restricts maintenance, expansion, or ability to react to a need for their service is avoided. Attorneys have significant influence over the site development process. Utility land uses can be unsightly and are unlikely to change. Utilities have tremendous security concerns, particularly since 9/11. Opportunities for public access are minimal or nonexistent.

Opportunities to apply land protection strategies in areas of utility company ownership include:

- Provide some trails and public access that would not interfere with the function of the utility.
- Encourage restoration projects, native plantings, and stormwater best management practices onsite in areas that are not publicly accessible so these sites can function as habitat corridors, connections, and buffers to other sites.

K) Golf Course Land Ownership and Land Use.

Golf courses are found throughout the watershed, mainly in the river’s North Branch region. Golf course properties are intensely managed by expert land managers. A golf course’s financial viability can affect opportunities to protect the land long-term. When a golf course fails, the site is often developed for commercial or residential use as opposed to being maintained as open space.

II. Detailed Document (continued)

Opportunities to apply land protection strategies in areas of golf course ownership include:

- Easements are tricky to accomplish because tax deductions are not usually available and it is difficult to show the public good in the transaction. Encourage other land protection methods such as a land use covenant.
- Encourage conservation best management practices that would enhance the golf course experience, help golf course uses succeed, and thus help protect land from development.
 - Manage the site to a more natural (native) landscaping standard. This would be less expensive for the owners.
 - Encourage golf courses to participate in the Audubon Cooperative Sanctuary Program.

II. Detailed Document (continued)

C. CHARRETTE SUMMARIES

4. RIVERBANK NATURALIZATION

Definition, Scope, and Context

Riverbank naturalization is an important area of focus because it is the point where the water meets the land. This point of contact provides an opportunity to enhance ecological connections between the land and water in the watershed. Projects at the river's edge or riparian area can accomplish multiple objectives that include increasing habitat, enhancing riverbank stability, and reducing erosion. A riverbank naturalization project must be designed for a specific site, but the success of the project is dependent upon integration of the site within larger ecological and human systems.

Tools Developed

Process to design riverbank naturalization project
(Tool Kit – F)

Catalysts for a Riverbank Naturalization Project

There are many potential sites for riverbank restoration or naturalization along the Chicago River. Charrette participants agree that when riverbank naturalization is not incorporated into a long-term municipal plan, the process for identifying these sites tends to be reactive and driven by market forces. Landowners initiate these site-specific efforts when: A) there is an immediate infrastructure problem, such as instability or erosion; B) the land has changed hands and a new owner wants to redevelop the land or change the land use; C) the site is part of a municipal watershed or open space plan. Large public entities, such as forest preserve districts and municipalities, are the most receptive to riverbank naturalization projects because they can have embedded long-term planning mechanisms, can be more environmentally aware, and recognize the river as a regional public resource.

Riverbank Project Assessment – System-Wide Considerations

Watershed scale characteristics that must be considered when a riverbank naturalization project is proposed include:

A) Hydrology

- Local watershed stability.
- The connection of the site to the floodplain.



After considering the hydrology, geomorphology and social context of this site in Northbrook, Ill., the Chicago River's banks were naturalized to best suit the needs of adjacent landowners and have a high impact on habitat. The riffles and pools feature provides aquatic habitat benefits in downstream communities as well.

- Water level fluctuations, such as depth, length of time, and velocity.
- The amount and type of recreational or commercial boat traffic.
- The channel forming discharge and how it will change over time.

B) Geomorphology

- Historic context of the site.
- All elements of the river including in-channel, streambed, toe of bank, and slope of riverbank.
- Bank height and steepness.
- Ability to reform, flatten and “play with” the riverbank slope.
- The adjacent land use, both upstream and downstream.

C) Political, social, and cultural considerations

- Ability to affect zoning policy or local ordinances that might restrict project choices.
- Stewardship potential.
- Working with permitting agencies (costs money and time).

II. Detailed Document (continued)

Riverbank Project Assessment – Site-Specific Considerations

These characteristics include:

A) Flora and fauna

- The current levels and types of vegetation on the site, including the amount of shade and the prevalence of invasive species.
- The types and levels of plants that could survive on the site.
- The riverbank or existing structure's potential as a growing medium, such as the properties of the sediment and soil and the amount of erosion.
- Specific needs of animals and fish in the area.
- Dams and other restrictions to fish migration, including improperly designed culverts, on-line impoundments, and grade restrictions.
- Habitat needs of mussels and other aquatic species.
- Method of using flora and fauna to define success in a restoration project.

B) Landowner and land use

- Address the problem that needs to be solved such as erosion or instability.
- Define causes of problem; is a local problem or a systemic one?
- The objectives and expectations of the landowner, including the expected level of stability, redundancy, and aesthetics.

- The degree of consensus that exists around the goals of the project.
- Expected land use or end use of the site.
- Recognition of the various roles for structures and hardscapes and the willingness to accept hybrid solutions.
- The level of awareness of the owner and/or the community about the existing problems and the implications of the solution alternatives.
- The owner's tolerance for risk and willingness to try new things.
- Local municipal codes regarding stormwater management that govern work within the flood corridor often have the biggest impact on what solutions might be possible in a reach of a stream.
- Role of consultants and project managers in educating landowners.

C) Financial considerations

- The willingness to perform a pilot or demonstration project on the land and use as a way to obtain different funding sources.
- The ability to do cost sharing (grants) for the work.
- The ability to stage the work over a number of years to spread the cost.
- Ongoing monitoring and maintenance.

II. Detailed Document (continued)

C. CHARRETTE SUMMARIES

5. WATER QUALITY CHARRETTE

Definition, Scope, and Context

Water quality, and the national and local policies that govern it, is one of the most complex issues facing the Chicago River. With the growing use of the river by recreational users such as canoeists, kayakers, rowing teams, and anglers, and the incidence of migrating and local birds, mammals, and mollusks that use the river for their home, water quality of the Chicago River is also becoming an increasingly important issue. Thus, the definition of water quality should be expanded beyond its chemical, physical, and biological characteristics to include human perception-based indicators including clarity and odor of the water, humans' ability to interact with the water without becoming ill, and the abundance of wildlife.

Tools Developed

Twelve Guiding Principles of Clean Water for the Chicago River (Tool Kit – G)

Clean Water Reference Kit

Summary of the Clean Water Act (A)

Nine Minimum Controls for Combined Sewer Overflows (B)

National Pollutant Discharge Elimination System (NPDES) Permit Process (C)

A more comprehensive measure of water quality is needed for the Chicago River.

The following parameters should be included in water quality criteria for the Chicago River:

- Chemistry—dissolved oxygen, biochemical oxygen demand, pathogens, nutrients, and endocrine disruptors.
- Biological indicators – index of biological integrity (IBI) and macroinvertebrate biotic index (MBI).
- Biomonitoring – examining the biological (living) communities in the river to determine the complexity, diversity, and species composition in the river.
- The way people use the waterways.
- Volume and content of pollutant discharge from the sewer infrastructure.
- The morphology of the river and riverbank conditions.



A more comprehensive indicator of water quality should include biological indicators such as macroinvertebrate biotic index (MBI). These teachers are learning how to assess such indicators.

- The sediment quality (both chemical and biological composition).
- The surface and groundwater connections and the connectivity to the rest of the watershed.

Editor's note: at the time of publication, some of the following suggestions are currently being implemented.

Policy actions that can most effectively improve water quality in the Chicago River

- A) Fully enforce the Clean Water Act** — Fully implement existing regulations, use enforcement tools as needed, and improve the reissue process for NPDES permits. The Clean Water Act imposes technology-based limits on all dischargers, regardless of the impact on water quality. There are water quality-based limits (NPDES permits) for most of the important pollutant parameters.
- B) Implement existing regulations to reduce wet weather discharges** — Wet weather discharges include both CSOs (City of Chicago, Metropolitan Water Reclamation District of Greater Chicago, and other suburban municipalities in the combined sewer areas) and stormwater discharges (North Branch, north of Dempster Avenue). There are existing limits or parameters for CSOs and stormwater runoff in the Clean Water Act or other supporting policies. Ensure they are being implemented and enforced effectively. Content and volume of wet weather discharges effect water quality to a greater extent in the Chicago River than in other streams in the region.
- C) Address historical hydrological and morphological modifications to the Chicago River** — There should also be ways to influence future development to minimize runoff, and maintain open lands.

II. Detailed Document (continued)

- D) Implement disinfection techniques at all sewage treatment plants as soon as possible.**
- E) Urge Illinois EPA (IEPA) to complete the Use Attainability Analysis (UAA) currently being conducted on the Chicago Area Waterway System and then fully implement the resulting water quality standards.**

Suggested Improvements to Existing Policies and Regulations

A) Improve water quality standards for the Chicago River within the current regulatory process.

- Standards should include both technology-based and water quality-based standards. Sometimes, the minimum technology-based treatment requirements that all dischargers must meet, regardless of dilution, are not adequate to protect downstream water quality standards and uses. Thus, more stringent water quality-based limits are needed to protect the water resource.
- There should be state-wide water quality standards and resulting permit limits for nutrients.
- Recreational use of the Chicago River has increased significantly in both quantity and frequency of users. Recreational uses must be protected by upgrading water quality standards. The ongoing UAA being conducted by the IEPA is the current forum to address this issue.
- Combined Sewer Overflow (CSO) discharges should be monitored and controlled for frequency, duration, and content, in accordance with the guidelines in the EPA's Combined Sewer Overflow Control Policy (1994) and the intent of the Clean Water Act.
- Water quality standards should address nonpoint and upstream pollutants.

B) Improve the permitting process.

- Currently, stormwater permits and Separate Sewer Overflow (SSO) or CSO permits are technology-based, and therefore do not force stormwater controls that would result in an improvement in water quality. Water quality criteria should be incorporated into stormwater and SSO/CSO permits. An effort should be made to easily quantify the results of improved permit limits.
- NPDES permits should be reissued on a timely basis when they expire. The reissue of permits provides the necessary opportunity to make changes and to upgrade the water quality standards in the permits.

- NPDES permits set discharge limits that must be met.
 - Municipal separate storm sewer systems (MS4) Programs (small MS4s and individual discharge permits) should be implemented through Phase II of the NPDES program.
 - A watershed approach for permitting would effectively improve water quality. This approach should include consideration of the homeowner's contribution to the combined sewer system.
 - Permits should be issued on a region-wide basis so that all issues are addressed in the permits.
- C) Improve enforcement within the regulatory process.**
- Compliance should be achieved for all requirements including narrative water quality standards and CSO requirements (including the Nine Minimum Controls and guidelines for a Long Term Control Plan as outlined in the EPA's 1994 Combined Sewer Overflow Policy).
 - Non-compliance with water quality standards and permit requirements should be taken seriously. If a permittee violates standards or permit requirements, the IEPA should undertake additional steps for enforcement beyond the quarterly non-compliance reports that are currently required. The IEPA can bring a violator into compliance over time. For example, they can work with the discharger to fix the problems or proceed with an administrative or judicial action.
 - Oversight and enforcement by regulatory authorities should be a priority. Excuses are given by dischargers, such as the unavailability of federal funding or "it's someone else's problem." These should not be tolerated.
 - There should be an enforcement mechanism for fixing the root causes of sewer discharges (aging sewer pipes, increase infiltration onsite, and such) in addition to enforcement of the permits.

Additional Resources

- Section II. G. of this report, entitled "Resources and Regional Success Stories" contains a case study of the disinfection process from the North Shore Sanitary District.
- Section IV. D. of this report, entitled "Research Findings from the 'Strategies for a Clean Chicago River' Project" contains additional information on water quality research and recommendations pertaining to the Chicago River.

II. Detailed Document (continued)

C. CHARRETTE SUMMARIES

6. PUBLIC ACCESS CHARRETTE

Definition, Scope, and Context

Public access for all types of recreational users of the Chicago River has increased tremendously over the past 25 years. While Friends acknowledges the importance of a variety and diversity of activities on the river, at the shore line, and along a public corridor lining the riverbanks, Friends' work on increased recreational river access is not focused on power boating or commercial river tours, but rather on human-powered recreational uses. There is also an opportunity to enhance the links and connections from the river corridor to other trails and public parks in the Chicago region. Friends would like the river to have the context and amenities so that people could make access to the Chicago River part of their daily routine.

Types of Public Access

- A) **On the river activities** — access points at the water are imperative for these activities.
- Rowing.
 - Paddling (canoeing, kayaking).
 - Power boating.
 - River tours (usually commercial).
- B) On shore, **activities dependent on the river**.
- Fishing.
 - Research and monitoring.
- C) On shore, but activities that are **often, but not always, dependent on being adjacent to the river**. Thus, it is important to link these activities to the fabric of the adjacent community.
- Walking, bird watching, dog walking.
 - Biking.
 - Sitting and looking.
 - Sports fields, family and picnic areas, arts performances.
 - Other (teen hangouts).



The Chicago River continues to gain popularity as a recreational amenity. Multiple recreational uses and a variety of activities must be supported.

Future Public Access Needs, Benefiting All Users:

- Increase number of access points, both formal and informal, from land and from water, especially in the Chicago downtown area and the South Branch.
- Prioritize new access points that achieve river “connectivity” by allowing for or creating continuous paths, increasing links to other areas of recreation (including public plazas, parks, active institutional sites, etc.), and providing more ways to cross the river.
- Access points should exist in every neighborhood, be a start and end point of a destination, and link the river to public transit.
- Public spaces on the river should provide for and promote multiple uses by providing a variety and choice of activities (to facilitate the “power of 10”). Activities could include plazas and sports fields, river monitoring sites, volunteer restoration sites, or a traveling information guide, such as the bike ambassador model.
- Ability to access the equipment needed to use the river including canoes and bikes.
- Basic amenities, including trash receptacles, benches or picnic tables, washroom facilities nearby, lighting (if safety is an issue), equipment rental places, commercial facilities, parking spaces (needed for anglers, paddlers, power boaters, because they often come with equipment).
- Better signage, maps, and information about access points.

II. Detailed Document (continued)

- A way to ensure on-going maintenance of access points and trails.
- Continued dialogue between user groups about issues like congestion, etiquette, and safety. There is a need to figure out how to self-regulate between the groups to accommodate concurrent uses.
- Stopping points for on-the-water users – including safety ladders along seawalls and small dock-like structures above water level for people to right their boats; also, commercial establishments such as bars or restaurants, and places for power boaters to get gas.
- Access points for fishing are where fish are caught, and because of that are often informal and very site specific. Anglers do not want access to sites where there are no fish.
- New fish habitats need to be created for fishing to increase. New habitats can be created by installing rocks or cribs.
- Any access points for anglers should be relatively safe and visible. Docks would be fine. On shore, most anglers need only a six foot space. No cutting of vegetation is needed. If access points are created, “build the path where the footprints are.”
- Most existing trails are multi-use, allowing both bike and pedestrian uses. There are approximately 13 miles of trails within Chicago alone.
- Most cyclists have their own bikes but there is increased demand for bike rentals. The Velov model in Europe provides rentals at stations where users can rent bikes with credit cards. Many people use the trails for commuting purposes and as part of their daily routine instead of for purely recreational purposes.
- Trail planning needs to consider multiple uses – not just biking and walking for exercise, but also recreational, getting from place to place, and all variety of uses.
- Trails are not connected across the region. Some landowners do not allow a path on their property, or structural barriers exist (such as bridges or street crossings). More underbridge connections should be created.
- There are grade issues on some trails – they may be too steep and do not conform to ADA Accessibility Guidelines. Wheelchairs, walkers, and roller-bladers may have difficulty using these trails.
- The design of the trail should channel the desired behavior on the trail. Some existing sites were not designed for effective use. For example, there may be light fixtures in the middle of the trail, or the trail meanders too much to be manageable for cyclists. To achieve connectivity, creative design may be needed at some sites.
- Paths for moving from one point to another can be combined with smaller, thinner trails that can be used to explore an area. These smaller trails could be designed with less hardscape, used only for foot traffic, and intended to create a sense of “leaving the city behind.” Street ends near the river are good candidates for this type of path. In Chicago, community groups could be a starting point to implement these types of trails because these groups may know of informal access points that are visited frequently.
- Benches and plazas with drinking fountains would be good amenities for trails that run through more urban areas. When engineers design the trails, they think that user trips are uninterrupted, so these amenities are not included in the designs. In reality, trails are used for all lengths of trips and functions. Personal safety amenities also need to be included in the design, such as lighting in tunnels.
- Crossing the river can be challenging and dangerous. Safer river crossings that are dedicated to non-motorized traffic, like the proposed pedestrian bridge at Hood Avenue over the North Shore Channel (recommended in the *Chicago River Corridor Development Plan*) are needed.
- Some leadership needs to be created around the idea of creating organizations that can plan and maintain paths and trails, such as Illinois Prairie Path and the Friends of the Bloomingdale Trail.
- More communication is needed about the benefits of multi-use trails to the community, including health benefits and recreational opportunities.

II. Detailed Document (continued)

D. RESEARCH FINDINGS FROM THE “STRATEGIES FOR A CLEAN CHICAGO RIVER” PROJECT

In the Clean Water Act, goals to protect the country’s waterways in order to provide for the use of these waters by humans, land-dwelling animals, and aquatic life are outlined. Often discussed in shorthand by policymakers and environmental advocates by the term, *fishable and swimmable*, the Clean Water Act specifically safeguards water quality for the protection and propagation of native aquatic life and for safe recreation in and on the water. The Clean Water Act also outlines several policies and policy tools that can be utilized to achieve a high level of protection for our nation’s waters. One of the tools provided by the Clean Water Act is the determination, enforcement, and periodic review of water quality standards. Friends of the Chicago River (Friends) envisions a day in the future where water quality standards would support a *fishable and swimmable* Chicago River.

Envisioning a *fishable and swimmable* Chicago River is an inspiring task, but delineating the implementation of the vision can be daunting. Water quality initiatives that would make the Chicago River *fishable and swimmable* require an immense degree of planning, research, interagency collaboration, knowledge, and financial resources. Friends began to tackle this task in 2004 by analyzing the research and programs needed to identify the policy, on-the-ground projects, infrastructural needs, and management requirements needed to realize the vision of a *fishable and swimmable* Chicago River. Part of this research was conducted during the charrette project, which is detailed in the other pages of this document. In addition, because of the immediacy of ongoing policy initiatives directly related to the water quality of the Chicago River as it pertains to the Clean Water Act, Friends also conducted intensive and extensive research on water quality improvements for the Chicago River, prior to and during, the charrette project. Based on this research, Friends prioritized three watershed-wide recommendations specific to improving water quality in the Chicago River. Such a move would cost millions of dollars but the investment would be recouped through savings to the taxpayers. These savings include millions of dollars in flood damage reduction and reduced expenses for sewage treatment system operations and maintenance,

in addition to hard to quantify but not less significant value-added benefits such as property value increases and enhancement to recreation and quality of life.

The recommendations for improving water quality are:

- 1) Complete the Tunnel and Reservoir Plan (TARP) for the combined sewer area to eliminate the majority of combined sewer overflows.
- 2) Implement disinfection as part of the effluent treatment program at all water reclamation plants so that the majority of bacteria and pathogens are eliminated from water that is discharged into the river.
- 3) Apply stormwater best management practices and install “green infrastructure” to reduce water input into the sewer system and augment groundwater infiltration.

Complete the Tunnel and Reservoir Plan

Prior to the 1960s, excess combined sewage – a mix of raw sewage and stormwater runoff – from 52 communities’ sewer systems in 375 square miles within Cook County, discharged to area waterways from over 400 combined sewer overflow (CSO) points. This situation occurred approximately 100 times per year when storms would exceed the capacity of the combined sewers to transport flow, thus flooding local streets and basements. In order to minimize and eliminate this occurrence, civic engineers and city planners directed sewers to discharge their flow to the Chicago River waterways (and eventually to rivers downstream) instead. During particularly heavy storms, the amount of water and sewage directed to the Chicago River waterways was occasionally significant enough to cause the waterways to reach flood stage, which would cause flood gates to be opened. Opening the flood gates resulted in CSOs into Lake Michigan, polluting the area’s drinking water source and forcing beach closures.

To a lesser extent, this CSO problem still exists today. It has been considerably addressed by the Tunnel and Reservoir Plan (TARP), a sewage infrastructure project designed in 1972 by the Metropolitan Water Reclamation District of Greater Chicago (MWRD). TARP was developed to significantly reduce combined sewer overflows (CSOs) from spilling into area streams and Lake Michigan from the combined sewers within Cook County, and in fact, since the start of construction, 850 billion gallons of CSOs have been captured and treated¹. There have been no reversals

II. Detailed Document (continued)

to Lake Michigan since 2002², and fish species have increased approximately fourfold³. In addition, the USEPA and IEPA determined TARP to be the long term control plan for controlling CSOs in the region in 2000. This decision was in accordance with the federal guidance issued in 1995 on long term control plans for CSO control, which supported and clarified the policies in the Clean Water Act and in the EPA's CSO Policy of 1994.

Originally conceived as a two-phase project, Phase One of TARP consists primarily of 109.4 miles of a tunnel system designed to capture "first flush" sewage pollution and hold it for processing until capacity is available at water reclamation plants. The tunnel system was completed in 2006 and its projected benefits include reducing the number and volume of CSO events and thus river pollution⁴. Phase Two of TARP consists of three reservoirs, McCook, Thornton, and O'Hare, which will provide the anticipated storage capacity of 6.3 times⁵ the capacity of the tunnels for capturing wastewater. When TARP is completed, it is anticipated that the region will receive benefits of both flood reduction and pollution reduction⁶ in the Chicago River.

In the past, the federal government provided the majority of funding for stormwater and sewage infrastructure projects like TARP, and federal funding will pay for a substantial portion for the completion of Phase II. However, as the federal budget can change from year to year, funding for TARP is occasionally reallocated to other federal priorities, which has caused major delays in the construction timeline. Currently, the anticipated completion date of the Thornton reservoir is 2014, and the McCook reservoir, 2014 (stage one) and 2023 (stage two).⁷ The O'Hare reservoir was completed in 1998.

Friends recommends that the MWRD and IEPA develop a clear and enforceable completion schedule, submitted as an addendum to the existing construction plan and augmented by a funding plan, to achieve the completion of TARP in accordance with the current projected schedule.

If federal funds are not available, the MWRD should explore nonfederal financial tools in order to stay on schedule such as user rates, bonding capability, and other viable funding mechanisms.

Implement Disinfection as at All Water Reclamation Plants

Around the same time groundbreaking was taking place to begin the tunnels of the TARP system, the Clean Water Act was passed. The USEPA, authors of the Clean Water Act, stated that all waterways in the nation should be *fishable and swimmable*, and designated the ones that were not. The water quality and habitat in the Chicago River during this time was degraded, and thus river-based recreation was limited or nonexistent throughout the watershed. Because it lacked any river-based recreational use, the Chicago River was determined not to be *fishable and swimmable* in the 1970s. Consequently, water quality standards were applied that were suited to the uses of the river at that time. However, the language of the Clean Water Act includes a provision for review of water quality standards that are below the *fishable and swimmable* level to support the uses present on a river if the uses change over time. In 2003, the USEPA deemed that the uses of the Chicago River had radically changed since the 1970s due to gradual but noticeable water quality improvements over the past four decades. Because of water quality improvements, people began using the Chicago River for recreational activities, such as paddling and fishing, in increasing numbers. Thus, the USEPA determined that a review of the water quality standards for the Chicago River should be conducted by the state. This review process is called the Use Attainability Analysis (UAA).

The UAA is still being conducted at the time of publication of this document. However, based on analysis of the data presented at the UAA, Friends advocates that treated wastewater must undergo tertiary treatment, including disinfection, so the majority of bacteria and pathogens are eliminated. Along with the reduction in flooding and pollution that will be achieved after the completion of the TARP reservoirs, disinfection of wastewater will achieve the most effectual water quality improvements for the Chicago River.

Apply Stormwater Best Management Practices (BMPs) and Implement Green Infrastructure Throughout the Watershed

Over the three decades since the Clean Water Act was first implemented, federal guidance and supplemental policies have been issued by the EPA to support its intent. Since

II. Detailed Document (continued)

the 1990s, a growing cultural movement for sustainable water management also emerged. This movement aimed to develop and implement alternate techniques and technologies that mimic and supplement natural environmental processes. Called “green infrastructure” or stormwater BMPs, these techniques and technologies aimed to reduce the volume of nonpoint source pollution and filter and treat water through systems such as plants, soils, and microbes rather than pipes, channels, and underground detention vaults. Supporting this trend, the USEPA signed an agreement with four national environmental groups on April 19, 2007, to promote the use of green infrastructure to reduce stormwater runoff and sewer overflows.

Reducing water input into both the separate sewer system and the combined sewer system in the Chicago River watershed would help to reduce water pollution by reducing the need for capacity in the sewer pipes for stormwater that is essentially clean. The best way to reduce input into the sewer system is to create opportunities for better stormwater infiltration at the place where rain falls. With the increasing density and development throughout the Chicago River watershed, the natural method of stormwater infiltration must be augmented by techniques and technologies on a massive scale. Many of these techniques and technologies, such as permeable pavers, are referenced in the *Resources and Regional Success Stories* section of this document. Policies that support stormwater infiltration, such as permanent protection of open space and progressive stormwater management ordinances, are also discussed in this document in the *Land Protection* section and the *Tool Kit*. Because of the volume of stormwater that must be captured in the Chicago region, applying stormwater best management practices and implementing green infrastructure must occur across the entire watershed, irrespective of municipal boundaries, in order to make an impact.

Watershed plans help to guide policy initiatives and on-the-ground projects, such as green infrastructure projects, by compiling and categorizing land use and ecological information in the watershed. An extensive watershed plan has been developed for the North Branch of the Chicago River by the North Branch Watershed Project, a partnership between Friends of the Chicago River and Lake County Stormwater Management Commission. This watershed plan has been implemented in portions of Lake and Cook counties.

The MWRD has begun the process of developing watershed plans for the remainder of the watershed. These watershed plans should emphasize the widespread implementation of green infrastructure and should be based on hydrological watershed boundaries without regard to municipal boundaries. Watershed plans and projects that include green infrastructure will provide overlapping benefits in addition to stormwater control, such as the creation or improvement of land and aquatic habitat and cost savings with regard to materials and maintenance.

Financial Impact

The completion of TARP, the implementation of disinfection in the wastewater treatment process, and the installation of green infrastructure projects all have significant costs. Friends believes that there are definitive economic benefits to the region that will manifest as soon as these objectives are achieved. First, there will be cost savings once TARP is completed, such as a reduction in money spent for flood damage incurred during storm events. Secondly, reducing CSOs and disinfecting wastewater will preserve recreational use and increase habitat, making the river more appealing to the residents of the watershed. Thirdly, installation of green infrastructure and the resulting infiltration of water into the ground, a comprehensive complement to the TARP system, will reduce the volume of water and pollutants into the sewer system and allow the sewer system to operate at a higher capacity, thus reducing operation and maintenance costs.

In addition, preliminary economic research, such as a paddling survey conducted in 2006 (Appendix A) and a study on the Equalized Assessed Value of river-edge properties in the City of Chicago (Appendix B) indicate that the region is already recognizing the economic value of a healthier Chicago River. Increased recreational use and increased real estate investment are two of the most prominent indicators of the river’s increased desirability to citizens and residents, developers and property owners, as well as river-edge business owners. Friends asserts that these economic benefits can only multiply as the water quality in Chicago River improves, and we suggest that further research should be conducted on the potential economic benefits offered by increased recreational activities, such as fishing and birding, and an additional increase in property values.

II. Detailed Document (continued)

With these economic benefits in mind, improvements in water quality and increased riverbank and streambed stability will provide the foundation for what we need to achieve the vision of a *fishable and swimmable* Chicago River.

¹ Email communication with R. Lanyon, May 2007.

² Email communication with R. Lanyon, May 2007.

³ Email communication with R. Lanyon, May 2007.

⁴ TARP Status Report as of December 1, 2006, Metropolitan Water Reclamation District.

⁵ Email communication with R. Lanyon, May 2007.

⁶ TARP Status Report as of December 1, 2006, Metropolitan Water Reclamation District.

⁷ Email communication with R. Lanyon, May 2007.

III. Tool Kit

A. OPEN SPACE CATEGORIES SPECIFIC TO THE CHICAGO RIVER WATERSHED

The Chicago River can be roughly segmented using a scale that characterizes the quantity and quality of vegetation along the riverbanks, land use, and ownership of the land.

Open Space Type	Level/Quality of Vegetation and Land Use	Ownership or Protection	General Location
I. High Quality Natural Communities	<ul style="list-style-type: none"> • High level of vegetation • High quality vegetation • Habitat for endangered and threatened species • Limited public use 	Mainly forest preserves or land trusts	Lake County, North Branch, above Foster Ave. in Chicago.
II. Unmanaged or Recovering Natural Communities	<ul style="list-style-type: none"> • High level of vegetation • Degraded quality vegetation • Limited public use 	Forest preserves and private owners	Some forest preserve land, also some lands adjacent to forest preserves
III. Created Natural Areas	<ul style="list-style-type: none"> • Created (altered) vegetation • Smaller features • Significant public use • Designated park use • Potential for enhanced habitat for migrating birds 	Park districts	Throughout the watershed where park districts are located and have designated and designed a river-adjacent park
IV. Unprotected Open Space	<ul style="list-style-type: none"> • Mowed grass and trees • No attempt to enhance landscaping or create habitat • Significant public use 	<ul style="list-style-type: none"> • Private and public ownership • Current ownership not always known • Potential vulnerability to future development 	Throughout the watershed: golf courses, cemeteries, corporations, ball fields, vacant urban land adjacent to the river
V. Small Scale, Private Spaces	<ul style="list-style-type: none"> • Some vegetation or soil for vegetation • Some mowed grass and/or weeds • Remediation may be required 	<ul style="list-style-type: none"> • Private ownership • Possibly multiple owners • Residential properties • Active industrial sites 	Along areas of the North Branch in Lake County, north side of Chicago between Montrose and Irving Park on the east side
VI. Built Environment	<ul style="list-style-type: none"> • No vegetation • No natural riverbank, mainly seawalls • Brownfield sites 	Private and public ownership	Downtown Chicago, industrial properties on South Branch, Goose Island, or sites adjacent to industrial properties

III. Tool Kit (continued)

B. LIST OF AQUATIC HABITAT PARAMETERS

Little is known about aquatic habitat in the Chicago River, and thus, a full-scale aquatic habitat assessment is needed. To that end, aquatic habitat experts listed the parameters that must be considered for an aquatic habitat assessment that would provide the baseline information needed to assess a site's potential for improvement and an appropriate strategy for restoration. Aquatic habitat parameters include:

Hydrology

- Land use
- Precipitation
- Sewer system
 - Combined sewer system
 - Separated sewer system
- Groundwater
- Surface runoff
- Vegetation patterns
- Topography

Hydraulics

- Velocity
- Discharge level and frequency
- Froude number (Used to quantify the resistance of an object moving through water and to support benthic invertebrates when determining how to achieve critical flow over a riffle.)
- Dams and other obstructions to the stream

Stream Morphology

- Grade and transition
- Bank type and slope
- Stream depth
- Stream width
- Substrate type
- Sinuosity (meander or straight)

- Erosional processes
 - Natural – undercutting the riverbank, cut and fill alluviation
 - Unnatural - wasting and slumping banks, channel incision
- Existence of woody debris

Biotics

- Existence of specific species that gauge progress
- Colonization (source and sink populations)
- Vegetation (riverbanks, channel, riparian)
- Dams/obstructions/passageways/disturbance (both terrestrial and aquatic)
- Woody vegetation, dead trees
- Food source variety and quantity (primary productivity)
- Aquatic vegetation, including submergent and emergent vegetation
- Structure, function, health in ecosystem community context (the relationship between organisms within a community)

Water and Sediment Quality

- Quantity and quality of effluent and combined sewer overflows
- Nutrient load (Phosphorous, Potassium, Nitrogen)
- Dissolved oxygen levels
- Water temperature
- Metals, PCB, PAH, hydrocarbons

III. Tool Kit (continued)

C. PROCESS TO IDENTIFY EFFECTIVE METHODS TO PROTECT LAND

1) Take a watershed or sub-watershed approach to protection priorities and strategy

- Open the door for dialogue about land use options. Make it easy and understandable.
- Tie education and outreach to water quality standards (for example, through NPDES permits).
- Educate developers on how to comply with standards in both design and management.
- Educate legislators, local elected officials, and municipal staffs.
- Find the watershed planning activities that are going on and look for commonalities and how watershed groups can learn from each other.

2) Identify properties

- Identify properties, current owners, and current status.
- Identify property tax codes that are on or near the river.
- Determine if there is ecological value to the land.
- Determine method to identify properties that may be changing status or owners before it happens.
- Identify pending ownership changes through tax default lists, pending listing, Environmental Protection Agency remediation lists, scavenger sales, and zoning changes.

3) Relationship building and awareness of opportunities or “landowner cultivation”

- Build relationships with current landowners. Be proactive, and make it voluntary for the landowner.
- Build relationships with agencies, elected officials, and board members of municipal councils and regional land trusts and conservation organizations.
- Educate them about river issues and frame the debate in their terms – their mission, values, priorities.

4) If landowner approaches, listen

- Understand what the landowner is trying to accomplish, what they want and need.

- Understand their constraints. (Example: a landowner has 200 acres of land, but an agency only wants 150 acres. What are the options for the remainder of the land, such as an interim buyer?)
- Review all the acceptable options and trade-offs with the landowner.
- See which options are attractive to them. (For example, does an ecological resource help them with one of the other aspects of their mission, like education?)

5) Determine tool(s) or strategies

- Considerations that help determine tool(s) or strategy selection:
 - Length and durability of protection desired.
 - Current owner situation and preferences.
 - Options for on-going land management.
 - Timing of the protection effort (When land ownership changes, is the buyer ready to pay to protect some portion of the land?)
 - Type of relationship between buyer and seller.
 - Available funds.
 - Valuation of property (Seller’s perception of value may not be what someone will pay).
 - Adjacent land use, if there are habitat or encroachment issues to consider.
 - Size of parcel.
 - Relevance and value to buyer’s mission or strategic plan (Example: explain the value of the property in the context of the river or watershed).
 - Value of the parcel to the objectives of the buyer, compared to the effort and resources needed.
 - Land use change.
 - Development options.
- Use tools like “1031 tax deferments” where landowners selling land at a profit can defer taxes on that profit by using the proceeds to acquire similar property for business or investment purposes. Using “1031” allows time to reinvest capital gains from a sale without being taxed.

III. Tool Kit (continued)

6) Obtain funding

- Be creative about funding.
- Determine who benefits from a healthy, scenic river and understand how to reach them.
- Consider creative ideas like:
 - A voluntary contribution with purchases. (Example: for restaurants along the river, one dollar of each meal goes towards protecting the river, similar to the breast cancer model).
 - Corporate sponsorship.
 - Money that becomes available from settlements.
 - Using a portion of condo association money for maintenance.
 - Easements can provide a match for funding.

- Create ways to provide manpower and other resources.
- Demonstrate that funding for restoration is easier to get if the land is protected and will be managed.

7) Negotiate

- Try to own outright, but if this is not possible (owner is not ready, not enough funding, etc.), “keep the door open” and create strategic plan for eventual ownership.
- Be creative.
- Customize the deal to the owner.

III. Tool Kit (continued)

D. LAND PROTECTION METHODS

These methods can be used separately or in combination with other land protection methods.

	Name of Method	Description of Land Protection Method
A	Fee-simple ownership, also known as fee interest or fee simple interest, for purchaser bargain sale	<ul style="list-style-type: none"> • A way of describing full ownership of a piece of land, including all of the legal rights to the property. • Less than fee interest is ownership with restricted rights. A person buying land that already has a conservation easement is getting less than fee interest. • Provides the most ability to do active habitat management. • Bargain sale is land sold below fair market value.
B	Conservation easement	<ul style="list-style-type: none"> • Can be located in buffer areas for important parcels held in fee-simple ownership. • Landowner gets a tax break if easement is donated. • Landowner can stay on the land. • Landowner may or may not allow public access. • Landowner manages land. • Must be monitored over time by the party that holds the easement (grantee) at least annually for the life of the easement. • Good for creating buffers and corridors. • Individually negotiated. • Suitable for publicly or privately owned land.
C	Access easements	<ul style="list-style-type: none"> • A long-term lease agreement. • Is not permanent. • Individually negotiated.
D	Donation through wills or estate planning, also known as “life estates”	<ul style="list-style-type: none"> • Life estates - current owners can stay on land during their lifetime. • “Undivided partial interests” is donation of interests in land over several years until organization has full ownership – tax deduction spread over several years. • Land can also be donated outright.
E	Lease	<ul style="list-style-type: none"> • Tends to be short term. • Can be used as a strategy to “keep the door open” and postpone development or other action on the land.
F	Right of First Refusal	<ul style="list-style-type: none"> • Defined as the right of a specific agency to decide whether or not to buy land before it is offered to other potential buyers. • To be the most effective, it needs to be recorded on the property deed.
G	Agricultural easement	<ul style="list-style-type: none"> • Maintain land for agricultural use. • Use farming techniques that are less intrusive to conservation (organic or BMP techniques to reduce erosion, loss of soil, and silting in of waterways.)
H	Utility easement	<ul style="list-style-type: none"> • Good for creating corridors. • Can be difficult to negotiate with utility company attorneys. • Utility companies need flexibility for access to their facilities.
I	Traded value	<ul style="list-style-type: none"> • Providing security or screening in trade for access, for example.
J	Planned Development (PD) process	<ul style="list-style-type: none"> • 30 foot setback from the river’s edge for new development in the City of Chicago and numerous other opportunities for input on development.
K	River Improvement Fund (RIF) for seawall reconstruction	<ul style="list-style-type: none"> • City of Chicago program that uses local TIF funds from industrial districts to reinvest in seawall repairs.
L	River TIF	<ul style="list-style-type: none"> • Currently limited by state law because TIF funding must be reinvested locally • River would need to be divided into a series of TIF districts
M	River management entity for small parcels of land	<ul style="list-style-type: none"> • Could monitor easements. • Could provide security. • Could purchase easements. • Could develop areas for recreational use. • Could provide insurance. • Could manage interface between existing uses and public uses. • Could unite and manage fragmented parcels.
N	Mutual covenant	<ul style="list-style-type: none"> • A group of landowners agree to restrictions on their land use. This may or may not involve a conservation group. • Can be nullified by subsequent agreement of owners and is non-binding if property changes ownership.

III. Tool Kit (continued)

E. PROCESS TO DESIGN A RIVERBANK NATURALIZATION PROJECT

Designing a riverbank naturalization project is a complex and site specific process that requires a high level of expertise. The following outline is an example of the approach an expert might take to assess a riverbank and design a naturalization project at a particular site. This process requires working with multiple variables, and is interdisciplinary and iterative.

1) Gather information to identify the limitations and constraints of the site

- Understand the channel forming flow.
 - Conduct a hydrological study and a hydraulic study
 - Plan for a flood event based on the pertinent model (50-year flood, 100-year flood, etc.)
 - Calculate the hydraulic flow and look for bankfull flow indicators
 - Possibly conduct pebble counts to evaluate bed stability (but understand that pebbles could have been washed from upstream, etc. and pebble counts are not applicable for clay/silt bedded streams.)
- Understand the geomorphology of the site.
 - Examine existing bars (areas of aggradation of sediment within the channel or in near-bank areas), sediment transport, cross-section, profile, soils, vegetation etc.
 - Measure the stream gauges with information from USGS, identify evidence of vertical stability, etc.
- Understand the property owner and/or stakeholder objectives and constraints, including finances, timeframe, and acceptable risks.
- Place the naturalization project within the context of the larger river corridor, and assess if there are impacts upstream, such as headcut migration or excessive sediment loading, that could cause the project to fail.
- Assess the future conditions of the project and the condition of the watershed. (For example: is it extremely built out? Is future development planned?)

2) Develop design criteria

- With the information gathered in step one, work with the client to develop criteria that the design must meet for it to be considered successful.
- Develop performance criteria that indicate whether the design criteria were met. (Example of design criteria: a culvert must pass fish of age one up to adult at flows at or below an annual average. Example of performance

criteria: design culvert to pass blacknose dace, one of the weakest swimming fish of the local community.)

3) Identify alternatives and options that meet the design criteria

- Run models and look for evidence that they will work.
- Identify the trade-offs of the options.
- Conduct a cost-benefit analysis.

4) Develop designs and evaluate potential design solutions

- Create a range of designs that meet the objectives. Include enough flexibility for inevitable changes or unknowns, as well as a management period to establish the site.
- Educate stakeholders including the landowner, community, and funders about the options.
- Work with stakeholders to gain consensus.

5) Obtain funding, local sources and opportunities include:

- Illinois Environmental Protection Agency (IEPA). At the time of publication, the IEPA seemed less interested in stream restoration than in previous years and allocated less dollars in the budget for it. It seemed difficult to quantify results of stream restoration by their objectives, and they have indicated frustration with lack of stewardship. Sediment remediation is their first priority now, though they may still be interested in novel approaches as a form of research.
- Illinois Department of Natural Resources (IDNR). At the time of publication, the C2000 funds restoration, not stabilization, especially if threatened species are involved. The Open Space Lands Acquisition and Development Program (OSLAD) has funds available for acquiring and developing land.
- National Resources Conservation Services (NRCS).
- Matching sources, like grants from foundations.
- Developers may include a riverbank naturalization project in their plans if they receive incentives such as increased density or priority of their proposal in the

III. Tool Kit (continued)

development process.

- Inclusion of restoration funding in environmental mitigation programs.
- Generally, grant funding for maintenance of river naturalization projects is scarce.

6) Complete final design (plans and specs) and permitting

- Finalize stream design and analysis.
- Finalize agency permitting and approvals.
- Achieve compliance with permitting requirements.

7) Construction

- Contractor qualifications should include:
 - Experience with similar projects on the same scale
 - A working relationship with a designer who has experience with the construction observation phase

- Experience in the project management role with all stakeholders
- Ability to deal with contingencies and the ability to adjust the design to deal with unexpected issues
- Understanding of what the project should look like and how it should perform
- Agreement to acceptability and performance standards
- Ability to ask the right questions and provide input and alternatives, based on knowledge of build techniques and materials

8) Monitoring and maintenance

- Native plant maintenance.
- Bioengineering stabilization monitoring.
- Vegetative performance monitoring.

III. Tool Kit (continued)

F. TWELVE GUIDING PRINCIPLES FOR CLEAN WATER FOR THE CHICAGO RIVER

The Chicago River weaves its way through our communities; it binds neighborhoods, towns, and cities together. Its waters bring life to a startling array of flora and fauna, a scenic respite for residents, and economic opportunities for local businesses. Protecting its waters and wildlife, its recreational possibilities, and its role in commerce as a transportation corridor is imperative to protecting this region's economic, social, and environmental health.

1. WHEREAS clean water is everyone's right and responsibility, we support collaborations between government, business, and individuals to achieve the goal of a clean, healthy Chicago River.
2. WHEREAS the Chicago River system is a combination of natural and man-made channels and canals, we support working to preserve and enhance the character of the Chicago River and its uses for plants, animals and humans.
3. WHEREAS the Chicago River is impacted by any action taken within its watershed, we support efforts to improve the health of the Chicago River undertaken from a watershed perspective.
4. WHEREAS the Chicago River is affected by all land use in its watershed and the retention of open space is crucial, we support protecting and maintaining the current amount of open space within the watershed.
5. WHEREAS stormwater is a valuable natural resource, we support preserving, protecting, and utilizing the stormwater that falls within the Chicago River watershed.
6. WHEREAS there are numerous methods for controlling stormwater, which is integral to the improved health of the Chicago River, we support the development and use of green infrastructure to protect stormwater and the Chicago River.
7. WHEREAS it is critical to employ a fiscally responsible approach to clean water infrastructure, we support developing local financial incentives for funding clean water initiatives, especially for updating aging sewage infrastructure, utilizing bioengineering techniques along riverbanks, and installing green infrastructure throughout the watershed.
8. WHEREAS Phase One of the Tunnel and Reservoir Plan (TARP) has dramatically improved the health of the Chicago River, and completing the Phase Two reservoirs is a critical component in an overall strategy to restore the aquatic health of the river, we support developing additional (non-federal) financing mechanisms to ensure TARP is completed as soon as possible.
9. WHEREAS combined sewer overflows (CSOs) are the remnants of an outdated infrastructure system and a major impairment to the aquatic health of the Chicago River, we support developing a timeline for the total elimination of CSOs on the Chicago River through effective stormwater management and completing TARP.
10. WHEREAS the Illinois EPA is currently conducting a Use Attainability Analysis (UAA) on the Chicago River Waterway System to assess if the Chicago River has appropriate water quality standards to protect people and wildlife, we support an upgrade in water quality standards and the implementation of methods to meet them.
11. WHEREAS public use of the Chicago River for paddling, fishing, and other recreational activities is growing, and effluent from water reclamation facilities on the Chicago River contains levels of bacteria and other pathogens that are incompatible with this increasing use, we support cost effective disinfection of all effluent from water reclamation facilities on the Chicago River to protect public health.
12. WHEREAS community support through individual efforts contribute to the health and future of the Chicago River, we encourage citizens to participate in river improvement activities at a local level, including involvement in Friends of the Chicago River's annual stewardship event, Chicago River Day.

Name

Affiliation

Date

III. Tool Kit (continued)

G. RESOURCES AND REGIONAL SUCCESS STORIES

Though Friends of the Chicago River worked with over 50 subject matter experts to collaborate on the 25th Anniversary Charrette Series, the group recognized that there were additional resources, research, and expertise that were not included in the charrette. Friends used the available expertise to draw up the following list of resources and regional success stories, recognizing that it is limited in scope and subject to changes in resources and personnel after the date of publication of this report.

Please note that each workshop in the charrette series was conducted in a slightly different manner than the others. Therefore, the information in this section varies from topic to topic.

Riverbank Habitat

Resources and regional success stories were identified relative to land-based and riparian habitat types found in the Chicago River watershed.

A) Resources for *high quality natural areas* include:

- Forest Preserve personnel (Lake County Forest Preserve District, Forest Preserve District of Cook County)
- Abbott Laboratories project. They instituted a land management program that includes native plants, habitat creation, and more environmentally sensitive ways of managing industrial processing products, such as cooling water. (Abbott Laboratories)
- Lake Forest Openlands

B) Resources or best practices for *unmanaged, recovering, or degraded communities* include:

- Indiana Dunes Swale Study (The Nature Conservancy)
- Study on rivers and herpetology (The Nature Conservancy)
- North Branch Watershed Project (Friends of the Chicago River, Lake County Stormwater Management Commission)
- North Branch Restoration Project (Forest Preserve District of Cook County)
- Community classification system for Cook County Forest Preserves (Steve Thomas or Debbie Antlitz, Forest Preserve District of Cook County)
- Chicago Nature and Wildlife Plan (Chicago Department of Planning and Development)
- INAI Heritage Ranking (Illinois Department of Natural Resources)
- Open Space Plan (Friends of the Chicago River, Lake County Stormwater Management Commission)
- Chicago Wilderness Terrestrial Community Classification System (Chicago Wilderness)

- Chicago Wilderness Biodiversity Recovery Plan (Chicago Wilderness)
- Lake County Stormwater Management Commission
- Municipal park districts

C) Resources or best practices for *created natural areas* include:

- Chicago Nature and Wildlife Plan (Chicago Department of Planning and Development)
- Natural Areas Manager at the Chicago Park District
- Streambank Study (Chicago Metropolitan Agency for Planning, published under former name of organization, Northeastern Illinois Planning Commission)
- “The Lake Michigan Flyway: Chicagoland’s Role in the Miracle of Bird Migration” (Bird Conservation Network)

D) Resources for *unprotected open space and small scale, private spaces* include:

- Reports on water resource protection (Chicago Metropolitan Agency for Planning, published under former name of organization, Northeastern Illinois Planning Commission)
 - Flood damage maps (US Army Corps of Engineers, other municipal or private sector sources)
 - Municipal floodplain maps (Village of Northbrook, other municipalities)

E) Resources for the *built environment* include:

- Municipal zoning codes and development guidelines
- *Chicago River Corridor Development Plan and Design Guidelines* (Chicago Department of Planning and Development)

III. Tool Kit (continued)

Aquatic Habitat

Resources and regional success stories were identified in order to centralize existing data on aquatic habitat and leverage existing success stories. Sources include:

- *From Stockyards to Spawning Beds: Handbook of Bank Restoration Designs for the Chicago River and Other Urban Streams* (Friends of the Chicago River, Chicago Wilderness, Chicago Metropolitan Area Planning (formerly Northeastern Illinois Planning Commission), Chicago Department of Planning and Development)
- Restocking technologies (example: mussel cages) and habitat that can be built into the river
- Ultraviolet (UV) disinfection at North Shore Sanitary District sewage treatment facilities. Habitat improvements have already occurred downstream of the East Chicago wastewater plant. (North Shore Sanitary District)
- North Branch Watershed Project (Friends of the Chicago River, Lake County Stormwater Management Commission)
- Fish inventories (Metropolitan Water Reclamation District of Greater Chicago, US Army Corps of Engineers)
- Mussel inventories (Shedd Aquarium, Friends of the Chicago River)
- Nippersink Creek Watershed Plan (Ed Collins, McHenry County Conservation District, United States Geological Survey)
- Midewin National Tallgrass Prairie (Wilmington, Ill.)
- Springbrook Creek Restoration (Springbrook Nature Center, Itasca, Ill.)
- Wisconsin Wetlands Initiative
- Dam Maintenance, Repair, Modification, Abandonment, and Removal program (River Alliance of Wisconsin, Wisconsin Department of Natural Resources)
- Brewster Creek Dam Removal and Stream Restoration (Kane County Division of Environmental Management)
- Techny Basin area restoration, Lake Glenview (Don Owen and Robin Flakne, Village of Glenview, Ill.)
- Pools and Riffles Restoration Project (Village of Northbrook, Ill.)

Land Protection

Regional success stories of land protection are categorized by landowner type. They include:

A) Forest Preserves

- Kane County, Will County, and Lake County Forest Preserves have established many successful best practices for how to protect land.

B) Parks

- Gompers Park. The Chicago Park District excavated the fill and designed a natural wetland for the site, that includes habitat considerations. The park district and local volunteer groups maintain the land.

C) Municipalities and Townships

- North Park Nature Preserve. This land is owned by the City of Chicago and managed by the Chicago Park District. Permanent protection is guaranteed by a conservation easement held by CorLands. In this example, land preservation, education, and land management goals are accomplished simultaneously.

D) Metropolitan Water Reclamation District of Greater Chicago

E) Industrial and Commercial

- AAA Boatyard at 1111 N. Elston in Chicago. This industrial property will be converted to a public park.
- A formal industrial site at Eleanor, Lock, Fuller streets in Chicago. This site underwent environmental remediation and will be converted to a public park by 2008.

F) Residential

- Examples where public access was not a concern for the homeowner include: Rails to Trails, Batavia; Old Plank Road, Northbrook; Burnham Greenway Trail System; DuPage River Trail.
- Examples where “conservation developments” have minimized negative impacts to the land include: Tryon Farm (Michigan City, Ind.), Coffee Creek Center (Chesterton, Ind.), Blackberry Creek (Elburn, Ill.).

G) Corporate and Industrial

- Abbott Laboratories and Fermi National Accelerator Laboratory are examples of a large landowner that releases and treats cooling water onto its respective property in an environmentally sensitive way, initiates large-scale prairie restoration activities on site, and involves employees and volunteers in ongoing maintenance and stewardship.

III. Tool Kit (continued)

- CorLands is doing an ecological assessment of the land owned by the Girl Scouts for their regional camp facilities.
- Openlands' Corporatelands program converts turf grass areas into natural landscapes and involves the landowners' employees in the process.
- Examples where innovative design can be an education opportunity include: North Side College Prep (Chicago, Ill.), Deerfield High School (Deerfield, Ill.), and Loyola Academy (Wilmette, Ill.).

H) Land Conservancies and Land Trusts

No examples mentioned during the charrette.

I) Utilities

No examples mentioned during the charrette.

J) Golf courses

No examples mentioned during the charrette.

Riverbank Naturalization

Resources for riverbank naturalization include:

- *From Stockyards to Spawning Beds: Handbook of Bank Restoration Designs for the Chicago River and Other Urban Streams.* Authored by Friends of the Chicago River, Chicago Wilderness, Chicago Metropolitan Area Planning (formerly Northeastern Illinois Planning Commission), Chicago Department of Planning and Development, 1998.
- *Chicago River Corridor Design Guidelines and Standards.* Authored by the Chicago Department of Planning and Development, 2005. Chapter 3: Riverbank Zone and Appendix K cover riverbank stabilization techniques.
- *Stream Corridor Restoration: Principles, Processes, and Practices.* Authored by Federal Interagency Stream Restoration Working Group, Natural Resource Conservation Service, 1998. Provides general information.
- Dr. David Rosgen and Dr. Richard Hey have authored several publications on stream restoration. Their publications can be found through an organization called Wildland Hydrology. Their techniques have a western (geographic) focus.
- *Stream Restoration Inventory Phase 1 and Phase 2.* Authored by Don Roseboom, studies commissioned by Chicago Wilderness, Chicago Metropolitan Area Planning

(formerly Northeastern Illinois Planning Commission), 2002. Details stream practices in the Chicago area.

- *Stream Analysis and Fish Habitat Design: A Field Manual,* R.W. Newburg and M.N. Gaboury, 1993.
- *Stream Restoration: A Natural Channel Design Handbook.* Authored by North Carolina Stream Restoration Institute at North Carolina State University, 2003.
- Ed Herricks and Bruce Rhoads have designed stream naturalization projects in conjunction with the University of Illinois, Urbana-Champaign. They designed the pools and riffles model project in Northbrook, Ill.
- *A View of the River.* Authored by Dr. Luna B. Leopold, 1994.
- "Bank Stability Model," United States Department of Agriculture, Agricultural Resource Service, 2006, with ongoing revisions.
- Historical documents such as previous 20th century studies, 19th century surveyor notes, descriptions, etc.
- H&H models (hydrology and hydraulics), geotechnical models, available depending on an individual stream's records.
- Local landowners are an often overlooked resource – nobody knows their stream better.

Regional success stories include:

- Nippersink Creek (McHenry Forest Preserve District, Ill.); stream re-meandering project and wetlands restoration.
- Indian Creek (Kane County, Ill.); 4,000 linear feet of stream re-meandering.
- Raccoon Creek (Rockford, Ill.); 8,000 linear feet of stream re-meandering.
- Del Webb development (Kishwaukee River near Huntley, Ill.); developer-driven restoration on an original farm ditch.
- Hobson Creek (DuPage County, Ill.); streambank stabilization and riffle structures in urban area.
- Seavey Ditch (Lake County, Ill.); streambank stabilization, wetland enhancement.
- West Fork of the North Branch of the Chicago River (Northbrook, Ill.); pools and riffles installation project.
- Lake and garden area of Chicago Botanic Garden (Glencoe, Ill.); naturalization and restoration project.

III. Tool Kit (continued)

- Des Plaines River Wetlands Restoration Project (Wadsworth, Ill.); wetlands demonstration project.
 - Carrington Reserve and other developments by the Pulte Homes Corporation (West Dundee, Ill.); development and land management best practices to aid and enhance ground water recharge.
 - Des Plaines River (Illinois); streambank stabilization.
 - North Park (Lincolnshire, Ill.); streambank stabilization, floodplain restoration, bioswales, natural area restoration.
 - Flint Creek (Barrington, Ill.), recontouring of streambanks, addition of riffles, installation of native wetlands plants, creation of prairie buffer.
 - Mill Creek (Kane County, Ill.); environmentally sound stormwater engineering design.
 - Coffee Creek watershed (Chesterton, Ind.); innovative stormwater and wastewater management systems, native plants, streambank restoration.
 - Michigan Avenue Fish Hotel (Chicago); fish habitat and floating island demonstration downtown on the Chicago River.
 - Deerfield High School (Deerfield, Ill.); over 600 feet of streambank restoration.
 - Kansas City, Kan., and Portland, Ore.; residential rain garden programs.
- In-stream practices, like floating islands where roots dangle in the water (China) and Friends of the Chicago River's Michigan Avenue Fish Hotel.
- Bioinfiltration rain gardens.
- "Water Quality Inlets" or "Oil and Grit Separators" are water filtration structures that remove sediment and oils from stormwater prior to delivery to a stormdrain network, the ground, or other treatment. Often used as pretreatment for infiltration BMPs such as porous asphalt pavers, modular pavement, or infiltration trenches. Current brand names (at the date of publication) include Vortech, BaySaver, StormCeptor.
- Permeable or porous paving.
- End of pipe structures.
- Micro-filtration systems on dolphin clusters (structures in the river to protect bridge piers).

Water Quality

Disinfection of effluent at sewage treatment plants that release wastewater into the Chicago River could provide one of the biggest water quality improvements for the river. There are successful regional examples of disinfection technologies at wastewater treatment plants by the North Shore Sanitary District (NSSD). Some of the experience from this project could be scaled for use on the Chicago River. Main objectives of the project include:

Stormwater Filtration Techniques

In addition to projects that can improve environmental practices close to streams and rivers, there are technologies and techniques that increase stormwater infiltration throughout the watershed and reduce the impact of stormwater. Some of these technologies and techniques include:

- Vegetative buffers which provide some filtration.
- Vertical components, like "living walls" or "active walls" that are planted and joined to a building's utility or greywater disposal system, help purify a building's by-products.
- Daylight storm sewers, and replace with native-vegetated swales.
- Level spreaders provide some storage upstream, and the discharge is more evenly released across the buffer zone.
- The board of the NSSD is elected to oversee the operations but also have a fiduciary responsibility. They are progressive in their practices but their actions are normally a response to existing or future regulations. Municipalities will often go for the lowest-cost solution that meets the minimum requirements. To do the right thing, they need to incorporate clean water goals into their visions, but also need to be able to anticipate future regulations so they can react appropriately.
- There are separate sewers in the NSSD's jurisdiction. Challenges include occasional stormwater overflows and issues associated with older buildings and infrastructure, like pipes in disrepair that leak into the water table.
- The NSSD employs tertiary treatment, sand filters, and a pretreatment program. They voluntarily test for *e.coli*, but do not test for viruses. They have obtained better water quality measures downstream of their facilities than the existing water quality upstream from their facilities.

III. Tool Kit (continued)

- The NSSD has employed UV disinfection since 2001. A UV disinfection program is expensive to start, but effective and scalable. The program was implemented because of the cost of developing a disaster plan in case of a chlorine gas accident.

Other regional success stories of water quality improvement projects include:

- DuPage Urban Stream Center for the West Branch of the DuPage River – facilitated multiple municipalities to work together on the project.
- Grand Calumet River – removed sediments and reintroduced habitat.
- Center for Neighborhood Technology – created energy use calculator, which could be created to measure water use.
- City of Burnsville in Minnesota and City of Rock Island in Illinois – developed rain garden metrics to provide a neighborhood solution.
- State of Ohio – designed water quality measurements to combine biology and morphology indicators.
- Rouge River in Michigan – created strong stormwater ordinances and provided good demonstration of addressing and controlling wet weather discharges.
- Charles River in Boston – used daylighting techniques.
- States of Washington, Michigan, and Minnesota – developed programs to limit phosphorous use.
- Dane County, Wis. – uses voluntary North Shore programs that limit fertilizer containing phosphorus for river neighbors.
- Other groups, such as River Network or Coalition for Urban Rivers, might have additional case studies.
- Humboldt Park Lagoon restoration project – includes stepping stones for fishermen, bike paths, small walking paths. (Chicago Park District)
- Mayor Daley’s Bicycle Ambassador Program.
- Examples of nature-oriented, more naturalistic paths along the Chicago River include the Jimmy Thomas Nature Trail near Lathrop Homes, Chicago; Ronan Park, Chicago; and the Riverbank Neighbors site (street end at Berceau Street), Chicago.
- Openlands Project’s *Northeastern Illinois Regional Water Trail Plan* is an example of extensive water trails for paddlers.
- American Association of State Highway and Transportation Officials’ guidelines for trails (example: 10 foot width, grading and slope standards, materials, and guidelines for multi-use).
- University of Wisconsin - Madison Arboretum is an example of a park that closes roads to cars on weekends.
- “Medical Mile” trail in Little Rock, Ark. - trail wayfinding signage includes education about health benefits of using the trail systems.
- “Velov” bike rental model in Lyon, France – members have accounts that allow them to borrow a bike for a very low fee for short, in-town rides.
- Golden State Park in San Francisco - trails are small, naturalistic, and intimate.
- Stanley Park in Vancouver, British Columbia, uses separate trail markings for biking or walking use.
- Como Park in St. Paul, Min., has good wayfinding signage.
- Dave Getchell was an organizer for the watertrails movement and helped to create the “Maine Island Trail” and “North American Water Trails.”
- “Community-based social marketing” can be used to change people’s behaviors towards more sustainable habits and practices.

Public Access

Resources and regional success stories of public involvement in public spaces include:

- Chicago Department of Transportation’s work on biking/walking trails planning.
- The “Go Healthy” program in Logan Square, Chicago. (Chicagoland Bicycle Federation)

H. DESCRIPTION OF THE CHICAGO RIVER MATRIX

As part of the prelude to the charrette series, extensive research on the current state of the Chicago River was conducted and categorized. The result was the creation of the Chicago River Matrix, which detailed each reach of the Chicago River, and the associated characteristics of each reach. Characteristics that were analyzed included (1) land use type, (2) land protection opportunities/constraints, (3) riverbank condition, (4) existing setback, (5) land ownership, (6) water quality challenges, (7) sewage infrastructure, (8) municipal governance, (9) existing habitat (land and aquatic), and (10) existing resources such as active volunteer group, protected land, or an existing stormwater ordinance. The Chicago River Matrix was utilized as a starting point for each charrette session by the session participants, and grew with information gathered at each session.

Because of the size of the Chicago River Matrix, and because it is a living document that continues to be modified by Friends of the Chicago River, it will only be available in an electronic format. The reaches were categorized as listed below.

- **River Zone 1:** West Fork of the North Branch of the Chicago River
 - Reach 1A: Headwaters to Lake/Cook Road
 - Reach 1B: Lake/Cook Road to Oakton
- **River Zone 2:** Middle Fork of the North Branch of the Chicago River
 - Reach 2A: Headwaters to Lake/Cook Road
 - Reach 2B: Lake/Cook Road to Oakton
- **River Zone 3:** Skokie River
 - Reach 3A: Headwaters to Lake/Cook Road
 - Reach 3B: Skokie Lagoons system to convergence of Skokie River with West Fork
- **River Zone 4:** North Branch of the Chicago River
 - Reach 4A: Oakton to North Branch Dam
 - Reach 4B: North Branch Dam to Fullerton
 - Reach 4C: Fullerton to North Avenue
 - Reach 4D: North Avenue to Main Stem
- **River Zone 5:** North Shore Channel
 - Reach 5A: Locks to Howard Street treatment plant
 - Reach 5B: Howard Street treatment plant to convergence with North Branch of the Chicago River (North Branch Dam)
- **River Zone 6:** Chicago River Main Stem
- **River Zone 7:** South Branch of the Chicago River (from Main Stem to Mouth of Bubbly Creek)
 - Reach 7A: Main Stem to Cermak
 - Reach 7B: Cermak to South Fork of the South Branch
- **River Zone 8:** South Fork of the South Branch (Bubbly Creek)
 - Reach 8A: Turning Basin to 35th Street
 - Reach 8B: 35th Street to 39th Street and Racine Avenue Pumping Station

The waterway system continues beyond this point but the above sections contain the majority of Friends' work.

IV. Clean Water Reference Kit

A. OVERVIEW OF THE CLEAN WATER ACT (CWA) *Source: www.epa.gov/watertrain/cwa/*

Note: The following overview of the CWA was published by the USEPA and can be found on their website. Friends included this valuable background information as a reference so the reader can understand some of the laws, policy, and terminology that frame the policy issues pertinent to the Chicago River.

Introduction to the Clean Water Act

The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water nor with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

For many years following the passage of CWA in 1972, EPA, states, and Indian tribes focused mainly on the chemical aspects of the "integrity" goal. During the last decade, however, more attention has been given to physical and biological integrity. Also, in the early decades of the Act's implementation, efforts focused on regulating discharges from traditional "point source" facilities, such as municipal sewage plants and industrial facilities, with little attention paid to runoff from streets, construction sites, farms, and other "wet-weather" sources.

Starting in the late 1980s, efforts to address polluted runoff have increased significantly. For "nonpoint" runoff, voluntary programs, including cost-sharing with landowners are the key tool. For "wet weather point sources" like urban storm sewer systems and construction sites, a regulatory approach is being employed.

Evolution of CWA programs over the last decade has also included something of a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of this approach.

Brief Overview of Key CWA Elements

First, water quality standards (WQS) consistent with the statutory goals of the CWA must be established. Then waterbodies are monitored to determine whether the WQS are met.

If all WQS are met, then antidegradation policies and programs are employed to keep the water quality at acceptable levels. Ambient monitoring is also needed to ensure that this is the case.

If the waterbody is not meeting WQS, a strategy for meeting these standards must be developed. The most common type of strategy is the development of a Total Maximum Daily Load (TMDL). TMDLs determine what level of pollutant load would be consistent with meeting WQS. TMDLs also allocate acceptable loads among sources of the relevant pollutants.

Necessary reductions in pollutant loading are achieved by implementing strategies authorized by the CWA, along with any other tools available from federal, state, and local governments and nongovernmental organizations. Key CWA tools include the following:

- **NPDES permit program**
Covers point sources of pollution discharging into a surface waterbody.
- **Section 319**
Addresses nonpoint sources of pollution, such as most farming and forestry operations, largely through grants.
- **Section 404**
Regulates the placement of dredged or fill materials into wetlands and other waters of the United States.
- **Section 401**
Requires federal agencies to obtain certification from the state, territory, or Indian tribes before issuing permits that would result in increased pollutant loads to a waterbody. The certification is issued only if such increased loads would not cause or contribute to exceedances of water quality standards.

IV. Clean Water Reference Kit (continued)

■ State Revolving Funds (SRF)

Provides large amounts of money in the form of loans for municipal point sources, nonpoint sources, and other activities.

After implementation of these strategies, ambient conditions are again measured and compared to ambient water quality standards. If standards are now met, only

occasional monitoring is needed. If standards are still not being met, then a revised strategy is developed and implemented, followed by more ambient monitoring. This iterative process must be repeated until standards are met.

Source: www.epa.gov/watertrain/cwa/

B. NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT PROCESS

Source: www.epa.gov/watertrain/cwa/

Note: The following overview of the CWA was published by the USEPA and can be found on their website. Friends included this valuable background information as a reference so the reader can understand some of the laws, policy, and terminology that frame the policy issues pertinent to the Chicago River.

NPDES Program

The CWA makes it illegal to discharge pollutants from a point source to the waters of the United States. Section 402 of the Act creates the National Pollutant Discharge Elimination System (NPDES) regulatory program. Point sources must obtain a discharge permit from the proper authority (usually a state, sometimes EPA, a tribe, or a territory). Though the CWA does contain a long-range goal of zero discharge of pollutants, these permits do not, as the name of this program might suggest, simply say “no discharge.” Rather, they set limits on the amount of various pollutants that a source can discharge in a given time.

In most cases, the NPDES permitting program applies only to direct discharges to surface waters. Some cases in which discharges to ground water are directly hydrologically connected to a surface water have been incorporated into the NPDES program.

A wide variety of manmade conveyances are considered point sources, including pipes, ditches, channels, tunnels, certain kinds of ships, and offshore oil rigs.

NPDES permits cover industrial and municipal discharges, discharges from storm sewer systems in larger cities, storm water associated with numerous kinds of industrial activity, runoff from construction sites disturbing more than one acre, mining operations, and animal feedlots and aquaculture facilities above certain thresholds.

All permits state their issuance and expiration date. In accordance with the CWA, permit terms may not exceed

5 years. EPA's regulations require that permit applications be submitted to the permitting authority 180 days prior to discharge (if a new discharger) or permit expiration (if already an NPDES permit holder).

The NPDES program is structured to provide permit coverage to point sources in one of two ways: developing a unique permit for each discharger, or developing a single permit that covers a large number of similar dischargers. We call these types of coverage: individual permits and general permits, respectively.

An individual permit is just what it sounds like. An individual facility gets its own unique permit designed for its specific discharge and situation. For example, ACME, Inc. has a process wastewater discharge to Pristine Creek. ACME completes an application that describes its operation and discharge and requests a permit to allow it to continue discharging. The permitting authority reviews the application and crafts and issues a permit that is unique to the ACME, Inc. facility and provides specific conditions that ACME must meet.

A general permit is a permit that covers a large number of similar facilities with a single permit document. In this case, the permitting authority identifies a large number of very similar facilities and determines that the permit conditions that would apply to these facilities would be virtually identical. The permitting authority then crafts and issues a general permit that can be used to cover any discharger that meets criteria established by the permitting authority. Once the general permit is issued, any dischargers that think

IV. Clean Water Reference Kit (continued)

they meet the general permit criteria can submit a Notice of Intent (or other appropriate notification) to the permitting authority requesting coverage and promising to comply with the conditions in the permit. The permitting authority can then grant coverage or require the facility to apply for an individual permit.

General permits are limited by certain regulatory and practical constraints. The regulations at 40 CFR 122.28 require the permitting authority to define the geographical area and sources. Geographical area can be just about anything (e.g., watershed, county lines, state boundaries). Sources covered can include storm water or a discharger category with similar operations, similar wastes, and needing similar limits. Very numerous, small sources are more appropriately controlled by general permits. The more complex the discharge, the more likely an individual permit will be required.

All individual NPDES permits include a certain set of basic elements.

The first is perhaps the most obvious -- a specific, numeric, measurable set of limits on the amount of various pollutants that can appear in the wastewater discharged by the facility into the nation's waters. Such limits are often expressed as concentrations, combined with allowed volumes of discharge. Or, limits can be expressed as mass discharged per unit time (day, week, and so forth). Limits must be expressed in such a way that they cannot be met simply by diluting the facility's effluents with clean water just before they are released into the receiving water.

As explained in more detail later, such limits can be either technology based or water quality based. Regardless of how they are derived, effluent limits are performance standards; a permittee is free to use any combination of process modification, recycling, end-of-pipe treatment, or other strategies to meet them.

NPDES permits can also require the use of certain structural or non-structural BMPs. For "traditional" point sources, municipal wastewater plants and industrial facilities, BMPs are supplemental to end-of-pipe performance standards. For wet weather-related point sources, such as combined sewer overflows (CSOs) and municipal and industrial storm water runoff, BMPs are often the only "control" requirements in the permit.

If meeting the effluent limits in a permit will require upgrading in-plant or wastewater treatment processes, it would not be reasonable to require compliance with such limits upon issuance of the permit (in the case of existing sources). Hence, permits for such sources can include a compliance schedule. Such schedules usually include not only a final date upon which effluent limits must be met but also interim milestones, such as dates for onset of needed construction. EPA guidance specifies that compliance schedules extend no longer than the term of the permit.

Most individual NPDES permits include detailed monitoring requirements that specify what pollutants the permittee must monitor for in their discharge, how frequently the monitoring should be done, and what sampling and analytic techniques should be used. (Though EPA and states conduct some inspections and compliance monitoring, the vast majority of data about the contents of the discharges from NPDES facilities are collected by the permittees themselves.) In the past, permits required only monitoring of the facility's discharges, but in recent years, some states have required some facilities to sample and analyze the waters into which they discharge as well.

If a permit contains monitoring requirements, it will also include reporting requirements. Permittees are required to regularly submit the results of the monitoring required in their permit. Most commonly these Discharge Monitoring Reports must be submitted monthly, but in some cases they are less frequent. (General permits often require few, if any, monitoring or reporting requirements.)

All NPDES permits include a standard set of clauses, including provisions for reopening the permit if new information or other specific circumstances justify possible changes, authority to revoke the permit for cause, and authority for the permitting authority to enter the facility and perform inspections.

An NPDES permit also includes a cover page (permitting authority, permittee, statutory and regulatory authorities, and effective/expiration dates), special conditions (e.g., studies, compliance schedules), and standard conditions (boiler plate language included in all permits). Along with a draft permit, the regulatory authority must include an explanation of how the discharge limits were derived.

Source: www.epa.gov/watertrain/cwa/

IV. Clean Water Reference Kit (continued)

C. NINE MINIMUM CONTROLS FOR COMBINED SEWER OVERFLOWS

Source: www.epa.gov/npdes/pubs/owm0030.pdf

Note: The following listing of the nine minimum controls for combined sewer overflows (CSOs) was published by the USEPA on their website as part of the guidance for the NPDES program. Friends included this valuable background information as a reference so the reader can understand some of the laws, policy, and terminology that frame the policy issues pertinent to the Chicago River.

The nine minimum controls are identified in the CSO Control Policy as minimum technology-based controls that can be used to address CSO problems without extensive engineering studies or significant construction costs, prior to the implementation of long-term control measures.

They include:

1. Proper operation and regular maintenance programs for the sewer system and the CSOs
2. Maximum use of the collection system for storage
3. Review and modification of pretreatment requirements to assure CSO impacts are minimized
4. Maximization of flow to the publicly owned treatment works for treatment
5. Prohibition of CSOs during dry weather
6. Control of solid and floatable materials in CSOs
7. Pollution prevention
8. Public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts
9. Monitoring to effectively characterize CSO impacts and the efficacy of CSO controls

USEPA's *Guidance for Nine Minimum Controls* describes the nine minimum controls, and EPA's expectations for their implementation, in more detail.

Source: www.epa.gov/npdes/pubs/owm0030.pdf

V. Appendices

APPENDIX A

2006 PADDLING SURVEY

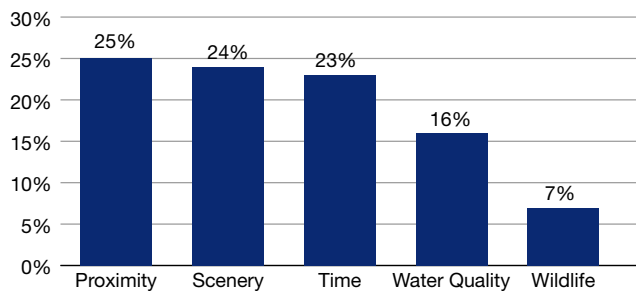
Friends of the Chicago River, joined together with the Openlands Project and the Northeast Illinois Water Trails Council to conduct the first public opinion survey of area recreational paddlers. This survey is designed to be used to build awareness of the positive contribution paddlers make to the local economy of the region and to better understand the needs of the community.

The survey was mailed to 1,500 randomly selected individual households who have registered their non- motorized watercraft (canoe/kayak) with the State of Illinois. It was also distributed electronically to members of Northeastern Illinois paddling clubs, participants in the Flatwater Classic canoe and kayak race, and members of the public who have requested maps from the water trails council.

According to the Illinois Department of Natural Resources, there are 15,000 non-motorized boat registrations in Northeastern Illinois. Of the 1,500 surveys sent out, we received 250 responses; this gives the results of the survey a 90% confidence level with a 5.2% margin of error.

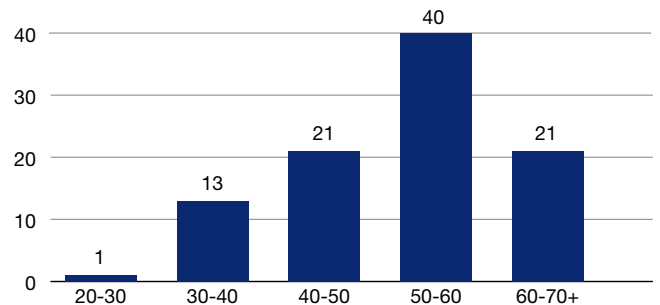
Findings:

1. The average number of Northeastern Illinois canoe trips in 2005 was 14. The median was seven.
2. The average number of canoe trips taken out of state in 2005 was four. The median was two.
3. The majority of the trips in Northeastern Illinois lasted two to four hours (48%). Second most common was four to six hours (30%).
4. The preferred paddle launch site was natural riverbank (64%) with concrete pad second (13%), and floating pier third (10%).
5. The most important qualities when choosing a location for a paddling trip was proximity, followed by scenery, length of time on the water, water quality, and wildlife.

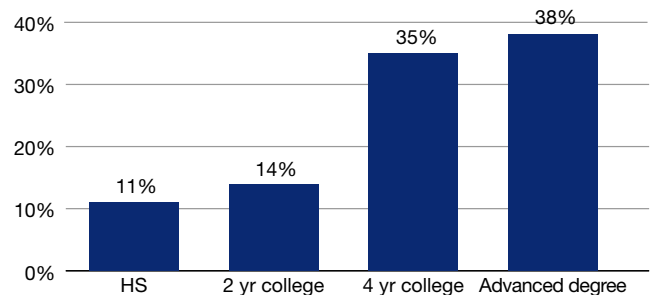


6. The average expenditure per 2005 paddling trip in Northeastern Illinois was \$34.
7. The average annual expenditure in Northeastern Illinois was \$266.

8. The average expenditure per 2005 paddling trip out of state was \$122
9. The average annual expenditure out of state was \$334.
10. The average age of paddlers was 52.



11. The paddling population is overwhelmingly male (78%), female (22%).
12. The education level is very high. Seventy-six percent have college degrees.



13. The annual income level is above average. 58% listed 70K+.

V. Appendices (continued)

Conclusions—Economic Impact

1. There are 15,000 owners who have registered non-motorized watercraft in Northeastern Illinois. With an average number of trips per household of 14, this means there were approximately 210,000 paddling trips in 2005. The economic impact of this paddling for Northeastern Illinois communities in 2005 was **\$7,140,000**.

Geographic Summary:

Respondents were asked questions concerning their use of particular water trails in Northeastern Illinois in 2005.

The following water trails are ranked by the number of survey respondents who indicated they had paddled that river in 2005:

1. Fox River (124 respondents had paddled it in 2005)
2. North Branch, Chicago (86 respondents)
3. Upper Des Plaines (65 respondents)
4. Lake Michigan (55 respondents)
5. Kankakee (52 respondents)
6. Kishwaukee (50 respondents)
7. Nippersink (47 respondents)
8. Lower Des Plaines (44 respondents)
9. DuPage West Branch (43 respondents)
10. DuPage Mainstem (38 respondents)
11. South Branch Chicago (29 respondents)
12. Salt Creek (27 respondents)
13. DuPage East Branch (10 respondents)
14. Chicago River – other (8 respondents)
15. Calumet Sag Channel (4 respondents)
16. Calumet River (3 respondents)
17. Little Calumet (1 respondent)

The following water trails are ranked by the total number of trips survey respondents indicated they took on those rivers in 2005:

1. Fox River (total 868 trips)
2. Upper Des Plaines (481 trips)
3. Lake Michigan (301 trips)
4. North Branch, Chicago (291 trips)
5. Lower Des Plaines (244 trips)
6. Kankakee (181 trips)
7. Nippersink (138 trips)
8. DuPage West Branch (113)
9. Kishwaukee (110)
10. DuPage River Mainstem (102)
11. Salt Creek (49 trips)
12. South Branch Chicago (44)
13. DuPage East Branch (17)
14. Chicago other (15)
15. Calumet (5)
16. Cal Sag Channel (4)
17. Little Calumet (1)

V. Appendices (continued)

B. INCREASE IN PROPERTY VALUES ALONG THE CHICAGO RIVER

A second benefit of improving the river's health: increased assessed values of river-adjacent properties.

Today it is commonly understood that property close to parks, greenways, bodies of water, and open space will command a higher price than other, similar property. In Chicago, this idea was formally championed by Frederick Law Olmsted, who in 1868 told the future developers of Riverside, Ill., that based on his experience with developing Central Park in New York, there was "a vast increase in value of eligible sites for dwellings near public parks."

The Chicago River historically provided much of the impetus for increasing land values as factories and industry developed along its banks. Maps of land values from 1892 show ridges of high property value on both the north and south branches of the river.

However, with the development of elevated railroads, higher bridges that were never closed because of passing ships, and additional transportation options, river-edge property values began to decline, as 1960s studies of property values adjacent to the Chicago River reveal:

"From Ashland Avenue westward, there is no clear-cut indication that waterfront property carries any premium over the land immediately behind it. In fact, in most of the profiles, waterfront values seem to be depressed somewhat below the level of property away from the water."¹

Cross-section analysis of the average value of a foot of land along the river reveals that as late as 1964, property values formed a trough of lower values as one approached the river, with overall values decreasing the farther one moved from the city center.

In the current market environment, which supports significant residential development along the Chicago River, Friends has joined with the City of Chicago's Department of Planning and Development to determine if the river's recently improved health has translated into a corresponding increase in values of river-adjacent properties.

We first examined data on the Equalized Assessed Value (EAV) of river-edge properties for the last two assessment periods. EAV is the value used to assess property taxes.

Since real estate property is assessed by the Cook County Tax Assessor's office every three years, we looked at data from the 2000 and 2003 assessments.

We chose to evaluate an 800-foot corridor on each side of the river based on a review of the relevant literature by John L. Crompton, who in his book *The Proximate Principle: The Impact of Parks, Open Space and Water Features on Residential Property Values and the Property Tax Base*, found that 89% of the value associated with water quality changes lies in the first 1,000 ft. from the shoreline:

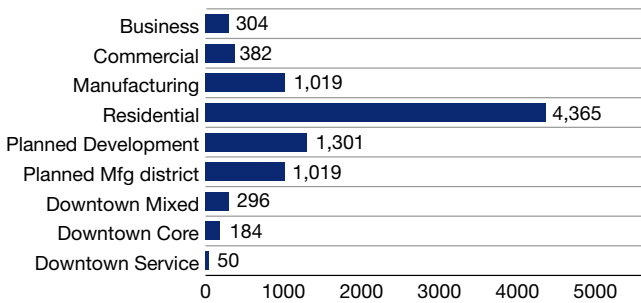
". . . the level of increase attributable to water quality improvement declined significantly with distance of the property from the water. Increases of 25%, 17%, 11%, and 5% in value, attributable specifically to water quality improvements, were found for residences at distances of 100, 500, 1,000, and 2,000 feet respectively from the water's edge."²

His research found that owners of property that has a higher value because of its location next to parks, open space, water features, etc., are likely to pay higher property taxes to governments because of the increase in the property's appraised value. As a policy matter, this means that if the incremental amount of taxes paid by each property is aggregated, it can be used to retire the bonds used to upgrade and develop the park, open space, or water feature enhancement.

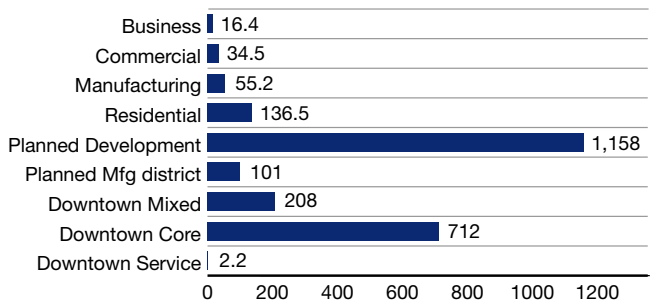
V. Appendices (continued)

Property Values Along The Chicago River

Within the boundaries of this corridor, we found 8,920 river-edge properties in Chicago divided into nine zoning classes. The largest category of parcels in the corridor is residential at 4,365, followed by planned developments at 1,301 and manufacturing and planned manufacturing with 1,091 each.



The total number of properties by zoning class that we studied does not necessarily correspond to the highest total EAV or the greatest rate of increase. Parcels that lie within the corridor boundaries of river-edge planned developments have the highest assessed value and account for 47% of the total 2003 EAV of the parcels we studied.



Our analysis showed that among the 8,920 river-edge parcels, EAV increased by 20.1% between 2002 and 2003. River-edge parcel values improved at a faster rate than properties in the rest of the city. EAV baseline across the city increased 17.29% during the same period. This was a total dollar increase of \$405 million, or a \$202.5 million annual increase.

This increase in EAV value from 2002 to 2003 was not uniform across zoning classes as shown in the table. Residential properties had the highest rate of increase at 24%, but the largest total dollar increase came from planned developments at \$210 million.

Chart 9: Property Value Increases 2002-2003

Zone Type	Change in EAV (millions)	Mean EAV Increase (%)
Business	3.0	14
Commercial	8.1	15
Manufacturing	6.4	10
Residential	35.9	24
Planned Development	210	6
Planned Mfg District	9.5	7
Downtown Mixed	39.6	10
Downtown Core	93.4	13
Downtown Service	0.05	1
Total	\$405.95	100

¹ Solzman, David M. 1966. Waterway industrial sites: a Chicago case study, p. 77.

² Crompton, John L. 2004. The proximate principle: the impact of parks, open space and water features on residential property values and the property tax base.