Waterway Management Strategy

Chicago Metropolitan Agency for Planning
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Chicago Metropolitan Agency for Planning

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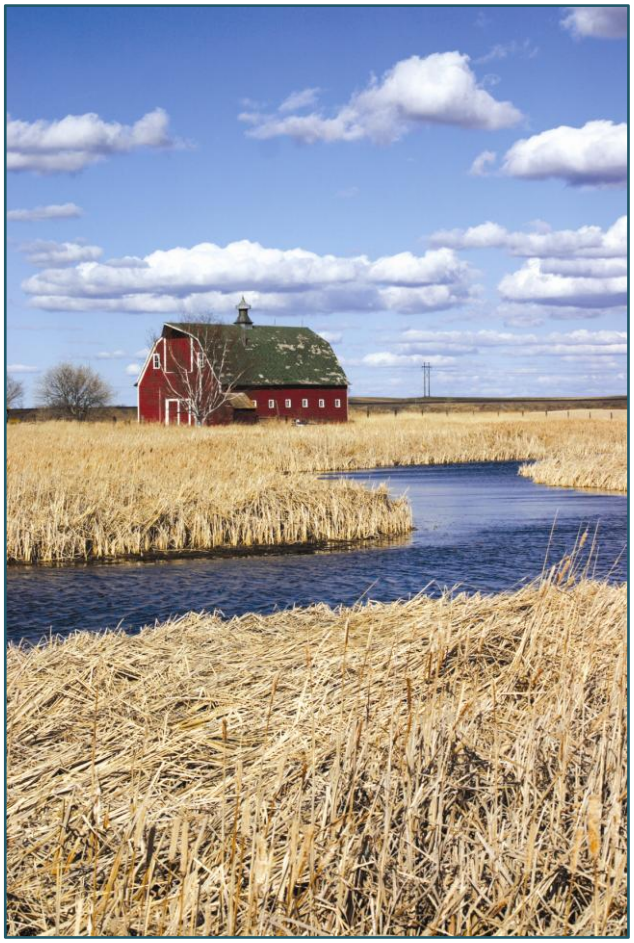
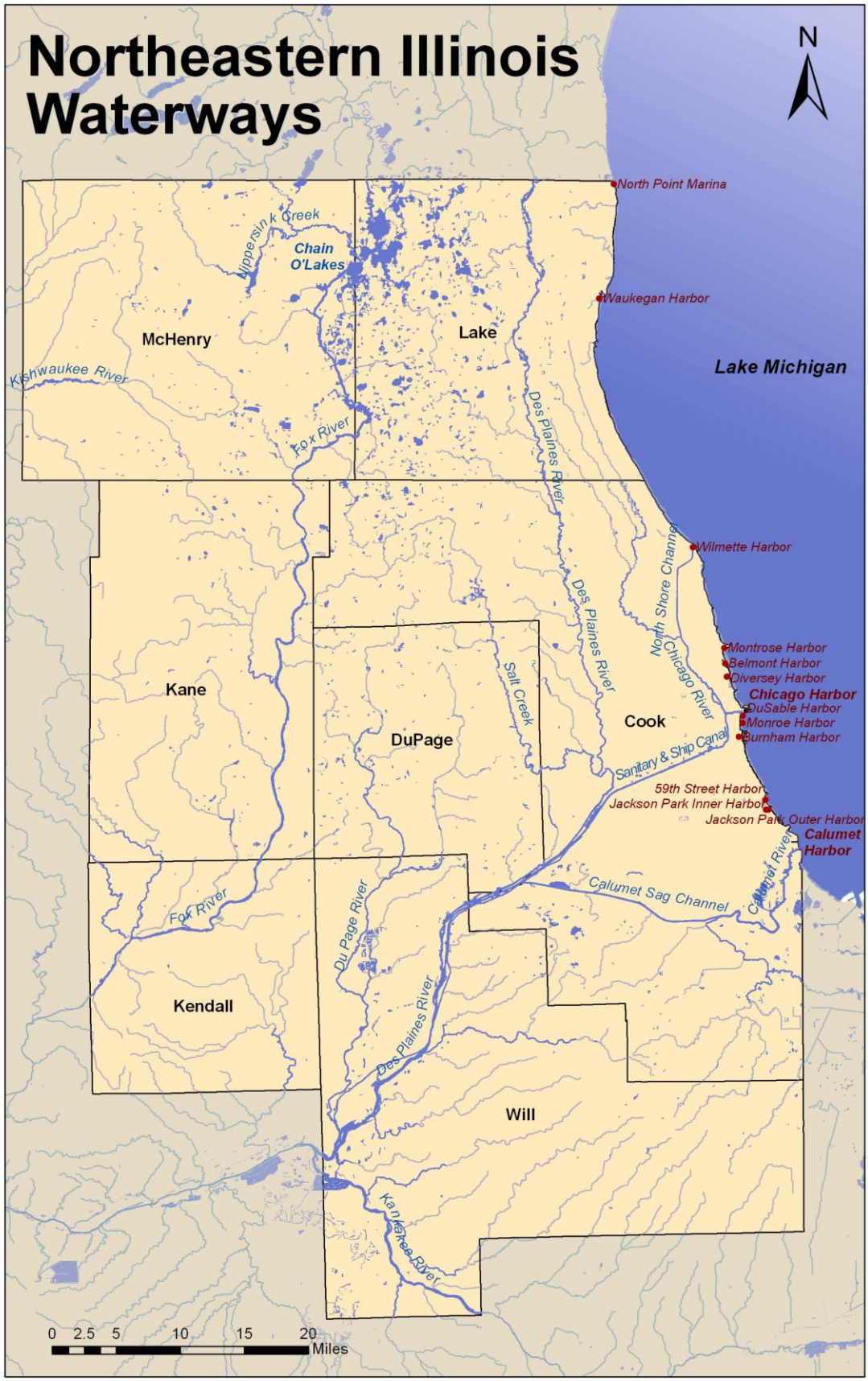
I. Introduction

The waterways of Northeastern Illinois play a vital role in the economic, social, and environmental health of the region, as well as the quality of life of its citizens. Lake Michigan, the Fox River Chain O'Lakes, and several thousand smaller lakes and streams not only provide opportunities for boating, hunting, fishing and snowmobiling, but also vital passive uses such as canoeing, hiking, swimming and sense-of-place. The Port of Chicago and the channels it connects are vital commercial shipping thoroughfares for the region and the entire Midwest. Although there are other key functions of our waterways, such as water supply, stormwater management, and ecosystem health, these are covered separately within other CMAP strategy papers. The purpose of this strategy analysis is to understand waterway management as a component of the recreational, economic and commercial resources of the region.



Waterways management is inherently a regional issue as waterways extend across federal, state, local, municipal, and private ownership boundaries, and multi- or concurrent regulatory authority. In addition to Lake Michigan, the larger of the region's waterways include the Fox River Chain O'Lakes, Calumet River, Chicago River, Des Plaines River, DuPage River, Kankakee River, Kishwaukee River, and Salt Creek. These waterways are fed and connected by a web of tributaries and historically significant canals. Some water bodies, such as the Calumet River and the Chicago Sanitary and Ship Canal are heavy commercial corridors that are host to international shipping trade. Other water bodies are national hubs of water recreation like the Fox River and Chain O'Lakes. Smaller meandering prairie rivers such as the DuPage, Kankakee, and Kishwaukee Rivers provide idyllic spots for passive uses such as canoeing, kayaking, and fishing. Waterways have always played a significant role in the history and development of the region, and continue to serve as critical regional resources.

Figure 1


Northeastern Illinois Waterways
N
North Point Marina
Waukegan Harbor
Lake Michigan
Wilmette Harbor
Montrose Harbor
Belmont Harbor
Diversey Harbor
Chicago Harbor
DuSable Harbor
Monroe Harbor
Burnham Harbor
59th Street Harbor
Jackson Park Inner Harbor
Jackson Park Outer Harbor
Calumet Harbor
Chain O'Lakes
Lake
McHenry
Kishwaukee River
Fox River
Des Plaines River
North Shore Channel
Chicago River
Salt Creek
Cook
DuPage
Kane
Sanitary & Ship Canal
Calumet River
Calumet Sag Channel
Du Page River
Kendall
Will
Kankakee River
0 2.5 5 10 15 20
Miles

In Northeastern Illinois, several key groups and organizations have recognized the value of waterway planning and management on a regional scale.

A joint effort between the Northeastern Illinois Planning Commission, the Illinois Paddling Council, and Openlands, the *Northeastern Illinois Regional Water Trails Plan* was adopted in 1999. The *Water Trails Plan* served to outline the major waterways throughout the seven-county region, identifying existing and potential access points and prioritizing sites for implementation of a regional water trail network. According to Gary Mechanic, President of the Illinois Paddling Council, this was the "first regional system of water trails in the world" (Mechanic, 2008). Since adoption, the plan has served as a guide for implementation, resulting in an updated map in 2007, identifying completed trails and areas still needing improvement.

In 1984, the Chain O'Lakes-Fox River Management Agency, now known as the Fox Waterway Agency, was created by the Illinois General Assembly and given wide-ranging authority to deal with waterway management issues in Lake and McHenry Counties. The desire to bring various legal authorities together in a coordinated attack on continuing issues led to the formation of the Chain O'Lakes Fox River Special Areas Management Plan (SAMP) in late 1989. Since then, the Fox Waterway Agency continues to promote programs, such as the 2007 "Reclaiming Wisconsin Topsoil" campaign to promote beneficial reuse of lake sediments, as well as the 2008 FWA Task Force, which brings together the counties of Lake, McHenry, and Kane, as well as southeastern Wisconsin, on flooding and other waterway management issues in the watershed.

As a part of the *GO TO 2040* planning process, a Regional Vision was adopted, representing a set of shared values expressed through a comprehensive public participation process. The Regional Vision specifically calls out water-based transport as critical to effective transportation in the future, and waterways as a part of the green infrastructure network, providing recreational opportunities and ecosystems benefits.

The purpose of this report is to give a general overview of the existing conditions of waterways in our region in terms of their use as recreational and commercial assets, and then explore the potential impacts of implementing regional waterway management.

II. Existing Conditions in the Region

In order to understand the current conditions of the network of regional waterways in Northeastern Illinois, it is helpful to look at them separately, through the lenses of recreational and commercial usage.

Recreational Use of Waterways

Inland Waterways

Northeastern Illinois is home to a multitude of waterways and water bodies amenable for paddling, fishing, and boating. According to the *Water Trails Plan*, the region boasts 2,000 miles of streams; 500 miles of which have been designated as a part of a regional water trails system (NIPC, et al, 1999; Longo, 2008). This system includes 174 planned launch sites, 94 of which have already been established, and 26 which are unimproved (Longo, 2008). The location of the water trails system and their public access points is displayed on a recently updated map from the *Water Trails Plan* (Openlands, 2007).

In addition to the extent of the regional water trails systems in Northeastern Illinois, the waterways are of high quality and variety. Within the region, a paddler can find a range of difficulty levels, and a wide variety of recreational experiences – from the "urban canyons" of downtown Chicago to pristine stream reaches to historic Native American routes. The *Water Trails Plan* identifies different "experiences" rather than geographies – family/beginner, scenic, unique, quiet/natural/wildlife, and handicapped accessible. This exemplifies the breadth of Northeastern Illinois' waterways.

Lakes and ponds also play a key role in the waterway network, both in terms of hydrologic flow and recreational access. Waterbodies serve as the meeting points for the larger waterway network, often located at the confluence of several streams or rivers. In addition, they can serve as the most accessible opportunity for users to find boat launches, beaches, and fishing spots. Not including rivers, streams, or Lake Michigan, Northeastern Illinois boasts over 45,300 acres of waterbodies (CMAP, 2005).

Much of this inland coastline, around lakes and along rivers and streams, has been protected and preserved as forest preserves, parks, and conservation districts. The Green Infrastructure Vision is primarily focused around this existent network of preserved natural lands, with a focus on the region's waterway network to knit the "infrastructure" together.

Lake Michigan

The expansive waters of Lake Michigan are a source of pride and a beloved recreational asset for the region's residents. Making up over 68 miles, the northeastern Illinois lakefront is dotted with several marinas and harbors, fishing spots and swimming beaches (NIPC, et al, 1999). These amenities are important recreational outlets for the region. See the appendix (Table A-1) for a list of the region's Lake Michigan beach access locations.

The Chicago Park District currently hosts the largest municipal harbor system in the United States. The nine Chicago Harbors (Belmont, Burnham, Diversey, DuSable, 59th Street, Jackson Park Inner, Jackson Park Outer, Monroe, and Montrose harbors) can currently accommodate over 5,100 boats, generating revenues exceeding $17.5 million in slip fees per season (Chicago Harbors website). The Chicago Park District also owns the small Calumet Yacht Club harbor, but contracts management to a private company (Chicago Park District, 2008).

Chicago harbors boast occupancy rates near capacity. The *Chicago Lakefront Harbor Framework Plan* was drafted in 2007 by the Chicago Park District to address demand for four new harbors, an estimated 3,000 additional boat slips, and multiple breakwaters and structural and amenity improvements. (Chicago Park District, 2007). The proposals are descendant from Daniel Burnham's original vision for the lakefront in the Chicago Plan of 1909. Additional details about the plan for Chicago's harbors can be found in the appendix, but it is interesting to note that Chicago's harbors boast occupancies in excess of 98%. There may be a need to add additional marina space to accommodate regional needs.

Between Chicago city limits and the Illinois-Wisconsin border are three large harbor/marinas – North Point Marina, Waukegan Harbor, and Wilmette Harbor. North Point Marina is located near the Illinois-Wisconsin border in Winthrop Harbor, Illinois. The marina is owned by the Illinois Department of Natural Resources, and has 1,477 slips available for both seasonal and transient boats between 30 and 60 feet in length, generating revenues exceeding $5 million per season. The marina is currently at 80% occupancy (IDNR 2008). Waukegan Harbor is playing a key role in encouraging redevelopment in Waukegan, serving as a focus for new recreational opportunities and economic stimulus (City of Waukegan, 2003). The harbor supports both recreational and commercial water craft, and currently has 940 recreational slips, half of which were renovated in 2008. About 250 slips in Waukegan Harbor are currently open (Waukegan Harbor, 2008). Wilmette Harbor is located at the mouth of the North Shore Canal and Lake Michigan in Wilmette, Illinois. It is operated by the Wilmette Harbor Association, a private, non-profit corporation. Wilmette Harbor offers 300 moorings for both motorboats and sailboats, all of which are currently occupied (Sheridan Shore Yacht Club, 2007). Like Chicago's harbors, occupancy rates are high or at capacity for all of these north shore sites as well.

In addition, small sailboat and kayak facilities are also available at various locations along the lakefront such as Pearlman Boating Beach in Glencoe, Park Avenue Beach in Highland Park, Gillson Beach in Wilmette, and others along the north shore.

Access to Northeastern Illinois Waterways

Envisioned by Daniel Burnham and legally established by retail tycoon Montgomery Ward, the open lakefront parkland of Chicago and the harbors, marinas, and beaches identified above

served to provide the region's residents with largely uninhibited access to Lake Michigan. Many of northeastern Illinois' interior waterways, however, are a mix of public bodies of water, local government control of waterways, or private ownership.

In Illinois, public access to waterways was determined by a legal precedent set in the 1800s. The legislation claims public access is only necessary on those waterways which were of commercial use at that time, resulting in about 8%, or 2,500 miles, of the state's approximately 33,000 miles of rivers and streams to be considered legally accessible to the public (IDNR, 2004). However, the State of Illinois has designated public bodies of water in the State of Illinois within *Title 17, Ch.1, Section 3704, Appendix A: Public Bodies of Water*, under the authority of the *Rivers, Lakes and Streams Act [615 ILCS 5]* to "protect the public's interests, rights, safety and welfare in the State's public bodies of water." There are currently 59 bodies of waters specifically named in the aforementioned *Appendix A*.

Information about the region's waterway access can be found on IDNR's website, from the forest preserve districts and park districts, the Metropolitan Water Reclamation District (MWRD), and from groups like the Fox Waterway Agency, Friends of the Chicago River, and Openlands. Many of these stakeholder groups have plans dealing with access.

In order to address private ownership along the region's lakes, rivers, and streams, and physical limitations related to access and use of the waterways, such as undeveloped or underdeveloped passive boat launches, dams, and waterways with multi-use conflict issues, the 1999 *Water Trail Plan* was created. The primary goal of the 1999 *Water Trail Plan* was to coalesce a regional effort to expand passive boating access on the areas waterways. The plan's focus on passive boating is apt because a great many of the major metropolitan rivers and streams are not conducive to other types of boating – due to shallow waters, narrow channels, and/or a prevalence of dams. As the name of the plan implies, water trails are analogous to bike or walking trails. The efforts of the *Water Trails Plan* and/or other relevant plans that address waterway access are described in detail, by waterway stretch.

Chicago River

The Chicago River has been a working river since the city's inception. Over the course of northeastern Illinois' history, the river has been significantly realigned and, most famously, permanently reversed in 1900. The use of the river for recreation is much more recent. Unlike the other waterways of northeastern Illinois, access to the Chicago River is comparatively poor. Much of the river is inaccessible due to steep earthen banks or steel seawall.

Access to the river has been addressed by several City of Chicago planning documents, including the Chicago River Corridor Design Guidelines, an expansion of the Chicago Park District's earlier Chicago River Master Plan. The River Master Plan focuses on increasing public access to the river, and developing it as a recreational asset, with a greenway along its banks, and restoration and protection of habitat. The Design Guidelines specifically describe the standards for

development along the river, requiring setbacks and public access points. This can be challenging, considering that the Chicago River has historically been an industrialized, working river. As more residents turn to the river to recreate, either on the waterway itself, or along its banks, it may create conflicts with current commercial uses. It will be important to manage the variety of users along this highly populated, urban river. According to the *Water Trails Map*, the Chicago River has seven established launch sites, five sites proposed for construction, and three unimproved launches.

Calumet River, Little Calumet River, and the Cal-Sag Channel

Like the Chicago River, the Calumet River has been heavily altered from its original state. The river is predominately a commercial shipping river, representing the largest port in the Chicago metropolitan area. A reversed river, the Calumet's mouth is near the Illinois-Indiana border on the far south side of Chicago. Although commercial shipping traffic is prevalent in the area, the *Water Trails Map* shows the Calumet River upstream of the O'Brien Lock & Dam as a connection between the Calumet Area Water Trail and the Lake Michigan Water trail, with one existing access point, and one proposed (Openlands, 2007).

A tributary of the Calumet River, the Little Calumet River predominantly flows through residential and open space areas. There are two existing access points shown in the *Water Trails Plan* at the Little Calumet Boat Ramp and Gouwens Park, and three additional points proposed (NIPC, et al,1999; Openlands, 2007).

The Cal-Sag Channel is a canal that connects Lake Michigan via the Calumet River to the Mississippi River via the Des Plaines and Illinois Rivers. The channel has significant commercial barge traffic. The *Water Trails Plan* does not recommend including the entirety of the Cal-Sag channel as a part of the Calumet Area Water Trail, which terminates at the Alsip Boat Launch (NIPC, et al., 1999).

Des Plaines River

With a 95-mile stretch in Illinois, the Des Plaines River is one of the longest rivers in the region. Like many of the area's rivers, the Des Plaines is incredibly diverse. Although much of the river is protected by forest preserves (managed by Cook and Lake Counties Forest Preserve Districts), the Des Plaines becomes an urban and industrial river near its confluence with the Chicago Sanitary and Ship Canal. At this point, the Des Plaines River becomes a major commercial shipping river, connecting the Chicago Sanitary and Ship Canal to the Illinois River (NIPC, et al., 1999).

Dispersed along the Des Plaines River's length north of the Chicago Sanitary and Ship Canal is a series of dams that prevent continuous navigation. Several of these dams have official portages, which allow users to circumvent the dams. Other dams have only unofficial portages, which were identified as in need of improvements (Openlands, 2007). The northern sections of the river already have a number of launches, and high potential for more access points, whereas access to the middle and southern sections of the river are hampered by high banks and a scarcity of launches, in addition to prevalent dams.

Salt Creek

Salt Creek headwaters begin in Palatine, but the creek is non-navigable until the Busse Reservoir. Busse Reservoir, a flood retention area, is controlled by the Cook County Forest Preserve District. The forest preserve has public launch sites at the reservoir that support

canoes, kayaks, rowboats, and sailboats. Motor craft are not permitted (NIPC, et al., 1999). The *Water Trails Map* recommends the addition of several launch sites and portages around the three dams on Salt Creek in DuPage County (Openlands, 2007). The lower section of Salt Creek in Cook County flows again through forest preserve and Brookfield Zoo. The *Water Trails Plan* identified this short section between DuPage County and the confluence of Salt Creek with the Des Plaines River as being easily developable into a water trail (Northeastern NIPC, et al., 1999).

DuPage River

The DuPage River is comprised of two branches, West and East Branches, which converge to form one river in Naperville after leaving DuPage County. The river then flows south to join the Des Plaines River. In its entirety, the DuPage River includes 84 miles of waterways.

The banks of the DuPage River's West Branch are largely managed by the DuPage County Forest Preserve, which has developed several access sites. The *Water Trails Map* also identified developed portages on two of three dams in the West Branch. The third site was recommended for improvements (Openlands, 2007). The East Branch is typically non-navigable by canoes or kayaks north of Lisle (NIPC, et al., 1999). The *Water Trails Map* identified two established launch sites south of Lisle, and shows two recommended sites to be added (Openlands, 2007). There are also three established access sites along the main section of the DuPage River. The *Water Trails Map* identifies three unimproved launches and two additional launches recommended for construction along this stretch (Openlands, 2007).

Kankakee River

Although beginning in South Bend, Indiana, the length of the Kankakee River in northeastern Illinois is comparatively short to other waterways. The *Water Trails Plan* notes that the Kankakee River has several established launches in Kankakee County, outside of the immediate region. The Kankakee River has three established boat launches along its course through Will County to the river's confluence with the Des Plaines River. The *Water Trails Plan* emphasizes the need for a portage at Wilmington Dam, the only dam along the Kankakee River Water Trail (NIPC, et al., 1999).

Fox River and Chain O'Lakes

Shortly after crossing the Illinois-Wisconsin border near Antioch in Lake County, the Fox River enters the Chain O'Lakes State Park, where it empties into the first of 15 interconnected lakes that make up the Chain O'Lakes. In McHenry County, in Johnsburg, Illinois, the waterway becomes the Fox River once more as it travels the 90+ miles to the Illinois River. The Fox River Chain O'Lakes ranks as the most popular inland waterway in the entire United States. With over 7,100 acres of water, 15 lakes and 45 miles of river, this "Key West of the Midwest" accommodates every water-borne activity including boating, swimming, tubing, waterskiing, hunting, and fishing. A popular recreational option for the Chicago region for over 100 years, the Fox Waterway

registers over 25,000 boats per year who frequent the restaurants, marinas, two state parks and other entertainment venues and events unique only to the Fox River Chain O'Lakes (Fox Waterway Agency).

The Fox River Chain O'Lakes is power-boater oriented system with over 25,000 registered boats on average, per season, and over 32 marinas to serve their needs. The sizes of the vessels vary greatly with the average size boat of approximately 21 feet, to yachts and cigarette boats exceeding 27 feet in length (Fox Waterway Agency). There are a multitude of commercial boat ramps available at the local marinas as well as two free launches provided by the IDNR. Passive uses of the Chain O'Lakes and Fox River are identified in either the original *Water Trails Plan* or the *Water Trails Map* (NIPC, et al., 1999; Openlands, 2007), however, the *Water Trails Plan* recommends passive boaters use waters outside of power boat areas denoted by a large system of buoys.

The system also accommodates a very active hunting and fishing population. Both the Illinois Department of Natural Resources and the Fox Waterway Agency provide permits for waterfowl hunting blinds, with over 125 blinds permitted in 2008. For fishermen, the system has been rated as a top fishing destination with over 40 different species of game fish and has recently hosted several Walleye and Muskie National Tournaments that have been featured on ESPN.

Nippersink Creek

Nippersink Creek is a major tributary of the Chain O'Lakes and Fox River. The navigable portion of the creek begins at the north end of Wonder Lake and empties into the Chain O'Lakes. It accommodates passive boating activities, as the creek is generally shallow, and the *Water Trails Map* shows five complete launch sites along the length of Nippersink Creek. No planned future canoe launches are shown (Openlands, 2007). Nippersink Creek underwent major restoration efforts from 1999 to 2001.

Kishwaukee River

The Kishawukee River is fed by several tributaries in western McHenry County and surrounding areas. Most of the tributaries are too shallow and/or narrow for canoeing and kayaking. The more navigable portion of the river begins at the confluence of the north and south branches of the river. The *Water Trails Plan* indicated that the McHenry County Conservation District was in the process of acquiring land along the banks of the Kishwaukee River due to large private ownership (NIPC, et al., 1999). The *Water Trails Map* indicated no official canoe or kayak launch point as of February 2007 (Openlands, 2007).

Commercial Use of Waterways

Chicago and the Northeastern Illinois region owe much to its location as a center of waterway commerce. Located along the continental divide between the Mississippi River drainage basin and the Great Lakes drainage basin, the region served as a convergence of Native American waterway routes, which were quickly utilized by European settlers. Since that time, Chicago and the metropolitan region have emerged as a world class destination for commerce in large part due to its relationship to the water. Although the advent of the railroad largely replaced lake schooners and river barges in the transport of finished goods, the waterways of Northeastern Illinois are still used for the transport of bulk raw materials.

Port of Chicago

The Port of Chicago includes the Chicago and Calumet Harbors and also includes Foreign Trade Zone #22 (a 60-mile radius from Chicago municipal borders of designated space for storage, handling, and processing foreign goods) (IIPD website). The Port of Chicago is the second busiest port on the Great Lakes and the 32nd busiest port in the United States in large part due to the activity at Calumet Harbor (U.S. Army Corp of Engineers, 2004). More details on its two harbors are below.

Calumet Harbor

The region's main commercial shipping presence is at Calumet Harbor on the far south side of Chicago near the Illinois-Indiana border. The harbor is operated by the Illinois International Port District (IIPD) and consists of Iroquois Landing, the marine terminal at the mouth of the Calumet River at Lake Michigan, and Lake Calumet, which houses several terminals at the junction point of the Grand Calumet and Little Calumet Rivers. The banks of the Calumet River are lined with industries dependent on the harbor. Calumet Harbor shipped and received 16.5 million tons of goods in 2005. Commodities including limestone, coke, coal, salt, grain, cement, potash, and steel annually generate over $556 million in revenue (U.S. Army Corp of Engineers, 2004).

The Illinois International Port District is currently under fire for shifting the focus from its principal mission, shipping and port operations, to golf course management. A study done by the Civic Federation found that the IIPD has reported net losses every year between FY2002 and FY2005, with annual revenues decreasing by 5% during that time (Civic Federation 2008). More than half of the IIPD's revenues were generated by a golf course on the site, raising concerns about how the District is underutilizing its shipping capacity (Civic Federation 2008).

Chicago Harbor

In its early years, the harbor in downtown Chicago, at the mouth of the Chicago River and Lake Michigan, was the region's mainstay. Today, the Chicago River's Main Branch is no longer a large shipping port, but barges still use the Chicago locks at the river's mouth to access industries near Chicago's downtown area. In 2005, 74.8 thousand tons were shipped and received by the Chicago Harbor. These include commodities such as petroleum, newsprint, salt, and cement – an annual value of $1.1 million (U.S. Army Corp of Engineers, 2004).

Waukegan Harbor

Waukegan Harbor is a small port located in Waukegan, Illinois. The port shipped and received 642,000 tons of goods in 2005. The two main commodities at the port are cement and gypsum, which are used by local industries. The goods that come through the port annually generate approximately $8.5 million in revenue (U.S. Army Corp of Engineers, 2004).

The U.S. Army Corp of Engineers is responsible for maintaining large parts of the infrastructure at each of Northeastern Illinois' three commercial harbors. This includes responsibilities such as maintaining structural integrity of breakwaters and dredging approach and harbor channels.

In addition to the shipping and transport capacities of the region's rivers and canals, it is important to recognize that they also play a role in sanitation. The Metropolitan Water Reclamation District (MWRD) of Greater Chicago is a special-purpose district, independent of the City of Chicago. It is responsible for the Chicago Waterway System, consisting of 78 miles of canals which serve as key connections for commercial shipping routes (MWRD, 2008). Additionally, the the Chicago Waterway System drains millions of gallons of urban stormwater runoff and treated municipal wastewater effluent daily. MWRD operates the largest wastewater treatment plant in the world, Stickney Water Reclamation Plant, in addition to six other plants and 23 pumping stations, and controls the flow of water from Lake Michigan into the region (MWRD, 2008). More information about MWRD and the Chicago Waterway System can be found in the Wastewater and Stormwater Best Management Practices strategy papers (forthcoming).

III. Impacts of Waterway Management

The follow section attempts to identify, and if possible, quantify the economic, environmental, and social benefits of comprehensive regional waterway management.

Economic Impacts of Waterway Management

Effective waterway management can enhance economic opportunities in a variety of ways. Waterway planning can create opportunities for recreation and all the service economies that support it, as well as preserve important commercial shipping routes and the employment opportunities that go along with it.

Commercial

As described in the prior section on commercial use of waterways, the region's harbors are responsible for annually bringing approximately $566 million into the regional economy, mostly through Calumet Harbor (U.S. Army Corp of Engineers, 2004).

A 2003 study initiated by the Illinois International Port District, *The Local and Regional Economic Impacts of the Port of Chicago,* reports there are 3,367 port-related jobs directly associated with public and private marine terminal activities. The largest portion of the 3,367 jobs (1,185 jobs) is generated by imported steel products. The employees received $125.6 million in income from the marine terminals, an average annual salary of $37,291. An additional 3,423 indirect jobs are generated by companies dependent on marine terminals, generating an estimated $248.3 million income (Martin Associates, 2003).

The 2002 revenue of public and private marine facilities, $685.3 million, reinforces the importance of the economic impact of the port. The study also found that a total of $39.8 million of state and local tax revenue was generated by maritime activity in the Port of Chicago in 2002 (Martin Associates, 2003).

This study underscores the economic importance of commercial waterway use in the region. However, as described in the prior section, there are concerns that more can be done to capitalize on the region's potential as a hub of shipping and commerce. By identifying regional needs and assets, the economic potential of commercial waterway shipping in the region may be more fully met.

Recreation

> *"…the National Survey on Recreation and the Environment estimates that 'boating, floating, and sailing' activities are enjoyed by an estimated 77.1 million participants, that is, over 36% of persons 16 years of age and older."*
> *– National Water Safety Congress, 2004*

Increases in the recreational use of waterways nationwide make waterway management more imperative now then ever before. According to a 2004 report by the National Water Safety Congress, the amount of registered boats in the United States has grown from 2.5 million to 12.8 million over the last forty years. There is a need for increased coordination among the region's waterways to ensure the enjoyment and safety of boaters, tourists, shipping companies, and area property owners. In terms of local economies, this growth also represents a burgeoning new market for recreational amenities and services.

Boating

With such a wide variety of inland lakes and rivers as well as Lake Michigan, the region supports an active boating community.

According to the National Marine Manufacturers Association (NMMA), there are an estimated 12.8 million recreational boats registered in the country, and over 4 million unregistered recreational boats. Of these, Illinois ranks number 10 in the country for registered vessels (NMMA, 2007). A study focused on the economic benefits of the Great Lakes evaluated the economic impacts of Illinois registered boaters recreating on Lake Michigan (which doesn't take into account any other water bodies within the region). According to the study, boaters spend about $763 million annually on their watercraft, and an additional $1.2 billion annually on boating trips (Great Lakes Commission, 2007).

"One out of every four U.S. adults went boating in 2007." – NMMA, 2007

The Chicago Park District estimates $87.8 million is generated annually by craft-related spending for boats in its Lake Michigan harbors. An estimated $9,800 is generated for every slip in the harbor. Chicago harbors are self sustaining, and extra revenue from slip and mooring rentals is used for other Chicago Park District projects throughout the city (Chicago Park District, 2007). It is important to note that most Lake Michigan boats are too large to be trailered on roadways, and thus are stored along the Lake Michigan shorelines, supporting the marinas and business that provide maintenance, storage buildings, shrink-wrapping and winterizing for these vessels. Based on the occupancy rates described earlier, there are approximately 10,000 slips available along the Lake; using a general figure of winterizing and outside storage at $3,000 per vessel, it is estimated this revenue exceeds $30 million per season.

These economic impact estimates from just Lake Michigan are likely to be significant underestimates for the region as a whole. A 2002 national report commissioned by the U.S. Coast Guard found that 52% of surveyed boaters spent the majority of their boating time on lakes, compared with 21% on rivers and creeks, 11% on coastal waters, 9% in the ocean or gulf, and 6% in the Great Lakes (Strategic Research Group, 2002).

According to the Illinois Department of Natural Resources (IDNR), the region is home to about 450,000 registered boats. This information is an estimate, because boats are only required to be registered every three years, so any one year certifications total is approximately a third of the actual certified boats. According to IDNR, about 22% of these boats are non-motorized, but non-motorized boats like kayaks and canoes, often aren't certified, so this number is likely underestimated. This information is compiled by county in Table 1 (IDNR, 2008).

Table 1: Boat Certifications by County (2007)

County	All Boats	Non-motorized Boats
Cook	53,671	12,062
DuPage	19,233	5,017
Kane	11,423	3,139
Kendall	3,058	865
Lake	25,937	5,572
McHenry	17,070	3,597
Will	19,370	3,644
Regional Total	149,762	33,896

Source: Illinois Department of Natural Resources, 2008

Cook County has the highest number of certified boats of all counties in the region (and in the state), but it is interesting to evaluate this as a percentage of population, which reveals that McHenry County has the highest per capita boat registration (5.6% of the population) in the region (U.S. Census Bureau 2006). However, more than one person can use a boat at a time, and this doesn't take into account the number of users who travel in from out of the region. Therefore, this doesn't fully capture the number of recreational waterway users in the region, and it is likely the number that recreate on the region's waterways is higher.

Recent trends in waterway usage point specifically towards increases in paddling activities among users. A 2002 study found that, nationally, the paddle sport industry has grown at an annual rate of 5% since 1997 (Johnson, 2002). In fact, the U.S. Forest Service predicted that activity of recreational canoeing and kayaking paddlers will increase 73% by 2050 (Settina, 2001). An increase in paddlers has great potential to benefit local economies, especially more rural communities which may be in need of tourism revenue. Studies have shown that local economies benefit from paddling by increases in trip related spending (retail, food, and other local services) (Johnson, 2002). Openlands conducted a survey in 2006 and found that respondents spent an average of $266 annually to take paddling trips on northeastern Illinois waterways, generating an estimated total economic impact of approximately $7.2 million (Openlands et al, 2006).

According to the *Illinois Statewide Comprehensive Outdoor Recreation Plan for 2003-2008* (IDNR, 2004), Illinois is in the bottom 10% of states in terms of providing outdoor recreation lands and facilities. Considering that approximately 75% of the state's population resides within the seven counties of Northeastern Illinois, the outdoor recreation demands in the region are even more significant. In addition, the plan included survey results which revealed some of the most important types of open space to residents include lakes/ponds, natural areas, and stream corridors.

Fishing

Fishing is another popular recreation option in the region, one that clearly relies heavily on the waterways and access to them. According to IDNR records for 2008, over 200,000 fishing licenses were sold in the region. This constitutes approximately 44% of all Illinois fishing licenses. Like boating, Cook County has the highest number of fishing licenses of all counties in the region, but Kendall County has the highest per capita number of fishing licenses (6% of the population). This is broken down by county in Table 2. These totals do not capture the anglers who travel into the region regularly to fish on the region's waterways, and therefore might be underestimated.

Table 2: Fishing Licenses by County (2008)

County	Number Fishing Licenses
Cook	83,586
DuPage	19,741
Kane	18,238
Kendall	6,231
Lake	32,161
McHenry	14,004
Will	30,601
Regional Total	204,562

Source: Illinois Department of Natural Resources, 2009

Over the past ten years, several multi-state national fishing tournaments have held events in the region, highlighting its high quality sport fisheries and drawing anglers from all over the country. Local and national media outlets regularly spotlight fishing opportunities and the plentiful water resources within reach of metropolitan Chicago. Marinas, restaurants, bait and tackle stores, and guide services derive their livelihoods directly from recreational fishing in the region. The many lakes and rivers of the region provide a place to relax or participate in this favorite outdoor pastime. Fishing is an intergenerational activity, spanning all socioeconomic groups.

On the Great Lakes, recreational fishing is a multi-million dollar industry. Over a third of all U.S. anglers fish in the Great Lakes (Great Lakes Commission, 2007). Approximately half of all fishing in the Great Lakes occurs while on private boats, but charter-fishing operations provide opportunity to all fishing enthusiasts. In 2003, it was estimated that direct spending in Great Lakes coastal communities by charter fishing customers was over $20 million, not counting charter fees (Great Lakes Commission, 2007). Illinois has over 68 miles of accessible Lake Michigan shoreline, with abundant shorefishing opportunities, as well as charter boats and guide services. Lake Michigan provides anglers with the opportunity to catch salmon and trout, yellow perch, and smallmouth and largemouth bass.

Hunting

Hunting, more specifically, waterfowl hunting is a main source of recreation, and a waterways management issue as well. Although IDNR does not break down hunting licenses by type of game, the region has over 34,000 licensed hunters. The number of hunting licenses sold by county for 2008 is displayed in Table 3.

Table 3: Hunting Licenses by County (2008)

County	Number Hunting Licenses
Cook	9,728
DuPage	2,309
Kane	4,571
Kendall	1,980
Lake	4,087
McHenry	3,363
Will	8,348
Regional Total	34,386

Source: Illinois Department of Natural Resources, 2009

Despite the urbanization of the region, northeastern Illinois boasts several waterfowl hunting opportunities. These areas range from farm fields to wetlands to open-water areas, and include hunt clubs, state and county parks, and private lands. Access to these areas can be by boat, from shore, or open water blinds, either through permission from individual landowners, organized lotteries (Illinois Department of Natural Resources), or registration of blind locations (Fox Waterway Agency, Code of Ordinances). Organizations like Ducks Unlimited exist to support the sport through habitat reconstruction, education, and fundraising.

Waterfowl hunting supports local economies such as restaurants and sporting good retailers. The Associated Press has recently written several articles on the economy having little to no effect on sales related to hunting (Kafka, 2008). Hunting remains an activity that is passed from one generation to the next and an important part of family heritage.

Environmental Impacts of Waterway Management

The environmental impacts of utilizing waterways range greatly. Whereas paddling can encourage stewardship and promote water quality efforts, commercial uses can degrade a river into a channelized, lifeless transportation route. Regional waterway management should be able to accommodate all types of uses, depending on the waterway, and thereby focus environmental efforts to appropriate scales. By identifying which waterways are primarily utilized for each type of use, an effective waterway management plan can implement different approaches for different stretches, thereby reaping appropriate environmental benefits. Mitigation would be key in shipping canals or in lakes frequented by motor boats and jet skis, whereas preservation and restoration would be the goal in waterways visited by paddlers.

Dredging

Dredging is an important tool in waterways management. While dredging has historically been used in northeastern Illinois for canal and tunnel construction, basic maintenance of detention ponds, or to regain lost storage capacity in water supply reservoirs, more recently it has become a tool for restoration and water quality improvements. Dredging can have environmental benefits such as nutrient removal, improved habitat, reduced invasive species, and improved water quality. As development continues in the region, sedimentation and erosion deposit into lakes and rivers effecting aquatic plants, fisheries, and recreational uses. Dredging becomes a tool utilized for effective regional waterway management.

Seventy-five miles of the Chicago Waterway System are man-made canals which commonly see dredging for commercial shipping operations. The Fox River Chain O'Lakes area has utilized dredging to support water quality improvement and recreational boating for 25 years.

Removing sediment through dredging can be extremely costly. Averages range from about $5-$30 per cubic yard, depending on the type of dredging necessary (IEPA, 1998), and is usually designed in concert with other sediment controlling techniques such as shoreline stabilization and runoff prevention. It is a highly regulated activity requiring permitting from the U.S. Army Corps of Engineers, IDNR, and IEPA (IEPA, 1998), as well as a myriad of other Federal, State and local ancillary entities.

Dam Remediation and Removal

Run-of-river dams are dams spanning the length of the waterway that allow the continual free flow of water over the dam's crest. They can create a "hydraulic" downstream from the dam where a backwash plunges floating objects under the water, potentially trapping and drowning waterway users. Therefore, dams pose an obvious threat to waterway safety. A 2007 report by the Illinois Department of Natural Resources Office of Water Resources, *Evaluation of Public Safety at Run-of-River Dams*, investigated 25 dams in Illinois for potential remediation or removal (IDNR, 2007).

Of the 25 dams investigated in the report, 15 are located in northeastern Illinois – 12 on the Fox River, two on the Kankakee, and one on the Des Plaines. Remediation recommendations for each of these dams are outlined in Table A-3, in the appendix.

The recommendations had three essential components – improved signage, increased public awareness, and potential structural improvements to the dams (IDNR, 2007). Details about these mitigations can be found in more detail in the appendix, and more detailed rationales and caveats can be found within the original report.

Mitigation

Whereas water trails can promote stewardship and preservation, other uses can degrade aquatic environments. Ships, barges, motor boats, and jet skis can emit exhaust, leak fuel, and create turbulence. These impacts can affect water quality, harm fish and other wildlife, cause erosion, damage aquatic plants, and spread invasive species (Asplund, 2000). This is in addition to all the land-based uses and development, such as large shipping yards, marinas, and boat launches that have consequential waterway impacts as well.

Effective waterway management means that the environmental effects of these detrimental commercial and recreational uses will be mitigated. Some options for doing so include no-wake zones, restricting boating activity, and education and enforcement. "Given that most impacts of boats are exhibited in shallow-water near-shore areas, protecting these areas with no-wake zones would be the most effective way of reducing impacts" (Asplund, 2000). Restricting boat activity on some waterbodies by limiting access to just electric-motor or non-motorized boats can protect unique and sensitive environmental features. Simply establishing education and enforcement efforts can also make great strides in mitigating the environmental impacts of waterway use; informing users that their activities may be hurting the ecosystem may encourage them to be more careful, or recreate in appropriate place. Lastly, waterway planning can promote the use of newer technology – cleaner, quieter engines – mitigating impacts both in popular recreational waterways and heavily utilized shipping routes.

Chicago Waterways System – Disinfection

As an urbanized and industrialized system, the Chicago Waterway System has historically been viewed as "working rivers," serving as commercial thoroughfares and wastewater drainage. The majority of the system has been classified as "secondary contact waters," meaning that water quality must meet standards designed to protect indigenous species, non-contact recreation (boating), and commercial navigation (MWRD, 2008). Concerns have been raised that these standards are not strict enough, and that the MWRD should work to clean up this water further. In November 2007, the Illinois Pollution Control Board heard a proposal from the IEPA to amend the water quality standards and effluent limitations for the Chicago Waterway System. The IEPA proposes amendments to update the designated uses currently for secondary contact and indigenous aquatic life, and establishing a standard for effluent bacteria for discharges (IPCB, 2008). This would lead to disinfection of the wastewater effluent currently making up 50-100% of the flow in parts of the system (MWRD, 2008).

As an advocate group states, "During heavy rainstorms, MWRD is forced to occasionally reverse the river's flow – prompting swimming bans and beach closings along the Lake Michigan shoreline. Protecting Lake Michigan's health is vital not only for recreational users, but because it is a source of drinking water for 10 million people and is part of the larger Great Lakes system" (Alliance for the Great Lakes, 2008).

However, MWRD has filed a motion to the Illinois Pollution Control Board for a stay on the new rulemaking due to a need for further studies. The district argues that disinfecting the water within the Chicago Waterways System is cost prohibitive, and energy intensive, especially because the impacts may not bring the water quality to a safe enough level for general use.

Important public policy issues like this demonstrate the interconnected nature of waterway management, with significant impacts for the environment, economy, and public health.

Social Impacts of Waterway Planning

Safety

One of the biggest reasons to promote waterway management may be to improve user safety. Increases in waterway usage results in additional safety-related issues. The National Water Safety Congress has found that recreational boating accidents have risen by 21% and recreational boating injuries have risen by 14% since 1990 (National Water Safety Congress, 2004). Increases in waterway usage must be accompanied by greater management of the region's resources to coordinate additional safety procedures for area waterways.

Greater coordination of waterway uses is one of the most effective tools available to manage the region's waterways. The National Water Safety Congress (2004) and the U.S. Coast Guard (1997) explored this issue in their reports on waterway management techniques. These reports covered several approaches that a region could take in ensuring the efficient coordination of multiple uses on the waterway. One recommendation was zoning different areas of the waterway for different uses. Zoning could be used to control boat speed, keep paddlers and barges away from each other, or limit special activities (water skiing, wake boarding) to certain designated areas, among other things.

The Hampton Roads Planning District Commission (HRPDC), governing body of the Hampton Roads Region in Virginia, has used zoning to create recommended boating lanes, so that recreational and commercial boats are less likely to conflict with one another. The HRPDC has also created a no wake zone, limiting boaters' speeds to less than 6 mph within 50 feet of all vessels, shorelines, docks, swimmers, and other waterway users. The U.S. Coast Guard found that many states have enacted similar requirements, some going as far as to create no wake zones within 100 to 300 feet of all shorelines and boats. Illinois requires no wake zones (defined as speeds of 5 mph or less) within 150 feet of public launching ramps. In Illinois, there is no language about boating lanes or no wake zones near other vessels.

Another approach to waterway management is to increase the amount of enforcement and regulation. Taking steps like increasing law enforcement presence, creating licensing and certification requirements for boaters, and creating age minimums for certain waterway uses can increase waterway safety. Currently, the minimum age required to operate a motorboat in Illinois is ten years old. However, there are a number of provisions that motorboat operators age ten to seventeen must follow; depending on the age of the operator, these range from direct parent supervision to obtaining a Boating Safety Certificate.

Using visual markers, such as signs and buoys, can also promote safety, helping users understand areas that are off limits, dangerous, or have special provisions. These types of visual aids can also help keep visitors off of privately owned land, preventing a potentially serious conflict between local land owners and waterway users. The *Water Trails Plan* focuses on the efficacy and value of good signage, often relying solely on signage to warn of downstream dams or to indicate safe, public launch sites.

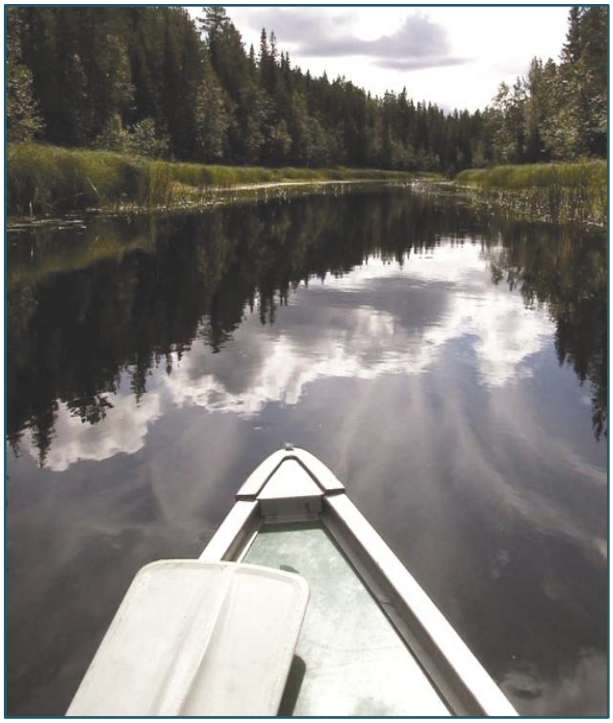
Health

Like other forms of active transportation such as bicycling or walking, fishing, hunting, and non-motorized boating can be great ways to promote better health and stay active. It is also believed that recreating outdoors may have benefits for mental health, although little research has been done on the subject.

Fishing and hunting often involve walking, hiking, or paddling to sites, and remaining alert out in the elements. Both activities are attractive to participants of all ages. The paddle stroke required to power a canoe or kayak requires the use of muscles in the legs, abdomen, and torso. As a result, paddlers build muscle, improving their cardiovascular fitness, and improving circulation. Paddling is a great way to lose weight, with most paddlers burning between 500 and 750 calories/hour on average (Gardner, 2002). In addition, the Openlands survey found that the average age of the region's paddlers is 52, which indicates that paddling is a great exercising option for a range of ages (Openlands, 2006).

Community

Improvement and coordination of regional waterways may be a significant way to enhance the way residents view their community. This topic was explored in a 2006 study on the relationship between waterway condition and quality of life. The study found a significant correlation between quality of life and sense of place. This correlation was based on the frequency of trips made to area waterways and the perceived waterway condition held by the people that made those trips. The authors found that the evidence suggested "that the quality of the natural environment can have implications for social well-being and human quality of life" (Cox, 2006). These findings are supported by a 2003 USDA Forest Service study that the physical quality of an environment to be the biggest factor in quality of experience (Daigle et al., 2003).



Educating the public about the goals and policies of the region's waterway is another way to promote harmony between the waterway and potential users. A 2002 report on a regional waterway system in Florida found that educating the public was imperative to the success of any waterway management plan. Specifically, the report suggested educating boaters on the rules of the regional waterway system, providing pedestrians with waterway trail guides, and posting signage throughout the region that clearly defines the types of uses that are allowed in different parts of the waterway system (Swett et al., 2002). In turn, a well-managed and planned regional waterways network provides opportunities for education. The story of the region's history, economy, and ecological heritage can all be told through the region's waterways.

Education and Stewardship

Waterways can serve as an opportunity to educate to the surrounding community and visitors about the environmental feature in their backyard. Educating people on the historical and ecological importance of regional waterways can encourage environmental awareness, create a sense of community pride, and facilitate public outreach efforts (Bergerson, 2007). Extending these educational opportunities to groups of people that use the waterways most often may result in the biggest environmental benefits. A 2003 report by Outdoor Recreation in America

found that 57% of kayakers and canoers were involved with environmental stewardship and volunteer activities (RoperASW, 2003).

As an example of this in northeastern Illinois, the *Water Trail Plan* helped established a Water Trails Keeper Program (Barghusen, 2008). This program coordinates volunteers as "reach stewards," responsible for reporting the conditions of the waterways. The Water Trails Keeper Program also has a pilot "maintenance core" of volunteers who work with the local forest preserve districts to clear downed trees or do other maintenance work to keep the waterways safe and usable (Barghusen, 2008).

Futhermore, recreational boaters of all types are often invested in preserving their favorite waterbodies and waterways from change. This can be parlayed into open space preservation, habitat protection, and water quality efforts.

IV. Conclusions

Waterways are often forgotten when evaluating the commercials and socio-economic resources of the regional area. While their use is often dictated by the geography, ownership and needs of the adjacent communities, their impact to the region is profound economically, socially, environmentally

Appendix

Table A-1: Lake Michigan Beach Access			
Municipality	**Beaches**		**Access**
Evanston	Lighthouse Clark Street Dog Beach*	Dempster/Greenwood St. Lee Street South Boulevard	Semi-seasonal and daily passes†
Beach Park	Illinois State Beach		Free
Chicago	12th Street 31st Street 57th Street 63rd Street Albion Calumet Columbia Fargo Foster Hartigan/Pratt Blvd. Howard Street Jarvis Ave. Juneway Terrace	George A. Lane Leone Loyola Montrose North Ave. North Shore Oak Street Ohio Street Kathy Osterman Rainbow Rogers Ave. South Shore	Free
Glencoe	Glencoe Pearlman**		Seasonal and daily passes†
Highland Park	Rosewood Central Millard Moraine		Seasonal and daily passes†
Lake Forest	Forest Park		Parking fees only†
Lake Bluff	Sunrise		Free for residents only
North Chicago	Foss Park		Free
Waukegan	Waukegan Municipal		Free for residents only
Wilmette	Gillson Langdon		Seasonal and daily passes†
Winnetka	Elder Lane Maple Street Centennial	Tower Road Lloyd**	Seasonal and daily passes†
Winthrop Harbor	Illinois State Beach		Free
Zion	Illinois State Beach		Free

* Exclusively Dog Beach ** Exclusive Boating Beach † Separate resident/non-resident fees

Sources: Websites of the City of Evanston, Illinois Department of Natural Resources, Chicago Park District, Glencoe Park District, Park District of Highland Park, City of Lake Forest, Lake Bluff Park District, Foss Park District, Waukegan Park District, Wilmette Park District, and Winnetka Park District.

Chicago Lakefront Harbor Framework Plan (Chicago Park District, 2007)

The Chicago Park District's *Chicago Lakefront Harbor Framework Plan* proposes adding approximately 370 boat slips at Jackson Park's Inner and Outer harbors as well as 900 feet of new breakwaters and amenity improvements. No slips are planned to be added to the 59th Street and Diversey Harbors, but the framework plan recommends minor amenity and infrastructure improvements. Plans for Belmont, Burnham, and Montrose Harbors include schedules to replace their Star Docks with conventional boat slips and add transient slips in addition to other improvements.

In addition to adding slips to existing harbors, the *Chicago Lakefront Harbor Framework Plan* also calls for four new harbors. At the former USX steel site, the proposed 87th street harbor would add over 1,000 new slips and accommodate boats in the 30 to 60-foot range. In tandem

with Chicago's 2016 Olympic bid, the Chicago Park District proposes a new 830 slip harbor at 31st street. As with the 87th street harbor, the 31st street harbor would support boats in the 30 to 60 foot range. Another new harbor, Gateway Harbor, is planned to be located just south of Navy Pier. The 430 slips to be added to this harbor are intended to support a large range of vessels (30 to 100+ feet) exclusively for transient users. The over 500 slips at the proposed DuSable East Harbor would accommodate boats in the 30 to 60 foot range. The harbor is planned for a location east of the existing DuSable Harbor and south of the Chicago Locks. At each of these proposed harbors significant infrastructure improvements, such as new breakwaters, docks, parking, fuel stations, and other harbor amenities and infrastructure are included in the Chicago Park District's plans.

Table A-2: Proposed Capacity Additions to Chicago Park District Harbor System

Harbor Name	Slips Planned to be Added
87th Street Harbor	1,016
Jackson Park Inner and Outer Harbors*	370
31st Street Harbor	830
Gateway Harbor	430
DuSable East Harbor	516
Total:	3,162

** Denotes existing harbor.*

Although no direct recommendations are made regarding DuSable and Monroe Harbors in the *Chicago Lakefront Harbor Framework Plan*, the Chicago Park District recognizes that a successful 2016 Olympic bid will ultimately mean a reconfiguration of the harbor. This and other proposals for a larger Monroe Harbor have been made throughout the city's history. The proposals are descendant from Daniel Burnham's original vision for the lakefront in the Chicago Plan of 1909.

Evaluation of Public Safety at Run-of-River Dams (IDNR, 2007) – Mitigation Options

A 2007 report by the Illinois Department of Natural Resources Office of Water Resources, *Evaluation of Public Safety at Run-of-River Dams*, investigated 15 dams in northeastern Illinois for potential remediation or removal (IDNR, 2007).

Table A-3: Preliminary Assessment of Potential Remediation Techniques for Selected Dams in Northeastern Illinois

Dam Name	River	Temporary Fill	Full Bypass	Riffle Pool	In-Steam Bypass	Stepped Face	Dam Removal
Wilmington	Kankakee	✓		✓		✓	
Millrace	Kankakee	E		✓			
McHenry	Fox					✓	
Algonquin	Fox	✓				✓	
Carpentersville	Fox	✓	✓	✓			✓
Kimball Street	Fox	✓			✓	✓	✓
South Elgin	Fox	✓	✓	✓	✓		✓
St. Charles	Fox	✓				✓	✓
Geneva	Fox	✓			✓	✓	✓
Batavia	Fox	✓					✓
North Aurora	Fox	✓			✓	✓	✓
Aurora East	Fox	✓				✓	✓

Table A-3: Preliminary Assessment of Potential Remediation Techniques for Selected Dams in Northeastern Illinois							
Dam Name	**River**	**Temporary Fill**	**Full Bypass**	**Riffle Pool**	**In-Steam Bypass**	**Stepped Face**	**Dam Removal**
Montgomery	Fox	✓		✓		E	✓
Yorkville	Fox					E	
Hofmann	Des Plaines	✓			✓	✓	✓

✓ - Structural modification feasible considered
E - Existing modification
Source: Illinois Department of Natural Resources Office of Water Resources' Evaluation of Public Safety at Run-of-River Dams - July 2007

The evaluation established guidelines for sign posting along the various rivers including installing buoys upstream of dams notifying users to portage around the dam. The public awareness campaign was recommended to convey the dangers of run-of-river dams not only to potential users, but also adjacent landowners, rescue personnel, and other relevant parties.

Several types of structural options were discussed in the safety report. The first option, temporary rock fill is placed against the downstream side of the dam. The purpose of the temporary rock fill is to alleviate turbulent waters immediately downstream of the dam. As the name indicates, temporary rock-fill needs to be replaced occasionally as fill is eroded and carried downstream. It is the only temporary solution proposed.

Permanent solutions include full bypass channels, riffle pool rock ramps, in-stream bypass channels, stepped dam faces, and dam removal. A full bypass channel diverts a small portion of river water around the dam. Such channels can be engineered to allow small boats (e.g. canoes and kayaks) to circumvent run-of-river dams without the need for portage. Bypass channels typically include riffle pool rock ramps, which are also classified as their own structural solution. Riffle pool rock ramps are a descending series of boulders that are placed along the width of the river. The decent in boulders is used to adjust the water level at the top of the dam gradually to the water level downstream of the dam. In-stream bypass channels share the same general approach as full bypass channels, but are created by removing a portion of the dam instead of circumventing the dam. The stepped dam, as the name implies, provides a series of steps downstream of the dam to help alleviate turbulent waters. Although regarded as the best option from a safety standpoint, run-of-river dam removal has several consequences that require investigating – potential erosion, damaged wildlife habitat, sediment transport, flooding, and others to name some.

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