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Infamous Past, Invisible Present: Searching for Bubbly Creek in the Twenty-first Century

Carl A. Zimring and Michael A. Bryson

Abstract

The South Fork of the South Branch of the Chicago River, commonly known as Bubbly Creek, is an excellent case study in the intended and unintended industrial transformation of urban waterways. From the opening of the Union Stock Yard in the 1860s to its closure one century later, Bubbly Creek served as a sink for industrial wastes. In the post-slaughterhouse era of the region, Bubbly Creek continues to serve as a sink, now for combined sewer overflow wastes. As Bubbly Creek bears the burdens of human manipulation, it also serves as habitat for several species of plants and animals. This article investigates the complex history of the waterway, how it is viewed (and ignored) today, and what its invisibility in the urban landscape may mean to future ecosystem restoration efforts.

At what point do we classify a river as natural or industrial? Rivers are natural waterways, carving wild channels into the earth and providing needed habitat for fish, flora, birds, and mammals. Human settlements have clustered around rivers for thousands of years, becoming part of the complex biotic communities that rely upon the waters. Rivers such as the Indus, the Nile, and the Ganges provided transportation and arable land to the peoples who settled on their banks, and these rivers are regarded as the cradles of civilization. Human societies throughout history have depended upon rivers.

Human societies have also manipulated rivers. Agricultural societies transformed landscapes as farmers cultivated land and water to their needs. The Industrial Revolution, however, had much greater effects on rivers, putting into question how much affected waterways resembled their pre-industrial, “natural” states. A common consequence of industrial activity is the degradation of rivers, streams, lakes, and other bodies of water. Within environmental history, some attention has been paid to oceans and harbors, with Sarah Elkind’s work on harbors in California and Massachusetts perhaps the most notable American example.¹ Most historians in this field have focused on how industrial activity has transformed rivers, especially those flowing through large cities in the United States and Europe.² Historians of the American West, including Donald Worster, Richard White, and Marc Reisner, have discussed how humans radically reshaped and harnessed the region’s rivers, with significant consequences for the people, animals, and plants living by and in the rivers.³ For Richard White, these altered rivers are “organic machines” serving industrial activity as they remain rivers. White argues that we should see these rivers as collaborations between humans and nature, in which humans may reshape a river to their own ends while the river “maintains its natural, its ‘unmade’ qualities.”⁴

White’s example was the Columbia River, dammed by humans who harnessed the energy to power the Northwest. More recently, Sara B. Pritchard expanded on White’s framework to describe rivers as envirotechnical systems shaped by time, place, culture, ecology, and technology.⁵ This envirotechnical model is instructive because the energy of rivers has powered agriculture and industry in civilizations across the world, while also serving as vital conduits for trade. But humans have exploited rivers for more than their energy or hydrological benefits to human, animal, and plant life; the water has additionally served to hide unwanted matter. Human dumping of wastes in the land, air, and

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water represented the search for a suitable sink for the wastes of industry and urbanization as cities grew rapidly in the nineteenth and twentieth centuries. The idea behind dumping wastes in water—whether oceans, lakes, or rivers—was that flowing water would dilute any pollution, thus cleaning the environment. Under this principle, people dumped heavy metals, bleaches, organic wastes, and petroleum into rivers throughout the industrialized world, leading to infamous pollution problems such as the fires on Ohio's Cuyahoga River due to petroleum refining activities in Cleveland in the twentieth century.⁶

Perhaps no body of water in the United States has a more infamous history than the Bubbly Creek branch of the Chicago River. This little tributary, less colorfully known as the South Fork of the South Branch of the Chicago River, seemed innocuous when Chicago was incorporated in 1833. It was the shortest of the river's southern tributaries, including the South Branch as well as the West Fork which led toward Mud Lake, an extensive marshy area southwest of present-day downtown Chicago. In wet years, travelers could find sufficient water to allow passage by canoe (albeit with difficulty) directly from the West Fork to the Des Plaines River via Mud Lake, and thence southward to the Illinois and Mississippi Rivers. In drier years, a challenging portage between the rivers awaited the explorer. It was the presence of Mud Lake that convinced the French explorer

Louis Joliet in 1673 of the economic opportunity awaiting those who made the portage viable by constructing a canal linking the two river systems.⁷

Reshaping a waterway

Time, capital, technology, the existing environment, and the widespread perception that the environment existed to serve human needs reshaped the waterway as Chicago industrialized and then deindustrialized. Today, Bubbly Creek is a heavily industrialized one-and-one-quarter mile stretch of water in Bridgeport, a neighborhood in the near southwest side of Chicago, and would be barely recognizable to Joliet were he suddenly transported to early twenty-first century Chicago. The creek begins just north of West Pershing Road (above the former home of the Union Stock Yard) and empties into the Chicago River's South Branch near a major transportation corridor that includes the CTA's Orange Line elevated train, Interstate 55 (aka the Stevenson Expressway), and the river itself.

The rapid industrialization of the new metropolis transformed the waterways of the region as much as it did the city's landscape. By the time of the 1888 map (figure 1), the land and water had already been transformed to serve industry. The Chicago River became a valuable resource to the growing city's businesses, pro-

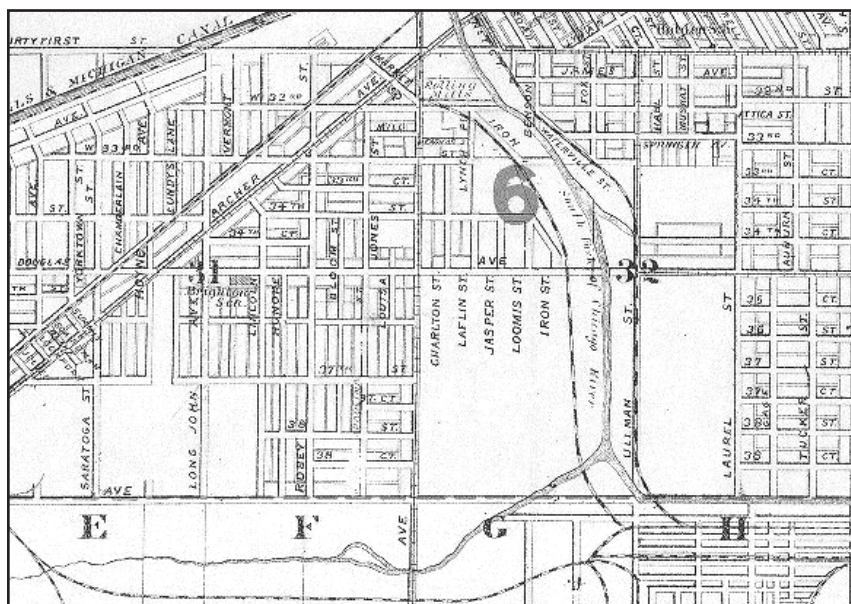


Figure 1. Map of the South Fork of the South Branch of the Chicago River as it looked in 1888. Bubbly Creek (the South Fork) is a 1.2-mile stretch beginning just north of I-55 and ending just north of W. Pershing Road (above the former home of the Union Stock Yard). Courtesy of University of Chicago libraries.

viding passage to the Great Lakes. Although the small South Branch was ill-suited to navigation, it had utility. Starting in the 1860s, the slaughterhouses, processing plants, and Union Stock Yard on Chicago's South Side dumped their wastes into Bubbly Creek. Decay from the accumulated organic matter released large bubbles of gas that constantly rose to the surface, earning the creek its new name. The fork had a weak current, so instead of diluting the waste in running water, the creek merely absorbed it. The problem was made worse after engineers reversed the flow of the Chicago River in 1900 with the opening of the Sanitary and Ship Canal, creating a massive infrastructure project designed to improve navigation and protect Chicago's drinking water supply by sending the city's wastewater downstream away from Lake Michigan and into the Mississippi River watershed. A collateral effect of this action was that it rendered Bubbly Creek stagnant: not only had engineers reversed the flow of the larger river, but their work completed the utter transformation of this little tributary into a static sink for wastes.⁸

These wastes were the consequences of meatpacking, an industry that centralized in Chicago in the late nineteenth century as massive slaughterhouses supplanted earlier centers in Cincinnati and regional markets. Chicago's industrial growth and the waste it generated were both unprecedented in size and scale (figure 2). The national concentration of meatpacking in Chi-

cago delivered livestock from across the Midwest to the city, where mechanized slaughterhouses rapidly disassembled the animals into commodified meat. An argument could be made that industrialized meat production reduced waste. The boast that "every part of the pig but the squeal" was used in sausages, bologna, and inedible byproducts such as brushes, buttons, and glue was a testament to the efficiency of the process. With decentralized butchering across the country replaced by one central site, unpleasant environmental effects of the national industry were out of sight and out of mind to most Americans, even as their meat became more abundant and more affordable. Chicago's meatpacking industry was a triumph of industrial capitalism.⁹

It was also disastrous for the local environment. Upton Sinclair immortalized the sink as "Chicago's great open sewer" in *The Jungle*, his 1906 depiction of the Stock Yard. A 1913 survey of Chicago's water found that "The presence of large sludge deposits and scum in the arms of the Chicago River, known as the Stock Yards Slip or Bubbly Creek, is responsible for a condition of nuisance and degree of odor which might not occur to such degree could the suspended matter be kept moving and even partially oxygenated."¹⁰

Between 1860 and 1970, the wastes from billions of slaughtered cattle, pigs, and chickens filled Bubbly Creek. Eventually, the wastes constrained and reshaped



Figure 2. Union Stock Yard, just south of the southern terminus of Bubbly Creek, July 1941. Thousands of cattle, hogs, and chickens were killed each day in the late nineteenth and early twentieth centuries. Wastes from the slaughterhouses were dumped in Bubbly Creek until 1971. Photograph by John Vachon, FSA-OWI Collection LC-USF34-063074-D, Prints & Photographs Division, Library of Congress.

the southern terminus of the creek. The water itself had been transformed. It was neither fit for drinking, nor navigable. The density of organic wastes was such that in 1911, the *Chicago Daily News* published photographs of first a chicken and then a man standing on the surface of the ostensibly liquid creek (figures 3 and 4). Reform-

ers' cries in 1893 held that if Christ came to Chicago for the Columbia Exposition in 1893, he would despair at what humans had done to each other in Chicago; that man and fowl alike could walk on Chicago's water in 1911 would no doubt provide the savior with little comfort about conditions two decades later.¹¹



Figure 3. Chicken standing atop wastes on the surface of Bubbly Creek, April 1911. Photograph by *Chicago Daily News*, Chicago History Museum.



Figure 4. Man standing atop wastes on the surface of Bubbly Creek, April, 1911. Photograph by *Chicago Daily News*, Chicago History Museum.

Indeed, reformers found Bubbly Creek a noxious and vexing problem. Residents of the area, largely immigrants working for the meatpackers, complained about the foul air and water. Residents coordinated with the University of Chicago Settlement House's founder, Mary McDowell, to protest the creek's state to Chicago's commissioner of health, only to find the city unresponsive to remediating the water. In the eyes of Chicago's government, Bubbly Creek's value lay entirely in its ability to serve industry. If continuing Bubbly Creek's status as a sink for slaughterhouse wastes produced sensory nuisances for residents and disrupted the ecosystem, protests were insufficient to move government to spend resources on changing that relationship, much less upsetting the industrial order that had defined human manipulation of the waterway for more than half a century.¹²

Although the city was loathe to regulate the activities shaping Bubbly Creek, change did come to the water in the twentieth century. Over time, the American meatpacking industry decentralized from its operations in Chicago due to changing logistics shaped by technological manipulation of the land for transportation. Railroads lost their central importance to distributing meat, lessening the advantage of one center of industry over a multi-nodal industry joined by highways and trucks. By midcentury, facilities in Kansas, Nebraska, and Colorado grew more important for the industry, and the Union Stock Yard shrank, eventually shuttering in 1971. Market forces and industrial reorganization, not municipal regulation, ended the discharge of waste from millions of animals in Bubbly Creek.¹³

Although the economic impetus to dump wastes declined, deindustrialization did not clean Bubbly Creek. Wastes already deposited remained in the stagnant water, now joined by human wastes, as the sanitary district built a pumping station at the creek's southern terminus. Bubbly Creek's location on the southwest side of Chicago meant it was also a useful sink for the overflow of sewage during storms. Because users of the Chicago River long ago became accustomed to using Bubbly Creek as a sink, that path continues to inform the creek's function even though the slaughterhouses have closed.¹⁴

Exploring Bubbly Creek

The enduring need for a sink for wastes is the constant in the dynamic cultural, economic, and technological

history of the South Fork of the South Branch of the Chicago River. Today, Bubbly Creek stands as a testament to the human transformation of waterways. This one-and-one-quarter-mile industrialized tributary is the product of 150 years of human reinvention. In the early twenty-first century, "Chicago's great open sewer" is well hidden within the city's concrete landscape, invisible even to longtime residents of the southwest side. Public access to its banks is minimal; no beaches or public landings adjoin its channeled walls lined by concrete, corrugated metal, or castoff concrete riprap. Though it sits surrounded by residential neighborhoods, few citizens use this body of water for leisure or transportation, with the exception of a bit of fishing at the small public park constructed in 2002 at the mouth of the creek.

Every day, thousands of people pass directly over Bubbly Creek in automobiles on Interstate 55 and trains on the Chicago Transit Authority's Orange Line. Few look down to glimpse the historic body of water beneath them, and even if they did, they would have a hard time seeing much. Part of the transformation of the Chicago River is that this sink is largely invisible, out of sight and out of mind. In an added irony, the landscape houses the ghost of another nineteenth-century technological manipulation of the region's waterways. Interstate 55 was built in the 1960s over the former channel of the Illinois & Michigan (I&M) Canal, the origin of which was at the present confluence of Bubbly Creek and the South Branch. Thus, by driving on the expressway, one is traveling over the ghost of the obliterated canal, even as one's view of Bubbly Creek is completely obscured—a classic example of history being made invisible and unmarked (figure 5).¹⁵

Few residents of the Chicago area knowingly visit Bubbly Creek today, but there are exceptions. In May 2009, faculty members at Roosevelt University (the authors and their colleague D. Bradford Hunt) arranged with the local conservation organization, Friends of the Chicago River, to take students canoeing on Bubbly Creek as the culminating field experience in an undergraduate seminar in urban sustainability. Friends of the Chicago River was established in 1979 to improve the health of the river for people and wildlife, and its activities have included using the historically industrialized river for recreation to bring attention to the waterway's plight and potential. Although Friends of the Chicago River had developed canoe trips and other outings to improve Chicago residents' relationship with the river over the previous thirty years, Bubbly Creek was not

a popular destination. This canoe trip—the first in a decade—would mark the start of several subsequent Roosevelt-Friends of the Chicago River canoe journeys on Bubbly Creek over the next few years as a few dozen Chicago-area residents have discovered more about the past and present of this infamous, yet obscure, part of the local environment.

One reason for this obscurity is a lack of public landing, beaches, or walking paths along Bubbly Creek. The Friends' canoe guides secured a private landing



Figure 5. View of Bubbly Creek and I-55 from the CTA Orange Line Ashland Station. The waterway is almost invisible from the vantage point of the neighboring buildings and roads. Photograph by Carl Zimring, May 2, 2009.

space a few weeks before the scheduled trip and a group of approximately twenty students and faculty entered Bubbly Creek at its northern point where it joins the South Branch of the Chicago River at the “South Turning Basin,” a wide-open area that was dredged and expanded decades earlier to allow cargo vessels to turn around, if necessary. Despite Bubbly Creek’s infamous history, the location offers paddlers an excellent view of the city, with the skyline clearly visible to the northeast (figure 6).

Directly to the west of the landing is Canal Origins Park, a small city park briefly mentioned above that was designated as a Chicago landmark in 1996 and formally opened in 2002. Canal Origins provides the only public green space along the creek and commemorates the northeastern terminus of the I&M Canal. When completed in 1848, the canal provided the long-sought shipping connection between the Chicago River and the nearby Des Plaines River, thus linking the waters of the Great Lakes with the Mississippi River system. The I&M Canal functions were supplanted by the much larger Sanitary and Ship Canal, built along the same route during the 1890s. Canal Origins Park features walking paths, public art produced by Chicago high school students, interpretive displays explaining the area’s history and geographic transformations, impressive views of the downtown skyline, and two shoreline fishing access areas. Despite its location at the mouth of Bubbly Creek, the park’s displays make scant mention of the creek’s history and present sig-



Figure 6. A view from the south, with Chicago's downtown as backdrop. The building and adjacent smokestack, center, is the Fisk Generating Station, a notoriously dirty coal-burning power facility that was closed in 2012 after many years of grassroots pressure by local environmental justice organizations in the Pilsen and Little Village neighborhoods of Chicago's Near Southwest Side. Photograph by D. Bradford Hunt.



Figure 7. These banks are largely concrete or metal, constraining the creek from flowing into nearby neighborhoods. Photograph by D. Bradford Hunt.

nificance; and the park's grounds, while well-designed and landscaped with native prairie plants, take a tremendous beating from their location along a busy urban through-street. Canal Origins' relative obscurity among Chicago's many city parks means few people act as stewards against this stress. Only eleven years past its construction, graffiti mars the student artworks and heaps of trash litter the grounds and, especially, the shoreline. Roosevelt-sponsored class outings to visit Canal Origins since 2011 have included litter removal and recycling in a small but symbolic effort to clean up the park and respect its historical significance.¹⁶

Explorations of Bubbly Creek reveal that the historical uses of the site remain evident. Although the Union



Figure 8. Small stretches of the banks are vegetated. The organization Friends of the Chicago River hopes to restore the waterway's riparian zone. Photograph by D. Bradford Hunt.

Stock Yard closed decades ago, the industrial heritage of the waterway is clearly apparent. The banks of the creek are almost entirely created by human engineering. Concrete walls and metal grates shape the boundary between land and water (figure 7). A few areas show signs of life, with vegetation growing along the creek, but even these narrow riparian zones are marred by extensive erosion, non-native trees and shrubs, and assorted trash (figure 8). Few Chicagoans value or even notice this stretch of water, and to the extent residents do use the waterway, it is as a sink for their own wastes. One of the trees overhanging the creek was draped with deteriorating plastic bags (figure 9). Open pipes, some of which trickled run-off from the combined sewer system into the waterway



Figure 9. Disposed plastic bags accumulated on the "Trash Tree," one of the few overhanging trees. Bubbly Creek's reputation as a sewer for industry and residents invites disposal. Photograph by Laura Bryson.



Figure 10. Despite the waterway's function as a sink, the land's proximity to downtown Chicago invites gentrification. Here, new townhouses abut drains for overflow sewage. Photograph by D. Bradford Hunt.



Figure 11. Canoes pass under the CTA Orange Line Ashland Station. Photograph by D. Bradford Hunt.

(even on that dry day in May 2009), extend out from the creek's concrete banks along its length.

Despite the presence of an industrial waterway in the neighborhood, the land around Bubbly Creek has changed since the slaughterhouses closed. The area's proximity to downtown Chicago invites gentrification, and over the past two decades, spacious new townhouses have grown alongside the creek (figure 10). Residents can commute downtown in less than twenty minutes via the Chicago Transit Authority's Orange Line train, as the Ashland Station passes directly over Bubbly Creek (figure 11).

Perhaps the most striking area of Bubbly Creek is its southern terminus (upstream end). This area, again bounded by concrete and steel, still bubbles with the gases of decaying organic matter. It is fenced, much like most modern sanitary landfills and sewers, so that pedestrians above the creek are safe from falling into it (figure 12). About thirty yards north of the southern terminus, the Racine Avenue Pumping Station (operated by the Metropolitan Water Reclamation District of Greater Chicago—MWRD) moves a combination of sewage and surface run-off wastewater from the surrounding area to the near southwest suburb of Stickney, where the world's largest sewage treatment facility is located.¹⁷ In times of moderate to heavy rainfall, however, the treatment system's capacity to retain and treat all of the wastewater is overwhelmed, and



Figure 12. The southern terminus of Bubbly Creek, which still actively bubbles as decomposing organic matter releases methane. Photograph by Laura Bryson.

the pumping station releases untreated sewage directly into Bubbly Creek, where it sluggishly migrates downstream (north) to the South Branch of the Chicago River (figure 13).

Water quality today

Recent analysis of the water in Bubbly Creek reveals heavy-metal concentrations exceeding the Illinois Environmental Agency's "extreme elevated" concentration level and high levels of organic pollutants. These high levels have remained relatively unchanged throughout the years, indicating that the water has never done its intended job of diluting the wastes.¹⁸ Part of this is due to the near-absence of flow in the largely stagnant waters of Bubbly Creek, a result of both natural topography and human engineering. Even in times of pre-European settlement, the Chicago River and its tributaries (including Bubbly Creek) drained the low-lying marshlands of the region in a rather slow and lazy fashion. With the permanent reversal of the Chicago River in 1900, Lake Michigan water surged through the Main and South Branches of the river, producing a relatively steady water level and continuous southwesterly flow. This artificially maintained water level and flow actually works against the natural slow drainage of Bubbly Creek into the South Branch and further

accentuates the stagnant quality of the creek's waters, where wastes accumulate but cannot readily escape downstream.

This legacy of environmental transformation and degradation remains apparent to visitors observing with the naked eye. While humans and chickens can no longer walk on the polluted skin of the water, we can still see the water bubble with gases produced by decaying organic wastes along the entire length of the waterway. On our May 2009 trip and again on subsequent visits, Roosevelt students have performed chemical-based tests of Bubbly Creek's water's quality at the mouth. The most consistent and significant finding has been a level of fecal coliform colony units well beyond the safe limit for boating or swimming, testament to the numerous combined sewage outfalls along Bubbly Creek and elsewhere throughout the Chicago Area Waterway System (CAWS) (figure 14).



Figure 13. About thirty yards north of the southern terminus, the Racine Avenue Pumping Station (operated by the Metropolitan Water Reclamation District of Greater Chicago) pumps combined sewage wastewater from the South Side of Chicago to the MWRD's waste water treatment plant in suburban Stickney. Photograph by Laura Bryson.



Figure 14. Roosevelt students and faculty performed several tests of Bubbly Creek's water quality. The most significant finding was a level of fecal coliforms well beyond the safe limit for boating or swimming. Photograph by Carl Zimring.

Our explorations of Bubbly Creek coincide with new scrutiny of the ways in which industrial society has transformed the Chicago area's waterways. Bubbly Creek's appearance and composition represent the use of nature to maximize value from resources as commodities. It is the result of the centralization of the American meatpacking industry and the concentration of byproducts in one central sink.

It is also a prime exhibit for Aldo Leopold's indictment of industrial capitalism's degradation of nature by attempting to conquer the water rather than respecting it as part of the biotic community. By viewing the South Fork of the South Branch of the Chicago River as conduit and sink for wastes rather than habitat, local meatpacking operations wrested it from its ecological functions, making the waterway nearly unrecognizable from its preindustrial state.¹⁹

Humans exerted agency to transform Bubbly Creek. We erected concrete and metal barriers to the shore. We dumped massive amounts of post-industrial waste that reshaped the creek, stilled the already-weak current, and befouled the water. We continue to dump untreated sewage in the creek, transforming the ecosystem.

Never, however, did humans render the waterway the sole dominion of one species. Despite the violence inflicted upon the site by humans treating it as a sink, other species have continued to populate and use the shore and water. Several species of birds and fish continue to make Bubbly Creek their home. A century after the *Chicago Daily News* documented man and fowl standing atop Bubbly Creek, this little, mostly invisible tributary aptly represents how Chicago has made use of its waterways. But Bubbly Creek is also part of the complex CAWS network of rivers and canals. Stretches of it are heavily industrialized; other parts have experienced significant increases in recreational use (notably, fishing and boating) in recent years. Since the early 2000s, the Friends of the Chicago River had been advocating upgrading the use designations of many sections of the CAWS to reflect the changing ways people were interacting with the river—as a living system that can be embraced and enjoyed, rather than simply a waste sink to be avoided.

New possibilities for the waterway

A cultural change in the perception of urban environments is producing new ideas about the stewardship

of the Chicago River and may have significant effects on the uses of Bubbly Creek in the future. At long last, policymakers on the federal and local level are changing their view of the waterways from conduit and sink to functioning part of the local ecosystem. After many years during which river advocates wrangled with a slow-moving Illinois Pollution Control Board on this issue, in early 2010 the city and the federal government engaged in a widely publicized debate on how the Chicago River should be managed. The U.S. Environmental Protection Agency stated in a letter to the Illinois Pollution Control Board that the river eventually should be made clean enough for swimming, a goal it claims is mandated ultimately by the Clean Water Act.²⁰ The letter highlighted the fact that any determination of acceptable water quality levels in the river system was contingent upon its designated uses, whether industrial, recreational, or other. Mayor Richard M. Daley and other municipal officials initially ridiculed the idea as costly, misguided, and unnecessary, though Daley's own view would soon change.

Perhaps the most striking rejoinder to the EPA's position came from MWRD Commissioner and Board President, Terrence O'Brien, who opined that a swimmable Chicago River flew in the face of the waterway's longtime functions and contradicted decades of hard work to transform the river to serve commerce and industry. From Commissioner O'Brien's point of view, the state of the Chicago River in 2010 represented a success story. "We're getting hit right in the face for doing our job," said O'Brien, who argued that the district is largely responsible for Chicago growing from a small fur-trading post to a thriving metropolis. "Why don't we finish what we've already started?"²¹ Notably, O'Brien was not describing Bubbly Creek specifically, but rather how the greater Chicago River system had allowed the city's industrial and commercial interests to thrive, defining the system not as an ecosystem but as a technological entity that had been exploited and could continue to be exploited for human gain.

In response to the federal mandate from the EPA for Illinois to upgrade its acceptable pollution standards for parts of the Chicago River system, the Illinois Pollution Control Board responded by designating stretches of the Chicago River, the North Shore Channel, and the Cal-Sag Channel as fit for "primary contact" by humans, such as boating and even swimming, which in turn requires higher water standards.²² Then in a surprising and historic shift in its position, the MWRD

voted to begin planning to implement the disinfection of wastewater before releasing it into the Chicago River, a reversal of its longstanding policy opposing disinfection.²³ This sea-change in the conception of the Chicago River system resulted directly from the aforementioned regulatory pressure *and* an influential change in leadership at the MWRD, which saw David St. Pierre, executive director since 2011, and Debra Shore, a strongly conservation-minded commissioner, advocate for a new direction for the MWRD. The District developed plans to test different sewage effluent disinfection techniques at two different wastewater treatment plants on the CAWS in areas where recreational use has been approved. Bubbly Creek, however, flows just downstream from these newly designated areas, and thus will not benefit from them in the near term.²⁴

Today, Bubbly Creek itself does not serve industry; meatpacking ceased almost half a century ago. The legacy of this urban sink, however, remains fixed in the landscape. Chicago's Great Open Sewer is stagnant and largely invisible, a remnant of Chicago's industrial heritage that is ignored in the city's present. Yet, despite Bubbly Creek's persistent problems with pollution and neglect, those who visit the waterway today encounter surprisingly abundant wildlife, including Canada geese, mallard ducks, all three local species of heron, kingfishers, sandhill cranes, cormorants, and even traces of beaver activity. On our periodic canoe trips since 2009, we have marveled at the scattered evidence of economic revitalization along the banks, such as a new condominium building in Bridgeport with a riverside view. We discuss the history of the creek with our guides from Friends of the Chicago River; contemplate what that history teaches us about the current efforts to conserve elements of urban nature, such as waterways and public parks; and muse about the options for its future restoration, given its continued function as a sink for urban waste. These visits make clear that despite Bubbly Creek's current exemption from recreational use designation by regulatory authorities, its day will come.

In the twenty-first century, Bubbly Creek has been the focus of a \$2.6 million ecological restoration feasibility study by the City of Chicago and the U.S. Army Corps of Engineers begun in the late 2000s and completed in 2015. The study assesses several options for dealing with the environmental degradation of the creek: doing nothing (officially known as "no action"); reme-

diating the polluted sediments by removing or capping them; restoring low flows to the channel in order to improve oxygenation and general water quality, and to flush out debris; bypassing the frequent overflows of untreated wastewater through an underground tunnel directly into the Sanitary and Ship Canal; and/or restoring a more natural and biodiverse stream bank ecosystem to provide water filtering functions, wildlife habitat, and aesthetic improvements.²⁵ The effectiveness of restoring water filtering, habitat, and the aesthetic beauty of the waterway is, of course, contingent upon eliminating the combined sewage overflows that continue to thwart the ecological recovery of Bubbly Creek. As of September 2015, reduction had not occurred and the entire Chicago River remained plagued by high levels of bacteria from human waste that exceed state limits for recreational waterways, reflecting (in the words of *Chicago Tribune* reporter Michael Hawthorne) "Chicago's long history of treating a slow-moving prairie river as little more than an industrialized repository for the city's waste."²⁶

If Bubbly Creek's status as a sink for wastes represents continuity in a long history of environmental degradation, reducing the number of combined sewage overflow incidents is a long-term goal of the MWRD and the U.S. Army Corps of Engineers. The Corps stated in its April 2015 report that improvements due to be completed in 2017 should "significantly reduce both the volume and frequency of [Racine Avenue Pump Station combined sewage overflow] events, making sustainable ecosystem restoration possible."²⁷

Beyond these technical considerations about Bubbly Creek's potential rejuvenation to a healthier state, this long-abused and nearly forgotten waterway is an ideal spot to consider tough questions about the state of the Chicago River and, more broadly, the sustainability of urban ecosystems. Why has it taken Chicago so long to address its infamous status as one of the only major US cities not to disinfect its treated sewage before releasing it into area waterways? What are the consequences of reversing, straightening, and dredging a waterway so it can serve as a shipping channel and waste receptacle? To what extent are the famous examples of Chicago manipulating its river system representative of urban water stewardship in the industrial world, and to what extent are they products of a specific time, culture, and place? What roles do—and should—rivers and streams play in the ecological and economic systems of the city and its suburbs? What does the

state of these waterways tell us about our attitudes toward water and its conservation? Finally, how might the process of redefining the vital industrial and civic functions of urban rivers work to restore the ecological integrity of those rivers for the benefit of diverse species and not just humans?

Bubbly Creek in the early twenty-first century is a site ripe for consideration of the complex interactions of industrial society and the environment over the past two centuries, and for pondering how to classify and manage waste in the future. Paying attention to the past and present of Chicago's great open sewer may improve the future of this and other industrialized waterways. Our hope is that this brief glimpse of Bubbly Creek will inspire renewed attention and action for the future of this storied urban river. While its water remains stagnant as of this writing, perhaps human manipulation intended to support Bubbly Creek's ecology rather than its economic utility will allow its "unmade qualities" to be more apparent to future observers. The irony that restoration of the creek's natural facets involves further human reshaping of the waterway reflects the enduring, complex relationships among the people, technology, and environment of Chicago's South Side.

Notes

1. Sarah S. Elkind, *Bay Cities and Water Politics: The Battle for Resources in Boston and Oakland* (Lawrence, KS: University Press of Kansas, 1998).
2. For comparative and European perspectives, see Christof Mauch and Thomas Zeller, eds., *Rivers in History: Perspectives on Waterways in Europe and North America* (Pittsburgh: University of Pittsburgh Press, 2008); Mark Cioc, *The Rhine: An Eco-Biography, 1815–2000* (Seattle: University of Washington Press, 2002); Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Cambridge, MA: Harvard University Press, 2011).
3. Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking Penguin, Inc., 1986); Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1996); Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1985).
4. White, 3 (see n. 3).
5. Pritchard, 20 (see n. 2).
6. Joel A. Tarr, *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective* (Akron, OH: University of Akron Press, 1996), 7–35; Ted Steinberg, *Down to Earth: Nature's Role in American History* (New York: Oxford University Press, 2002), 239; David Stradling and Richard Stradling, *When the River Burned: Carl Stokes and the Struggle to Save Cleveland* (Ithaca, NY: Cornell University Press, 2015).
7. Libby Hill, *The Chicago River: A Natural and Unnatural History* (Chicago: Lake Claremont Press, 2000), 13–14.
8. *Ibid.*, 8, 125–135.
9. One significant exception to the diminished environmental effects noticed by many Americans may have involved adulterated meat products. Concerns about the quality of food produced led to Congress passing the Meat Inspection and Pure Food and Drug Acts in 1906. William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W. W. Norton, 1991), 247–259.
10. Langdon Pearse, "The Sludge Problem," *American Journal of Public Health* 3 (June 1913): 547–551, quote on p. 548.
11. William T. Stead, *If Christ Came to Chicago!: A Plea for the Union of All Who Love in the Service of All Who Suffer* (London: The Review of Reviews, 1894).
12. Charles J. Bushnell, *The Social Problems at the Chicago Stock Yards* (Chicago: University of Chicago Press, 1902), 73; Thomas J. Jablonsky, *Pride in the Jungle: Community and Everyday Life in Back of the Yards Chicago* (Baltimore: Johns Hopkins University Press, 1993), 19–20; Sylvia Hood Washington, *Packing Them In: An Archaeology of Environmental Racism in Chicago, 1865–1954* (Lanham, MD: Lexington Books, 2005), 88.
13. Dominic A. Pacyga, *Slaughterhouse: Chicago's Union Stock Yard and the World It Made* (Chicago: University of Chicago Press, 2015), 170–172.
14. Hill, 102–104 (see n. 7); D. Motta, M. H. Garcia, and J. D. Abad, "A Modeling Approach for Organic Sediment Resuspension and Oxygen Demand in Bubbly Creek, Chicago, Illinois," in *Environmental Hydraulics*, eds. George Christodoulou and Anastasios I. Stamou (Boca Raton, FL: CRC Press, 2010), 289–296.
15. James Putnam, *The Illinois and Michigan Canal: A Study in Economic History* (Chicago: University of Chicago Press, 1918); Michael P. Conzen and Kay J. Carr, eds., *The Illinois and Michigan Canal National Heritage Corridor: A Guide to Its History and Sources* (DeKalb and Chicago, IL: Northern Illinois University Press, 1988); Michael P. Conzen, "The Making of an Industrial Corridor," in *The Industrial Revolution in the Upper Illinois Valley*, eds. Michael P. Conzen, Glenn M. Richard, and Carl A. Zimring (Chicago: Committee on Geographical Studies, The University of Chicago, 1993), 1–16.
16. Michael A. Bryson, "Canoeing Through History: Wild Encounters on Bubbly Creek," in *City Creatures: Animal Encounters in the Chicago Wilderness*, eds. Gavin Van Horn and Dave Aftandilian (Chicago: University of Chicago Press, 2015), 264–271.
17. See the MWRD's description of the Stickney Wastewater Treatment Plant at <https://www.mwrdd.org/irj/portal/anonymous/stickney>.
18. Xiuhong Zhao, Priscilla Viana, Ke Yin, Karl Rockne, Donald Hey, Jeffrey Schuh, and Richard Lanyon, "Combined Active Capping/Wetland Demonstration in the Chicago River" (paper D-019 presented at the Fourth International Conference on Remediation of Contaminated Sediments, Savannah, Georgia, January 2007).
19. Aldo Leopold, *A Sand County Almanac* (New York: Oxford University Press, 1949).
20. Linda Holst, Chief of Water Quality, United States EPA Region 5, to Illinois Pollution Control Board (15 April 2010), <http://www.ipcb.state.il.us/documents/dsweb/Get/Document-68448>.
21. Michael Hawthorne, "Water Officials: A Cleaner River Would Be More Dangerous," *Chicago Breaking News Center* (3 June 2010), http://articles.chicagobreakingnews.com/2010-06-03/news/28514045_1-richard-lanyon-water-quality-chicago-river.
22. Michael Hawthorne, "State Pollution Board Orders Chicago River Cleanup," *Chicago Breaking News*, 2 June 2011, http://articles.chicagobreakingnews.com/2011-06-02/news/29614721_1-sewage-overflows-chicago-river-waterways.

23. Michael Hawthorne, "No Tax Hike Needed To Clean Up Chicago River," *Chicago Tribune*, 2 March 2012, <http://www.chicagotribune.com/news/watchdog/ct-met-chicago-river-clean-up-20120302,0,1754632.story>.
24. For a short but useful review of the rather complicated recent history of Chicago's river policy, see Friends of the Chicago River, "Celebrating Disinfection: Steps to a Cleaner River," <http://www.chicagoriver.org/about-us/success-stories/celebrating-disinfection-steps-to-a-cleaner-river>. For comprehensive information and links to primary sources concerning these new regulations, see "Chicago Area Waterway System (CAWS)" on the United States EPA Region 5's website, <http://www.epa.gov/region5/chicago-river/index.html>.
25. U.S. Army Corps of Engineers, Chicago District, "Bubbly Creek," <http://www.lrc.usace.army.mil/Missions/CivilWorksProjects/BubblyCreek.aspx>; U.S. Army Corps of Engineers, Chicago District, "Final Independent External Peer Review Report: Bubbly Creek Ecosystem Restoration Feasibility Study," http://www.usace.army.mil/Portals/2/docs/civilworks/Project%20Planning/peer/bubblycreek_IEPR.pdf; U.S. Army Corps of Engineers, Chicago District, "Bubbly Creek Ecosystem Restoration Feasibility Study, April 2015 Draft Report," http://www.lrc.usace.army.mil/Portals/36/docs/projects/bubblycreek/Bubbly_Creek_NEPA%20public%20comment%20report_14%20Apr%202015.pdf.
26. Michael Hawthorne, "Chicago River Still Teems with Fecal Bacteria, Tests Show," *Chicago Tribune*, 28 August 2015, <http://www.chicagotribune.com/news/ct-chicago-river-bacteria-20150827-story.html>.
27. U.S. Army Corps of Engineers, Chicago District, "Bubbly Creek Ecosystem Restoration Feasibility Study, April 2015 Draft Report," http://www.lrc.usace.army.mil/Portals/36/docs/projects/bubblycreek/Bubbly_Creek_NEPA%20public%20comment%20report_14%20Apr%202015.pdf, i.