

*“In the next 30 years, 30 percent of the world’s population will be living in risky places along rivers. With climate change, extremes become more extreme and vulnerable populations become more vulnerable. Ninety percent of all natural disasters are water-related—floods, droughts, hurricanes—and 15 percent of our economy is eaten up with these disasters...what this means is that natural recovery is impossible.”*

—Henk Ovink, Special Envoy for International Water Affairs, The Netherlands

**Debra Shore, Commissioner  
Metropolitan Water Reclamation District**



**2019 ANNUAL REPORT**

2019 opened with three new members of the Board of Commissioners, a new executive director for MWRD, and a new Board president. Recognizing this propitious moment, a number of commissioners pushed to embark on a strategic planning initiative to be conducted jointly with senior staff. I was asked to co-chair this project, which will be unfolding in 2020. A few of our driving questions: How can the District be a leader in addressing climate change? How far shall we push for resource recovery? What is the highest and best use for the land the District owns? This will be big. Stay tuned.

# The Water Is High

Friends, it's wet and getting wetter. In 2019, Cook County recorded rainfall totaling 49.54 inches—more than a foot above the average annual rainfall for our region—just 1.32 inches shy of the all-time record. A single inch of rain distributed evenly across Cook County's 945 square miles equals more than 16 billion gallons of water. The 12+ inches of extra rain we received in 2019 add up to 207.7 billion gallons of excess water. That amount covering the expanse of Chicago means we'd be chest deep in water, and anyone under 4 feet tall would be submerged!



In addition, May broke a record for monthly rainfall volume with 8.25 inches. (The previous record, set in 2018, was 8.21 inches.)

According to Illinois precipitation records kept since 1871, four of the five wettest years in Cook County have occurred in the last decade.

Part of the reason it's been so wet is that it's also been so warm. 2019 was the second-warmest year on record, after 2016. For every single degree of warming, according to a recent article in the *Chicago Tribune*, the atmosphere absorbs four percent more water vapor. More vapor in the atmosphere means more rain falling—often in more intense, highly localized storms.

For instance, on October 2–3, between 11:00 p.m. and 1:30 a.m., 2.71 inches of rain fell in northern Cook County, following a week which saw 4.45 inches of rain. When the ground is already saturated from previous rains, it can't absorb more water. Much like frozen ground, drenched soil acts like an impervious surface, sloughing off water into streets and streams.

By 2:08 a.m., the water level in the North Shore Channel had risen so high—roughly 4.5 feet above the level in the lake—that engineers had to open the gates at the Wilmette Pumping Station to reverse stormwater overflow to the lake. Between 2:08 a.m. and 6:00 a.m., the MWRD released 54.5 million gallons of combined sewer overflow to Lake Michigan at the Wilmette Pump Station. (This location is more prone to reversals than the other controlling works at the Chicago River Main Stem or the Cal-Sag Channel because the North Shore Channel is narrow and shallow. It fills more quickly and thus is less capable of absorbing brief, intense storms.)

## Rising Lake Levels

The extra water in Cook County this year has been most apparent with rising levels in Lake Michigan. Can you even recall a mere seven years ago when Lake Michigan water levels matched the all-time low? When new sandbars emerged, becoming visible from the lakefront, recreational harbors faced huge dredging costs, and lake freighters had to lighten their loads to accommodate low lake levels?

Fast forward to January 2020 when the water level in Lake Michigan reached a new monthly high for the first time in more than 30 years. At 581.86 feet above sea level, Lake Michigan is currently 37 inches above its long-term average level and 17 inches above its level in January 2019. (Remarkably, this level is still nine inches below the all-time high set in October 1986.) Since 2018, Lake Michigan alone gained more than 6.6 trillion gallons of water.

Lake Michigan has risen more than five feet since 2013. Some of that is due to several particularly severe winters, when Lake Michigan had ice cover over more than 90 percent of its surface, reducing evaporation. (Remember the polar vortex of 2019, aka #chiberia2019, when temperatures fell below 0 degrees for 52 hours straight?)

The higher rainfall in 2019 and a somewhat warmer, wetter January 2020 have kept water levels dangerously high.

These high lake water levels, combined with several severe storms, have caused significant damage to lakefront beaches, paths, docks, marinas, and other structures, and even portions of Lake Shore Drive, in Illinois. On the eastern shores of Lake Michigan, severe beach erosion in Portage, Beverly Shores, Michiana Shores, and beyond has undermined dwellings, causing some homes to fall into the lake or come perilously close.

# The Water Is High



A particularly severe storm on January 10–11, 2020, battered the lakefront with heavy rain, snow, and ice. Wind gusts of more than 50 miles per hour created 23-foot-high waves ramming into the lakefront. Chicago Mayor Lori Lightfoot, along with state and federal officials, subsequently declared an emergency to secure funding from the Federal Emergency Management Agency for measures to bolster Lake Michigan’s shoreline and repair damage to lakefront trails, paths, and roads.

## Barge Traffic and Agriculture

Cook County was hardly alone in suffering from high rainfall and severe weather in 2019. The Mississippi River in Illinois was in flood stage for 127 days during 2019 (more than  $\frac{1}{3}$  of the year). High water and fast currents closed parts of the Mississippi River and Illinois River to barge traffic in late spring. In 2020, several locks will be closed July through October along the Illinois River for repairs to extend their lifespans (these locks had an original lifespan of 50 years but have been in service for 80 to 90 years).

More than 60 percent of Illinois soybeans are exported, mostly by barge. While the planned construction period was selected to avoid both the spring floods and harvest season, construction delays could require farmers to seek alternative, more expensive transportation methods for getting their crops to market.

According to the US Department of Agriculture, Illinois farmers planted and harvested less farmland in 2019—more than 1 million acres fewer than in 2018 (most of the lost acreage had previously been used for soybeans). In 2019, *corn production in Illinois fell 20 percent and soybean production fell more than 52 percent.*

That same year, due to extreme wet weather and uncertain federal trade policies, Illinois farmers planted their crops later, harvested less, accrued more debt, and participated in an unpredictable market where potential buyers were excluded during trade wars and negotiations.

Nearly 40 percent of Illinois farm income in 2019 resulted from federal trade and disaster assistance. Without continued federal assistance, farms in Illinois are projected to continue losing revenue in 2020. Illinois farmers have taken on their highest level of debt in three decades, largely due to increasing land costs.

## Preparing for Wet Weather to Come: More Like a Sponge, Less Like a Parking Lot

According to a study by the US Geological Survey, 7.5 percent of the land area in Cook County is covered by parking lots. That comes to 71 square miles of impervious surface (and doesn't include the additional surface area covered by roads, driveways, sidewalks, and buildings).

Here's a radical idea: let's rip up some of that concrete skin we've laid over the landscape. Not all of it, but some of it, where we can—driveways and patios and some overflow parking. A decade ago, the Illinois Sports Finance Authority converted one of the parking lots at Sox Park (now Guaranteed Rate Field) into a permeable surface, able to capture more than a million gallons of stormwater and keep it out of the sewers. It's working!

Homeowners can convert parts of their lawn to native plantings that don't require mowing or irrigation (once the plants become established) and that provide habitat for much-needed bees, butterflies, and beneficial insects. They can also install rain gardens and rain barrels and cisterns and swales.

Essentially, we need to do everything we can to capture water where it falls, keep it out of the sewers, and allow it to slowly infiltrate into the soil and recharge our underground water supply.

Here are some helpful guides and resources:

- ▶ [Center for Neighborhood Technology Green Values Calculator:](https://greenvalues.cnt.org/chicago/calculator.php)  
[greenvalues.cnt.org/chicago/calculator.php](https://greenvalues.cnt.org/chicago/calculator.php)
- ▶ [American Rivers: Green Infrastructure Information:](https://americanrivers.org/threats-solutions/clean-water/green-infrastructure)  
[americanrivers.org/threats-solutions/clean-water/green-infrastructure](https://americanrivers.org/threats-solutions/clean-water/green-infrastructure)
- ▶ [MWRD Green Infrastructure Program:](https://mwrdr.org/green-infrastructure-0)  
[mwrdr.org/green-infrastructure-0](https://mwrdr.org/green-infrastructure-0)

# Smart Sewers of South Bend

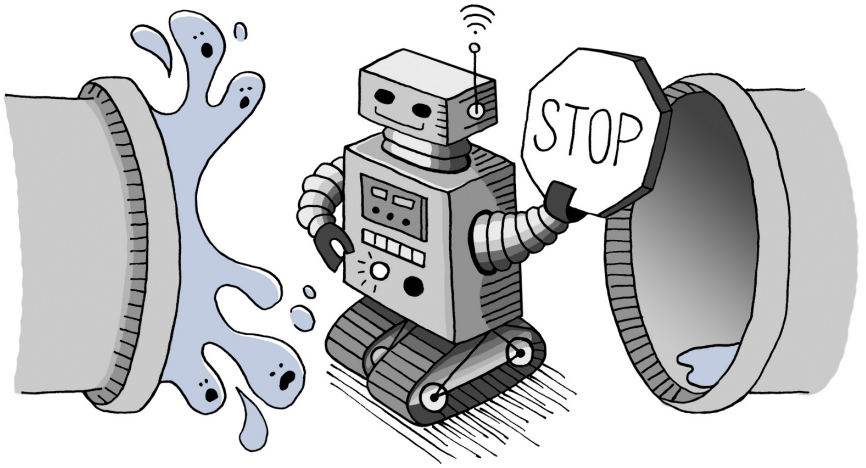
When I heard that the city of South Bend, Indiana, had saved \$500 million on the cost of reducing stormwater overflows, I wanted to learn more.

Some background: All older cities (including South Bend, Chicago, and 50 older suburbs in Cook County) have combined sewers. The pipe that runs down the middle of the street carrying waste from our homes—from our toilets, dishwashers, washing machines, and showers—also fills with rain from street drains, which carries salt, oil, pet poop, and other contaminants to mix with wastewater. When these pipes fill, as they often do in big storms, they're designed to overflow directly into a nearby river or stream. That's called a combined sewer overflow, and it's bad for water quality and water creatures because pollution is dumped into local waterways. As a result, the Environmental Protection Agency has been leaning on cities to devise plans to reduce or eliminate these combined sewer overflows.

Cook County's "long-term control plan" to reduce pollution and control flooding is the Tunnel and Reservoir Plan (TARP). Its 109 miles of massive tunnels below the Chicago waterways capture and store up to 2.3 billion gallons of sewer overflows. Three reservoirs (two and a half of which are completed) store up to 10.6 billion gallons of stormwater overflows. (This total capacity will increase by another 6.5 billion gallons when Stage II of the McCook Reservoir is completed in 2029.) Since the Thornton Reservoir went online in late 2015 and Stage I of the McCook Reservoir was put into operation in late 2017, Chicago and Cook County have reduced reversals to the lake and captured more than 83 billion gallons of stormwater, improving water quality in the river, protecting more than 1.5 million structures from flooding, and saving more than \$180 million annually in flood damages—at a total cost of more than \$3.814 billion.

South Bend, on the other hand, hadn't implemented a plan as of 2008 and was looking at a total bill of \$750 million to address its overflow problems. That's a tall order for a city of 100,000 residents.

In August, my staff and I took a field trip to South Bend to learn more about their "smart sewers" and how Mayor Pete Buttigieg's team saved so much money. We learned that, working with a data analytics company called EmNet, which grew out of research at Notre Dame, the city installed a network of about 120 sensors under strategically placed manhole covers that convey information about water level and flow in those sections of sewers via a cellular network every five minutes.



Then, by installing valves strategically located in the sewers and using real-time information sent by the sensors to a computer control center, operators (or the automated system) can open or close those valves, directing stormwater to areas of the sewer system that have the capacity to take it, and away from portions of the system that are full.

Like an underground stock market, the distributed decision support system, consisting of smart sensors and actuators, is able to trade available conveyance capacity in real time to avoid flooding.

And it's working! By optimizing the capacity of the existing sewer network with information from these sensors and manipulation of the valves, South Bend has reduced combined sewer overflows by 70 percent, saved about \$1.5 million a year in operating costs, and saved \$500 million in overall costs—without digging a Deep Tunnel or excavating huge reservoirs as Chicago and other cities have done.

What might this mean for Cook County, since MWRD has been committed to its massive TARP plan for many years? Could MWRD (which does not own local sewer systems) collaborate with individual suburbs to feed local systems into larger intercepting sewers in a more efficient manner, thus reducing flooding and basement backups? Could we test this approach in several areas that have become “choke points” in local sewer systems to see how it works? Could we use data analytics to optimize the capacity of local systems, thereby achieving savings both locally and at MWRD?

I'm going to be exploring these ideas in 2020. You can count on it.

# 130 Years of MWRD: 1889–2019

In 1889, contaminated drinking water threatened Chicago's residents with cholera and typhoid. A sluggish river full of garbage and sewage poured pollution and danger into the lake. What were Chicago's leaders to do? Why not something big and bold? Why not dig a canal to reverse the river and send Chicago's sewage downstream, away from the lake?

That's MWRD's founding story. The Sanitary District of Chicago was established on May 29, 1889, to protect Lake Michigan's water supply by conveying sewage away from the lake. According to the *Chicago Encyclopedia*, along with the creation of the Sanitary District, the Illinois legislature also earmarked \$31,163,032 in 1889 "to send Chicago's sewage southward." (In 2019 dollars, that is \$865,985,092.78.)

The *Encyclopedia* references a poem by Isham Randolph, the Sanitary District's first chief engineer:

"There was daring, there was genius  
There was brain there was brawn  
And from their gendered labor  
Twas a River that was born."

In 2019, 130 years after its founding, the Metropolitan Water Reclamation District had a budget of \$1.1 billion and 1,953 employees. It also:

- Treated an average of 1.5 billion gallons of sewage each day at seven wastewater treatment plants throughout Cook County, serving the equivalent of 10 million people;
- Owned 10,824 acres of land in four counties, 15 boats (including 3 debris collection boats), and 293 vehicles;
- Shared responsibility with the Army Corps of Engineers for 76 miles of man-made waterways including the Sanitary & Ship Canal, the North Shore Channel, and the Cal-Sag Channel;
- Reviewed and granted 665 permits of 10 different types, approved green infrastructure projects able to capture 45,399,239 gallons of stormwater, sold 981 rain barrels, and operated three laboratories;
- Generated renewable hydropower energy at the Lockport Powerhouse worth \$1,386,344 in energy sold to the grid in 2018;
- Managed five sidestream elevated pool aeration (SEPA) stations to help inject needed oxygen into the waterways;
- Monitored 44 sites for water quality and elevation data; and
- Owned and operated 94 rail cars and 36 miles of railroad.



# An Inspector General Comes to MWRD

For years, I have been seeking to establish an independent inspector general (IG) at the MWRD. IGs are officials specifically tasked with providing independent oversight of government agencies. Having an IG is widely considered a best practice in good government.

By spring of 2019, at the direction of the Board, MWRD staff had begun drafting an intergovernmental agreement to designate Cook County's Office of the Independent Inspector General (OIIG) as the oversight body for MWRD. (We felt this model of collaboration between governments would give MWRD a faster on-ramp and access to more resources for less money than a separate office devoted solely to MWRD.)

On April 18, 2019, the MWRD Board of Commissioners unanimously adopted an ordinance (O19-003, also known as the MWRD Inspector General Ordinance) to establish an Inspector General. The Cook County OIIG began operations at the District soon thereafter.

Since assuming oversight responsibilities at MWRD, the OIIG has:

- Held 70 information presentations with MWRD staff, reaching all employees, officers, and commissioners and informing them about the OIIG's mission and services;
- Offered legal and policy review of MWRD's Ethics Ordinance, and submitted detailed recommendations for amendments to the Ethics Ordinance to the Board of Commissioners;
- Received and reviewed a total of 58 complaints between May 17 and December 31, 2019;
- Opened a total of 32 case inquiries;
- Referred one matter to management or law enforcement; and
- Released three detailed summary reports and three quarterly reports.

We are still in the first year of IG oversight at MWRD, but the effect has already been positive and noticeable.

Even early skeptics of IG oversight at the District have come to think of the OIIG as a key resource for transparency and accountability, and to rely on OIIG's reputation for independence and neutrality.

- ▶ To examine the OIIG's 2019 MWRD quarterly reports, visit [cookcountyil.gov/service/metropolitan-water-reclamation-district-greater-chicago](http://cookcountyil.gov/service/metropolitan-water-reclamation-district-greater-chicago)

# Preparing for a Flu Pandemic

For years before the COVID-19 pandemic, I had been pushing MWRD to include a flu pandemic preparedness plan in its larger disaster preparedness efforts.

According to epidemiologists, the risk of a pandemic was not merely hypothetical. As the World Health Organization (WHO) noted back in 1999, "It is a statistical certainty: not a matter of 'if', but of 'when' and 'how serious.'"



▶ [Read more about WHO's assessment of pandemic risk:](https://emro.who.int/pandemic-epidemic-diseases/news/the-next-flu-pandemic-a-matter-of-when-not-if.html)  
[emro.who.int/pandemic-epidemic-diseases/news/the-next-flu-pandemic-a-matter-of-when-not-if.html](https://emro.who.int/pandemic-epidemic-diseases/news/the-next-flu-pandemic-a-matter-of-when-not-if.html)

Experts said that in the event of a flu pandemic, unlike other disasters for which the District must be prepared, utilities such as MWRD could expect significant absenteeism among employees—not only those who might become infected, but others who might choose to stay at home with their families. The District needs to be prepared to keep vital employees at plant sites in quarantine. Are we ready? We are finding out.

In April 2018, at my urging, MWRD modified its emergency preparedness plans to address pandemic preparedness. These modifications were based largely on guidance provided by the pandemic preparedness checklist published by the Centers for Disease Control and Prevention.

▶ [See the CDC's State And Local Pandemic Influenza Planning Checklist:](https://cdc.gov/flu/pandemic-resources/pdf/state-local-checklist.pdf)  
[cdc.gov/flu/pandemic-resources/pdf/state-local-checklist.pdf](https://cdc.gov/flu/pandemic-resources/pdf/state-local-checklist.pdf)

Building on this initial work, MWRD staff conducted an emergency response exercise in April 2019 to help identify information or guidance that might be useful to add to emergency preparedness plans. The issues identified through the exercise resulted in updates to MWRD's preparedness plan and were used to address the COVID-19 pandemic.

▶ [Local communities can help their residents prepare for an influenza pandemic using the CDC's Community Mitigation Guidelines:](https://cdc.gov/mmwr/volumes/66/rr/rr6601a1.htm?s_cid=rr6601a1_w)  
[cdc.gov/mmwr/volumes/66/rr/rr6601a1.htm?s\\_cid=rr6601a1\\_w](https://cdc.gov/mmwr/volumes/66/rr/rr6601a1.htm?s_cid=rr6601a1_w)

# Drug Take-Back in Cook County

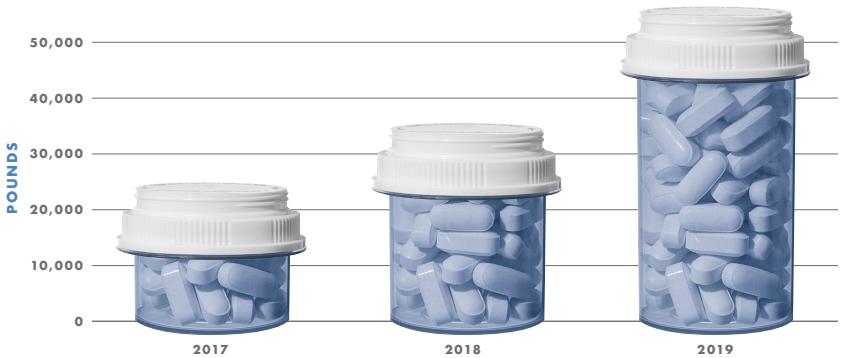
Three years after Cook County Commissioner Larry Suffredin and I shepherded a pharmaceutical collection ordinance to unanimous passage by the Cook County Board, the program is now a resounding success:

- The number of collection sites has risen from 85 (pre-ordinance, in 2016) to 200 (January 2020);
- 20–25 percent of pills collected by weight are opioids; and
- More than 40,000 pounds of drugs were collected in 2019.

Thank you, Sheriff Tom Dart, Pat Horne, and everyone on the Sheriff's Office team who are overseeing this important program!

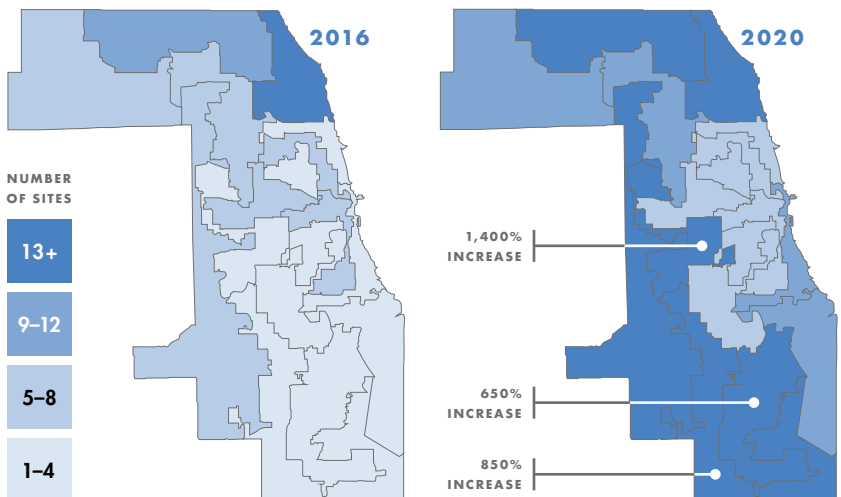
- ▶ For information about a mail-back program for people who don't drive or are confined to their homes, call 1-844-688-7379 or visit [cookcountysheriff.org/rx/home](https://cookcountysheriff.org/rx/home)

## WEIGHT OF DRUGS COLLECTED BY YEAR



## ERADICATION OF COLLECTION DESERTS

In 2016, more than half of Cook County's 17 districts were "collection deserts"—areas with fewer than five take-back sites. Since then, the number of take-back sites in each of those "desert districts" has increased by 200–1,400 percent.



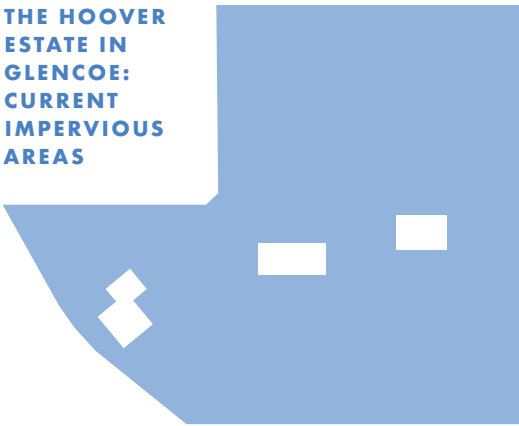
# When Open Land Disappears

In June, residents of north suburban Glencoe contacted my office in alarm. A developer had announced plans to build 29 single-family homes on a 12-acre site known as the Hoover estate which, at that time, had only three buildings (a 10,000-square-foot mansion, a coach house, and stables).

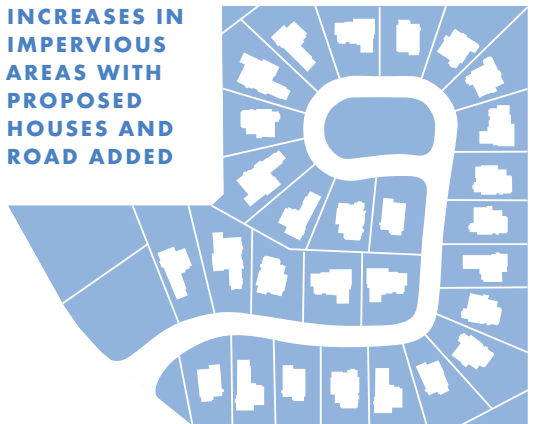
Nestled near Turnbull Woods Forest Preserve and the Glencoe Golf Club off Green Bay Road, these historic flatwoods—wooded areas with standing water much of the year—have numerous stormwater problems even without new homes creating more runoff.

Neighbors wanted to know if the MWRD's amendments to the Watershed Management Ordinance (WMO) would apply to the proposed development and would prevent flooding. Working with the Village Plan Commission and Village President, my staff and I attended meetings, prepared a framework for consideration, and encouraged Village officials to require stormwater control design to meet stricter rainfall data standards used in the new WMO. Known as Bulletin 70, these standards incorporate the recent effects of climate change on rainfall patterns in Cook County.

**THE HOOVER ESTATE IN GLENCOE: CURRENT IMPERVIOUS AREAS**



**INCREASES IN IMPERVIOUS AREAS WITH PROPOSED HOUSES AND ROAD ADDED**



# Wet Weather Playlists

For World Water Week (August 25–30), my staff and I compiled a modest playlist of rainy day songs on Spotify:

- "Don't Rain on My Parade,"  
Barbra Streisand
- "River of Happiness," Dolly Parton
- "Raindrops Keep Fallin' on My  
Head," B. J. Thomas
- "Singin' in the Rain," Gene Kelly
- "Rainbow," Kacey Musgraves
- "How Far I'll Go," Auli'i Cravalhi
- "Waterfalls," TLC
- "Dreams," Fleetwood Mac
- "(Sittin' On) the Dock of the Bay,"  
Otis Redding
- "Have You Ever Seen the Rain,"  
Creedence Clearwater Revival
- "Stormy Weather," Etta James



I shared the playlist with my email subscribers and encouraged them to submit their favorite wet weather songs, which we promptly added:

- "Tell Me Why (Just A) Garden in the Rain," Charlie Shaffer
- "The Gentle Rain," Astrud Gilberto, LuizBonfá, Matt Dubey
- "The Waters of March," Susannah McCorkle
- "Double Rainbow," Antônio Carlos Jobim
- "Soon It's Gonna Rain," Barbra Streisand
- "Cry Me a River," Joe Cocker
- "Waterloo Sunset," The Kinks
- "Moon River," Andy Williams
- "Burn On," Randy Newman
- "Water Music: Andante," Georgic Frederic Handel
- "Come Clean," Hilary Duff
- "Here Comes the Rain Again," Eurythmics
- "The Rain Song," Led Zeppelin
- "Fool in the Rain," Led Zeppelin
- "Texas Flood," Stevie Ray Vaughan
- "Let It Rain," Eric Clapton
- "Love Reign Over Me," David Holmes
- "Holy Water," Anjulie, Natalia Lafourcade, Phyno

▶ Listen at [bit.ly/worldwaterweekplaylist](https://bit.ly/worldwaterweekplaylist)

# State of the River

## A Transformative Task Force

At the end of January, Mayor Emanuel issued an executive order establishing a River Ecology and Governance Task Force to coordinate the work of agencies with oversight, regulatory, and planning authority over the Chicago waterways along with civic and nonprofit groups.

More broadly, the Task Force aims to transform Chicago's waterways system into a thriving and ecologically integrated natural asset, capable of accommodating the needs of people and wildlife through coordinated planning, investment, management, stewardship, and programming.

I was asked to serve as co-chair of the Science & Design working group, along with noted architect Phil Enquist. Other working groups focus on Stewardship and Volunteerism, Community Connections, and Trails.

Quickly, the Task Force worked with Amtrak to incorporate trees and shrubs atop a rebuilt half-mile section of seawall south of Roosevelt Rd., not only filtering stormwater but also providing habitat and improving views. Who needs another reason to get out on the river?

## Touring the Wild Mile

In May, Friends of the Chicago River, the Metropolitan Planning Council, Urban Rivers, the Ping Tom Park Planning Council, and REI led a kayak tour of the Chicago River from the new "Wild Mile" in Lincoln Park south to Ping Tom Park in Chinatown. The enthusiasm of my fellow kayakers was palpable as we paddled along this vital resource we're so fortunate to have in our city. And the weather was beautiful to boot.

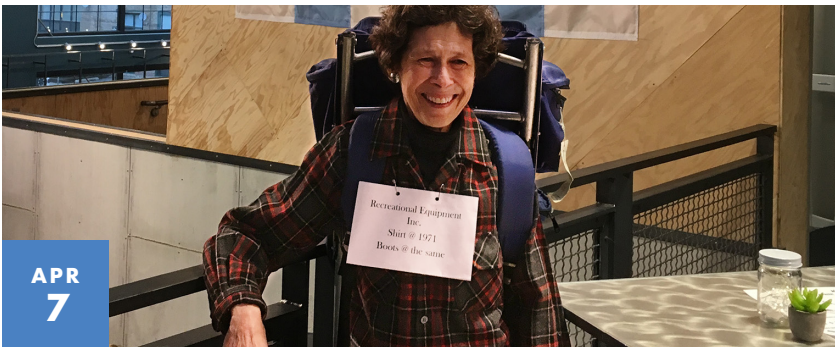


MAY  
29

## Other Notable Moments in 2019



At Current's World Water Day Symposium, Debra samples brew from Unreconciled Brewing Chicago—the first beer ever made from MWRD's treated wastewater. Environmental engineer Sharon Waller and her colleague Paul Strome collected the water for the brew near the outfall of the O'Brien Water Reclamation Plant on the North Shore Channel.



Debra sports her 1971 REI backpack, shirt, and boots at the grand opening of REI Lincoln Park. The new location overlooks the Chicago River and offers kayak and paddleboard rentals to encourage outdoor activity and community.



Debra flashes a cheerful thumbs-up as she nears her office during 2019 Bike to Work Week. A reminder that warm summer days are near!

Friends of Debra Shore

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## 2019 Annual Report

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