DEEP TROUBLE | THE WRONG-WAY RIVER

The permanent solution to species invasions would be costly and complex — but many believe less expensive than doing nothing.

A RIVER REMEDY

PAUL BEATY / FOR THE MILWAUKEE JOURNAL SENTINEL

Irwin Polls, a former employee of Chicago's Metropolitan Water Reclamation District, stands on a bridge over the North Shore Channel at the Wilmette Pumping Station. Polls worked on a study that details how the Chicago River and its canal system could be reversed to stop invasive species.

By DAN EGAN
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Sitting in his 27th-floor corner office in the Chicago Civic Opera Building, which rises like a canyon wall from the edge of the Chicago River, David Ullrich says he is convinced a man-made continental divide can be built in the middle of the nation's third largest city.

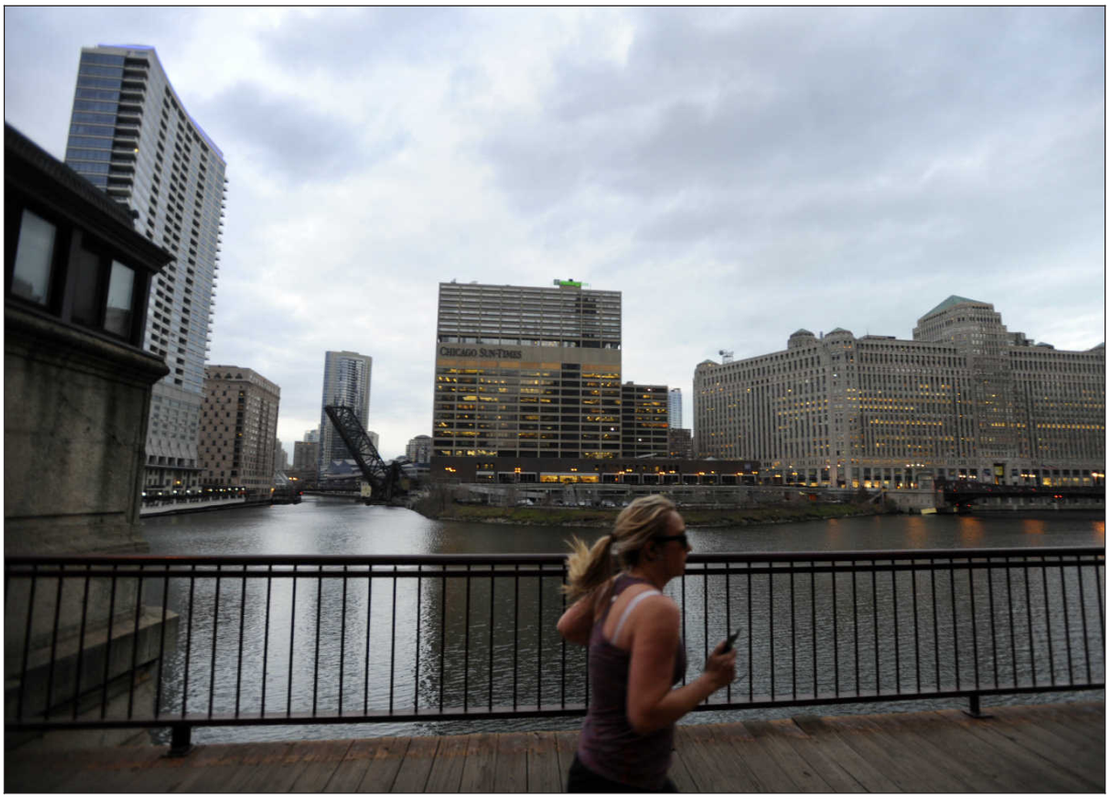
"If 110 years ago, from an engineering and financing standpoint, we could dig this huge canal and reverse (the river), 110 years later, with all the advances in technology, we certainly could undo what we have done," says the 64-year-old former deputy regional administrator of the U.S. Environmental Protection Agency.

Ullrich, executive director of a regional mayors group, is behind a study released earlier this year that argues the Chicago canal system can be plugged to stop Asian carp and other invasive species from making a mess of the Great Lakes — and that it can be done in a manner that won't kill navigation, trigger flooding or foul Lake Michigan.

The $2 million study his group conducted with the Great Lakes Commission, a body appointed by the region's governors and state legislatures, found that installing barriers on Chicago's river and canal system is relatively cheap, about $140 million.

But that would be just a sliver of the project's overall costs. The real challenge comes with figuring out how to rebuild the divide in a manner that keeps cargo flowing over the barriers and also handles all the water — and waste — that for more than 100 years has been flushed down the canal, into the Mississippi River basin and ultimately into the Gulf of Mexico.

Accomplishing this is much more complicated than dumping a pile of boulders in the river several miles southwest of downtown



The Chicago River in downtown Chicago now flows away from Lake Michigan, but some regional leaders are hoping to erect a barrier to reverse the flow in an effort to stop invading species.

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in the spot where the natural divide between the Great Lakes and Mississippi watersheds once existed.

Separating the basins today requires the focus of a surgeon, given how Chicago's industries, neighborhoods, navigation system and wastewater treatment facilities have evolved over the last century.

The study evaluated three alternatives to install a divide on the waterway system — a tangle of man-made canals and natural riverbeds draining hundreds of square miles. The options range from a single barrier on the Chicago Sanitary and Ship Canal well downstream from Lake Michigan to five barriers on the five separate waterways that connect Lake Michigan to the canal system.

What appears to be most promising is the study's "mid-system" option that calls for four barriers just inland from the lake and includes transfer facilities to move cargo and recreational boats over the divide. The big hitch is that while these barriers could be built in the next decade to stop the migration of Asian carp and other species from the Mississippi basin into Lake Michigan, they would not provide a true watershed divide until Chicago finishes building a network of tunnels and reservoirs to catch the city's chronic sewer overflows.

That isn't expected to happen until 2029. Until then, according to the plan, the water in the Chicago River would be pumped up and over the barrier. This man-made waterfall would still allow Great Lakes species to slip into the Mississippi basin, but would provide an insurmountable physical obstacle for Asian carp and other invaders to move in the opposite direction.

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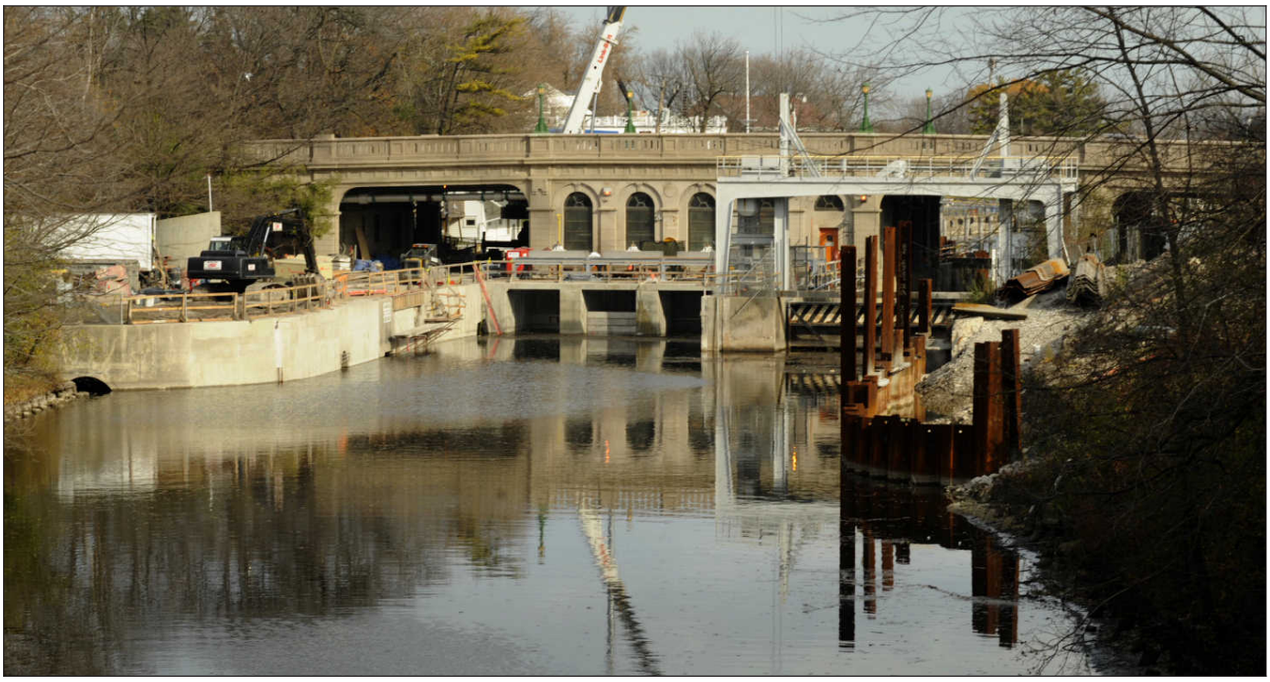
The North Branch of the Chicago River would be rechanneled with a barrier so it flows into Lake Michigan instead of the Mississippi River basin.

The pumps could be turned off once the sewage-catching tunnel and reservoir system was complete. Then all the water entering the river system east of the barriers would once again flow the direction Mother Nature intended — toward Lake Michigan.

It's all pie-in-the-sky to barge industry advocate Mark Biel, who was a member of the study team's advisory panel.

"I've been lobbying 25 years on behalf of industry," says the executive director of the Chemical Industry Council of Illinois. "I'm pretty good at killing bills and ideas that people come up with, and this one has all the elements you'd need."

Biel ticks off those elements: The time it would take to accomplish; the cost; the legal, regulatory and political hurdles tied to sending at least some of Chicago's treated wastewater back into Lake Michigan.



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The Wilmette Pumping Station north of downtown Chicago pumps Lake Michigan water into the North Shore Channel, which ultimately flows into the Mississippi River basin.

"This is not going to happen in my lifetime," says the 51-year-old. "And I don't plan on dying anytime soon."

Peter Annin, a Great Lakes author and managing director of the University of Notre Dame's Environmental Change Initiative, says barge industry advocates should brace for a long fight.

"I think it's important to protect jobs in the Chicago area waterway corridor," says Annin. "On the other hand, I feel sorry for those workers because this issue is not going to go away. They are going to be hounded by every major invasive species introduction for the next 100 years and beyond."

Flows and boats

From his office, Ullrich keeps a keen eye on what's floating on the river hundreds of feet below. He only occasionally sees barges. He sees armadas of kayaks, a steady stream of pleasure craft and the city's famed fleet of tour boats and water taxis. He believes most can be accommodated in the study's mid-system alternative.

That plan calls for:

■ A barrier just east of the Chicago River's confluence with Bubbly Creek, about 3 miles southwest of downtown Chicago. Once the tunnel and reservoir project is complete, water that drains into the river east of the new divide would flow back into Lake Michigan, as it did before 1900. A lock just to the south of Navy Pier at the lake could be removed or left permanently open, as could the gate at the Wilmette Pumping Station north of downtown.

This scenario would allow tour boats and recreational vessels free sailing throughout downtown and several miles inland, with the added benefit of not having to navigate the Navy Pier lock in order to get into or out of Lake Michigan. The barrier would mean Lake Michigan boats headed for marinas on the west side of the new divide would have to be lifted over, something the plan accounts for.

Barges coming up the canal system from the Mississippi basin would no longer be able to move into downtown or onto Lake Michigan at Navy Pier. The plan calls for a transfer facility at the barrier so barges on opposite sides of the divide could swap cargo, though it may not get much business. In 2010, 175 barges moved through the lock near Navy Pier, according to U.S. Army Corps of Engineers data.

■ A second barrier south of downtown on the Calumet River near the O'Brien Lock and Dam. Like the Chicago River, the Calumet was reversed in the 1920s with a man-made waterway that flows into the Sanitary and Ship Canal. Re-reversing the flow of the Calumet so it also again flows into Lake Michigan is a project that would mean the end of a heavily used direct connection between the canal system and Lake Michigan. The study calls for constructing an intermodal transfer facility at this barrier so barges could exchange cargo with trains, trucks and lakeside vessels.

■ Two other barriers would be installed on the Grand and Little Calumet rivers, which are much less used for navigation.

Del Wilkins, president of Illinois Marine Towing Inc., says he is all for protecting Lake Michigan from Asian carp, but can't believe anyone would contemplate choking the flow of cargo between the canal system and Lake

Michigan.

"This isn't just an Illinois or local issue. This is a national issue," he says as he stands in the wheelhouse of a towboat that pushes along at 5.8 miles per hour down the canal and past an oil refinery, about 25 miles southwest of downtown.

It's hard to imagine a more industrialized waterway. Lining the canal corridor are mountains of coal, forests of smokestacks and pond-sized fuel tanks. A barge lists as it takes on the weight of fresh fuel pumped from a web of hissing pipes. A nearby barge appears to be filled with metal scraps burned to a chalky white.

Federal data shows about 16 million tons of cargo move up and down this waterway annually, mostly coal, iron, steel, fuels and other bulk materials such as sand, salt and gravel.

"There isn't sufficient infrastructure with the railroads or highways to handle those tons," says Wilkins.

But the study doesn't contemplate shutting down the canal system to navigation, only the locks that provide access to and from Lake Michigan. Those locks handle only a fraction of the Chicago waterway system traffic, and the amount of cargo moving through them is getting smaller.

The Army Corps reports that barge traffic through the O'Brien lock dropped from nearly 12 million tons in 1994 to just more than 5 million tons by 2010.

That's roughly equivalent to 14 barges per day and less than 1% of the total cargo that moves through the Chicago region daily.

Both proponents and opponents of a barrier system believe the amount of cargo moving on the canal system could grow in the coming years, particularly as more container traffic is expected to arrive on the Gulf Coast once a Panama Canal expansion is completed in 2014. The Chicago canal system could handle the increased traffic because it is not operating at anywhere near capacity, yet businesses on the waterway probably aren't going to boom as long as the carp remain a threat to Lake Michigan.

"The mere uncertainty surrounding the idea of physical separation and its resulting impact on trade is scaring away potential investment and potential tenants," states a report released this year by the Illinois International Port District.

Joel Brammeier, president of the conservation group Alliance for the Great Lakes, says the carp problem should be an incentive for the barge industry to embrace a barrier with a transfer station.

"You know what?" he says. "The carp aren't going to go away. This threat to the Great Lakes is not going to start suddenly swimming south."

Estimated cost to accommodate navigation interests in the plan: $1.04 billion.

Carp and treated sewage

Would Chicago's beaches still be safe for swimming if the Chicago River's flow were reversed and treated sewage were sent into the lake? The study by the mayors group and the Great Lakes Commission argues "yes."

"In 1900, technologies did not exist to treat all of the pollutants discharged into the Chicago (waterways). Diverting the Chicago River was the solution to the threat posed by the continued degradation of Lake Michigan and the drinking water it supplied to the rapidly growing city of Chicago," state the study authors. "Today, technology exists to allow high-quality, treated effluent to return to Lake Michigan, thereby making separation possible."

Henry Henderson, director of the Chicago office of the Natural Resources Defense Council and a former assistant attorney general for Illinois, puts the situation less delicately.

"We move an incredible amount of water out of Lake Michigan on a per-second basis in order to move sewage," says Henderson, who previously served as commissioner of environment for the City of Chicago. "That is an outdated understanding of how to use fresh water. . . . It should not be used to dilute pooh."

Chicago's three main treatment plants discharge a combined daily average of about 1.2 billion gallons of treated effluent each day. Under the mid-system plan, only flows from the Terrence J. O'Brien Water Reclamation Plant would be headed for the lake. That facility serves about 1.4 million people in areas north of downtown and discharges about 230 million gallons of treated wastewater per day, roughly the equivalent of what the Milwaukee area discharges into Lake Michigan.

Kay Nelson, director of environmental affairs for the Northwest Indiana Forum, a privately funded economic development corporation, says once the public realizes installing barriers on the Chicago waterways would mean even a portion of Chicago's treated sewage would begin flowing into Lake Michigan, they won't stand for it. She also notes the portion of the canal and river system east of the proposed divide is plagued with heavily contaminated sediments that would have to be removed before the flows could be reversed to head toward Lake Michigan.

She says all this became apparent during discussions she had at a Great Lakes environmental summit in Ohio earlier this fall.

"I had somebody in Cleveland make the comment that people will just freak out

when they learn it will . . . require all these new waste streams, to introduce that much new treated wastewater into Lake Michigan," says Nelson, whose group represents dozens of businesses, including U.S. Steel and BP oil, both of which have a history of discharging pollution into the lake.

Yet it's not as if Lake Michigan has been immune to Chicago's sewage for the past century.

The Chicago River has been flowing away from Lake Michigan since it was reversed in 1900, but when big rains hit, gates at three locations in the Chicago area open to allow the waterways — and all their waste — to discharge into Lake Michigan.

It doesn't happen every year, but it has happened about 40 times at one of those three locations since 1985, and it can lead to a staggering amount of contaminated water spilling into the lake.

In 2008, a sustained deluge over several days unleashed 11 billion gallons of sewer overflows into Lake Michigan. That's more than Milwaukee has sent into the lake in the past decade.

Carp or no carp, the Natural Resources Defense Council's Henderson says this has to stop.

"The carp have done us a service," he says. "They've made us aware — and the rest of the country — of the failings of this system. And now we're talking about things that we weren't."

Tim Eder, executive director of the Great Lakes Commission, says Chicago should be upgrading its sewage treatment system regardless of whether the water goes back to Lake Michigan or down into the Mississippi River, the source of drinking water for cities as large as St. Louis.

"Is it right that the Chicago region hasn't had to live up to the same standards that Milwaukee, Cleveland and Detroit have had to contend with?" he asks. "That's a problem that needs to be fixed, whether it's going downstream or out into Lake Michigan."

Before even a drop of Chicago's treated sewage could head for Lake Michigan, upgrades are needed at the O'Brien treatment plant so sewage is at the very least disinfected, as is done at treatment plants across the country. That step is already planned by Chicago's Metropolitan Water Reclamation District, but it probably would be just the first of many. Treatment upgrades to deal with metals, nutrients, persistent organic chemicals and other pollutants likely would be required as well.

The mid-system plan calls for separating some combined sewer systems so they only carry sanitary waste to the O'Brien treatment plant, which would reduce strains on the overburdened system. It also calls for "green infrastructure" projects to channel storm water into the ground instead of sewers.

Irwin Polls, a former manager of water quality and aquatic ecology for the Chicago water reclamation district, was hired to do some of the research for the study. Originally skeptical about the prospects of separating the basins, Polls says he is now convinced that Chicago can be re-engineered back into its native basin.

"The technology is here, it can be done, that's not an issue," he says. "It's a question of whether taxpayers will pay to put all that water back in the lake, and how they feel about discharging treated wastewater into Lake Michigan."

Peter Mulvaney, former assistant commissioner of the Chicago Department of Water, also was hired to work on the barrier study and started out more than dubious.

"At first, for someone used to working on the system as it is, a radical change like this had me thinking: Give me a break! But after looking at it, there is a fair amount of sense to it," he says.

Mulvaney says more modeling and research are needed but he is intrigued by the idea that a basin separation could mean more places for storm water to go in situations that now cause flooding.

In the case of a 100-year flood, the barriers could still be breached to avoid catastrophe. That means, in rare events, the basins could once again be temporarily connected so storm-driven floods can flow into Lake Michigan instead of pooling on city streets, in neighborhoods and in basements.

Barrier proponents say this is not a deal killer, because for species invasions to be successful they typically require sustained access to a new water body — the kind now provided by the Chicago canal system.

The estimated cost in the mid-system plan to build a barrier system that deals with storm water and sewage treatment issues: $3.1 billion.

Solution cheaper than problem

Maj. General John Peabody was the leader of the Great Lakes region at the beginning of the U.S. Army Corps' basin study before being transferred last year to Vicksburg, Miss.

The years he spent working on the study make it clear to him that this would be something incredibly difficult to pull off.

"Gosh, you never say never . . . but you know the practical challenges of building the hydrologic separation are unbelievable in an urban area that's flat," he says as he slaps his hand on his forehead.

"I mean this used to be basically a big swampland, marshland, wetland area where

the (canal system) is now . . . just the practical matters of working through the real estate, legal issues, developing something that would work moving goods over hydrologically separated basins. I'm not saying it can't be done (but) these are enormous challenges."

Indeed.

The total cost of separation envisioned in the mayors group and Great Lakes Commission study under its four-barrier plan almost certainly will climb with more detailed engineering studies. The high end of the range is currently estimated at $4.27 billion.

And the cost in today's dollars to build the Chicago canal system that caused all the trouble in the first place?

$11 billion.