CONFLUENCE

WATER TECHNOLOGY INNOVATION CLUSTER

OHIO RIVER VALLEY REGION

Water Technology Innovation

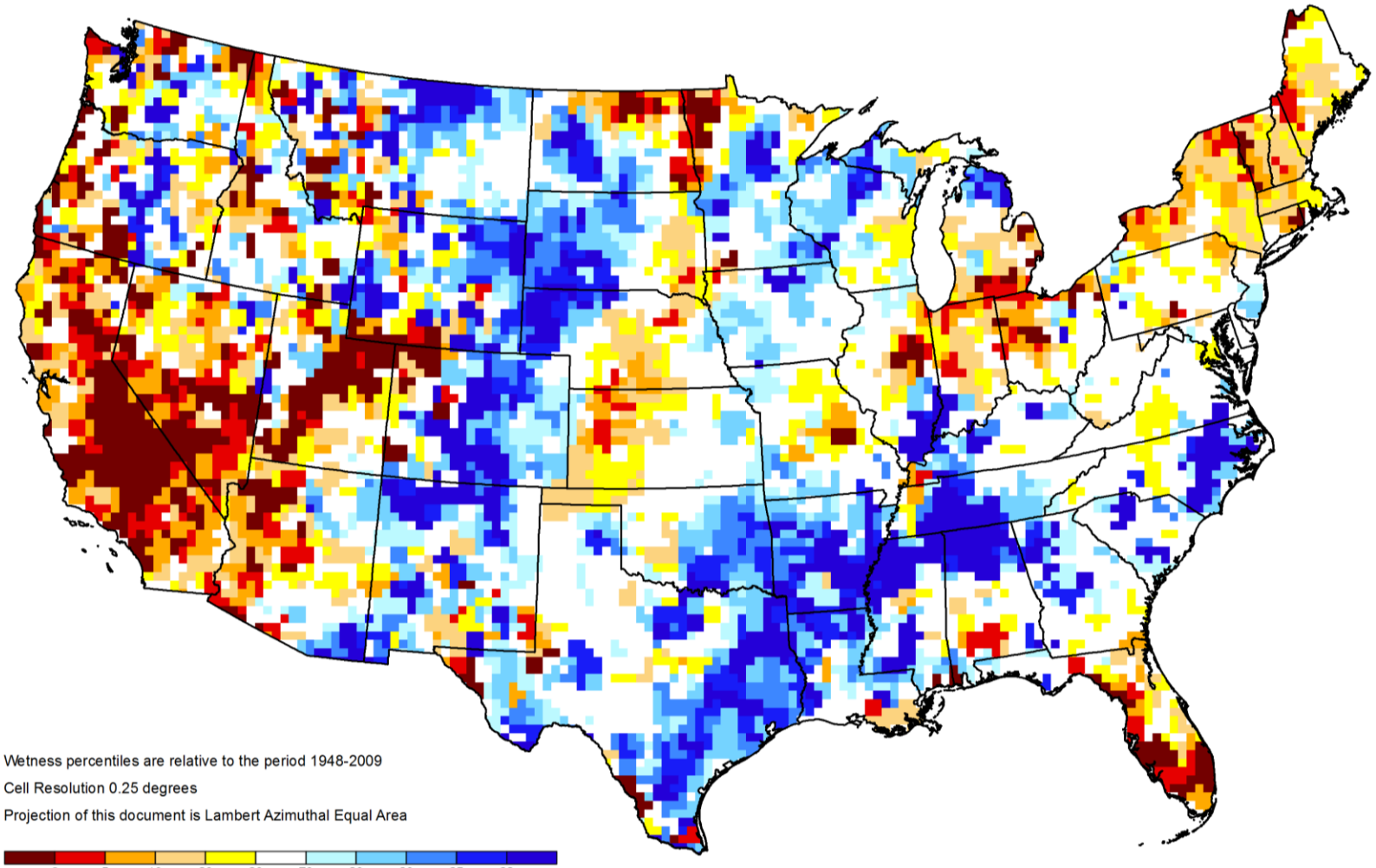
Clusters, the Wave of of the Future

Melinda Kruyer, Executive Director, Confluence
International Private Water Association

April 20, 2017

GRACE-Based Shallow Groundwater Drought Indicator

June 01, 2015



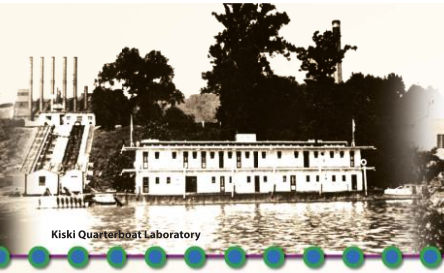
http://drought.unl.edu/MonitoringTools/NASAGRACEDataAssimilation.aspx

100 YEARS
1913 - 2013

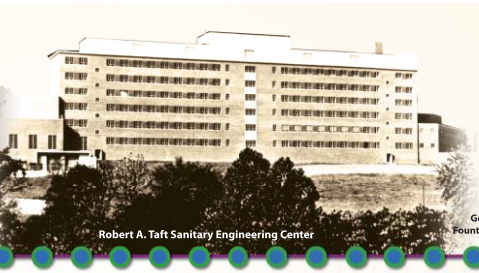
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Water Research IN CINCINNATI

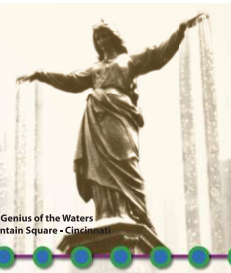
Kilgour Mansion



Kiski Quarterboat Laboratory



Robert A. Taft Sanitary Engineering Center



Genius of the Waters
Fountain Square - Cincinnati

Andrew W. Breidenbach Environmental Research Center

1913
Officers of the U.S. Public Health Service set up the Stream Pollution Investigation Station in Cincinnati, operating under a Congressional Act of 1912.

1921
Development begins on the application of two fundamental measures of pollution in a stream: the coliform bacteria index and the biochemical oxygen demand test.

1948
With the passage of the 1948 Water Pollution Act, the station is renamed the Cincinnati Environmental Health Center, authorized to protect water quality for fish and aquatic life, conduct research on water pollution and train personnel in pollution control.

1953
The Center moves to a new laboratory building on Columbia Parkway, later to be dedicated as the Robert A. Taft Sanitary Engineering Center.

1966
The Taft Center establishes a reputation for its work in wastewater treatment, water supply control, air pollution, radiation, and food protection for the Public Health Service.

1970
The Federal Water Quality Administration, National Air Pollution Control Administration and 13 other Federal units merge to create the U.S. Environmental Protection Agency.

1972
The legislation for the Federal Water Pollution Control Act of 1972 is enacted, later to be amended and renamed the Clean Water Act.

1975
President Gerald R. Ford dedicates the National Environmental Research Center, a new $28 million research laboratory, on Martin Luther King Drive in Cincinnati.

1979
EPA's Test and Evaluation Facility (T&E) opens on the grounds of the Mill Creek wastewater treatment plant in Cincinnati.

1980
The National Environmental Research Center is renamed the Andrew W. Breidenbach Environmental Research Center in memory of its first director (from 1971-1975).

1993
The 1991 reauthorization of the Clean Water Act and the 1993 Milwaukee Cryptosporidiosis outbreak ushers in a decade of research in disinfection, treatment and method development for recalcitrant pathogenic organisms.

2002
EPA creates the National Homeland Security Research Center in Cincinnati to protect human health and the environment from effects of biological, chemical and radiological contamination due to homeland security events.

2003
EPA announces an initiative for additional research and development for cost-effective technologies to help small systems meet the new arsenic standard and provide technical assistance to operators to reduce compliance costs.

2007
EPA initiates the Aging Water Infrastructure research program to develop innovative technologies for the operations, maintenance, and replacement of aging and failing drinking water and wastewater systems.

2011
EPA and the U.S. Small Business Administration announce the formal launch of a water technology innovation cluster, now known as Confluence, in the Cincinnati, Dayton, northern Kentucky and southeastern Indiana region.

2012
EPA funds research to support the goals of the water technology cluster. All of the projects have strong partnerships with regional companies, utilities or universities.

2013
EPA recognizes and celebrates the 100th anniversary of federal water research in the greater Cincinnati region.

Water Research IN CINCINNATI

100 YEARS 1913 - 2013

Why Cincinnati Region?

Cincinnati has more water technology patents per capita than any other region of the US

Indianapolis:
Drinking Water: 138
Waste Water: 45
Storm Water: 1

Lexington:
Drinking Water: 9
Waste Water: 26
Storm Water: 3

Louisville:
Drinking Water: 17
Waste Water: 62
Storm Water: 1

Columbus:
Drinking Water: 24
Waste Water: 46
Storm Water: 6

Frankfort:
Drinking Water: 3
Waste Water: 8
Storm Water: 0

Cincinnati:
Drinking Water: 96
Waste Water: 153
Storm Water: 9

Dayton:
Drinking Water: 8
Waste Water: 32
Storm Water: 0

Search Date: October 8, 2010
Source: USPTO, 1976-Present, Search terms: “Drinking Water”, “Storm Water” and “Waste Water”

Test Beds

Confluence has a rich suite of test beds that includes the US EPA Testing and Evaluation Center

Confluence's Formation

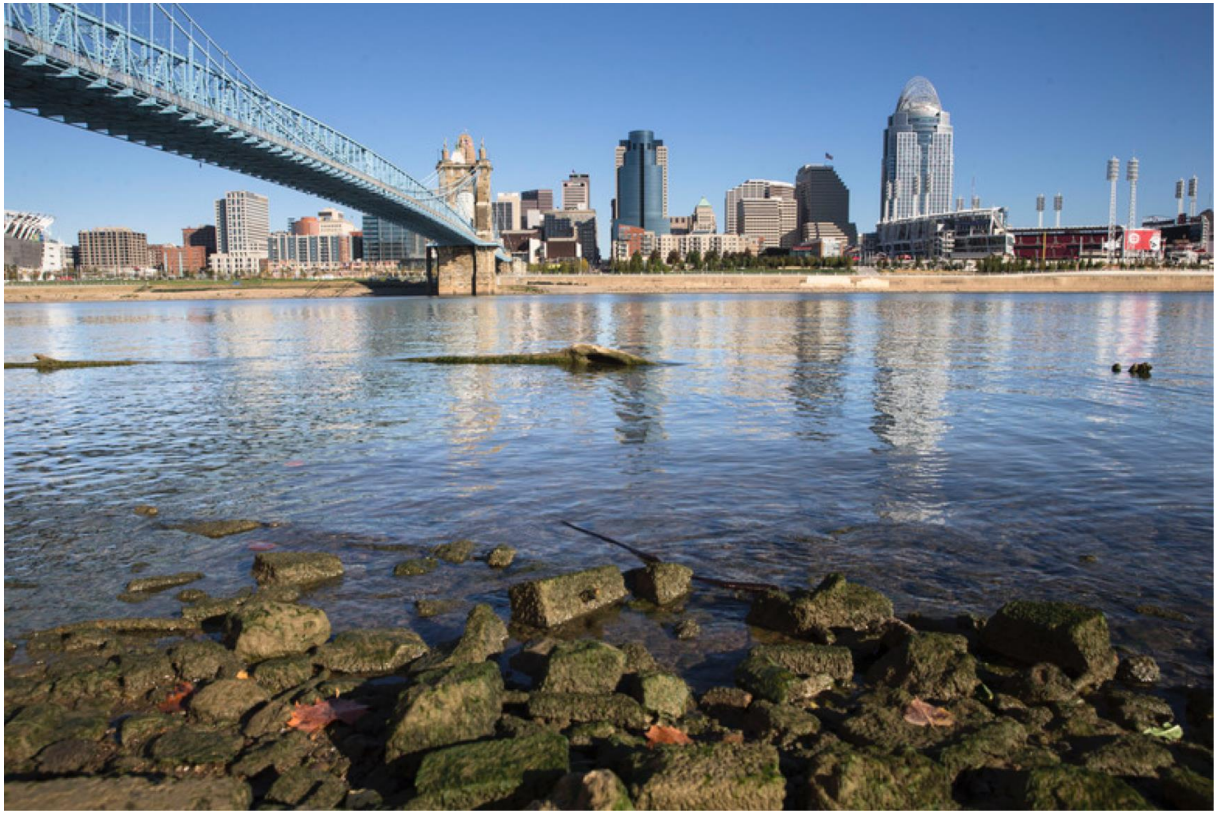
- Community leaders from the Cincinnati region agreed to proceed with formation of Confluence through EPA/SBA led engagement and analysis process
- January 18, 2011 – EPA Administrator Jackson and SBA Administrator Karen Mills announced launch of Confluence
- EPA announced commitment of over $5 million in support for water technology innovation in Cincinnati

Policy Innovation - Tri-State EPA Agreement

To expedite the commercialization process, Confluence brokered a landmark multi-state memorandum of understanding between Ohio, Kentucky and Indiana regulators so that startups and firms can get innovations approve by all three states at once.

Algal Toxin Projects

The Confluence Algal Toxin Project team (universities, agencies and private sector) was in place to act and coordinate multi-level data collection and analysis with NASA during the historical HAB event that covered 600 miles of the Ohio River in Sept., 2015.



Cincinnati Enquirer

September 26, 2015

The largest algal bloom ever recorded on the Ohio river happened on September 25, 2015. The bloom covered over 600 miles of the Ohio River. It passed right by the drinking water intakes for Cincinnati and for Northern Kentucky.

Confluence partnered with NASA, universities, agencies, startups, and private companies to address the HABs

NASA gets involved in local toxic algae struggle

Officials say record bloom has expanded

Carrie Blackmore Smith

Little bright-green flecks of algae, floating as deep and as far as the eye could see, greeted a group of scientists on the Ohio River Friday morning.

They had pulled up in a boat with their scientific instruments to the spot where the region sucks up much of its drinking water through underwater intakes.

Water officials had hoped the situation would have improved by now, but tests show that the algae bloom – the largest ever recorded on the Ohio River – has expanded over the last week from a 500-mile stretch to a 600-mile stretch, according to authorities at the Ohio River Valley Water Sanitation Commission, the organization that monitors the river's health.

The researchers, two from the commission, one from Bowling Green State University and another from a company that makes high-tech water quality meters, prepped their equipment and waited.

Until a Twin Otter, a twin-engine turboprop plane, came into view.

Aboard were NASA researchers, who had made the trip to Cincinnati from NASA's John H. Glenn Research Center in Cleveland, with a hyperspectral imager and miniature spectrometers.

This technology has been used for a few years in NASA's algal bloom observation project but it was the first time ever flying a swath of river near Cincinnati.

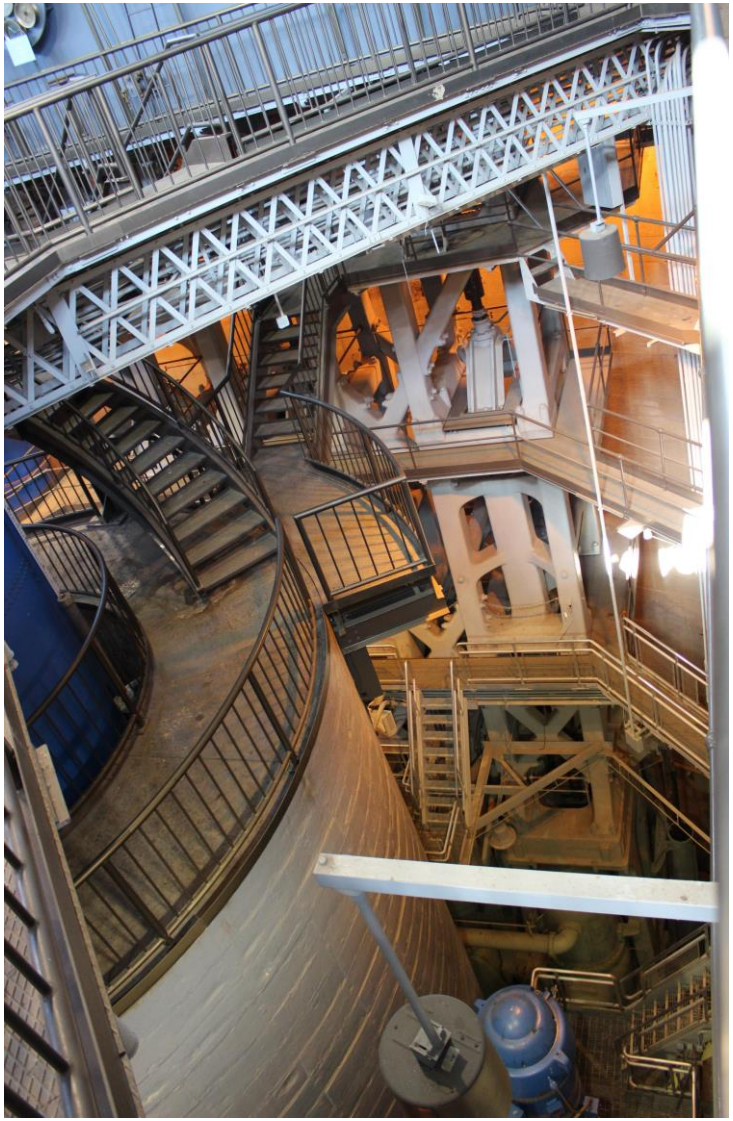
NASA has two primary goals with

See TOXIC ALGAE, Page 18A

THE ENQUIRER/PATRICK REDDY

Anita Simic, assistant professor of Geospatial Sciences at Bowling Green State University, foreground, was among those checking water quality and taking samples on the Ohio River to study the toxic algae in the water Friday morning.

Confluence Regional Utility Network



SPECIAL REPORT: **THE WATER ECONOMY**

Liquid gold

Water is why Cincinnati exists. And now, as much of the nation battles over how to secure the precious stuff, a new Tri-State group looks to leverage our local asset.

BY LUCY MAY | lmay@bizjournals.com

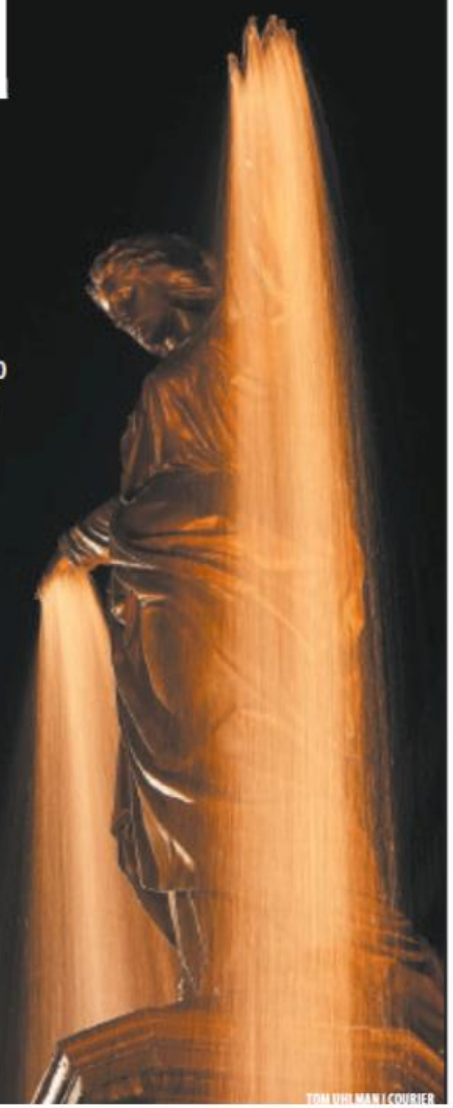
Greater Cincinnati's recipe for attracting new companies and creating jobs could be as simple as this: Just add water.

That's the premise of Confluence, a fledgling group formed by the U.S. EPA and Small Business Administration. With the backing of top brass from regional governments and businesses, the nonprofit is working to transform the Ohio River Valley into an economic development powerhouse. Confluence's leaders want to leverage what they call the "water assets" in Cincinnati, Dayton and Northern Kentucky. (See box, page 31.)

"It really is very much a gold mine of opportunity," said Scott Koorndyk, executive vice president of

WATER, PAGE 30

INSIDE THE REPORT



Downtown's Tyler Davidson Fountain, known as "The Genius of Water," is an apt symbol for Cincinnati.

TOM UHLMAN | COURIER

THE NUMBERS

Some perspective on local water

96.8M
Gallons in Ohio River flowing past Cincinnati per minute*

3.3M
Gallons in Licking River flowing per minute*

660,000
Gallons in an Olympic-sized swimming pool

1.5T
Gallons in the Great Miami Aquifer

WATER: *Formed by U.S. EPA and SBA, new Tri-State group works to monetize our massive water assets*