Wastewater monitoring for SARS-CoV-2 in colleges and communities: Use-driven collaboration

Katrina Smith Korfmacher, PhD
Professor of Environmental Medicine
University of Rochester

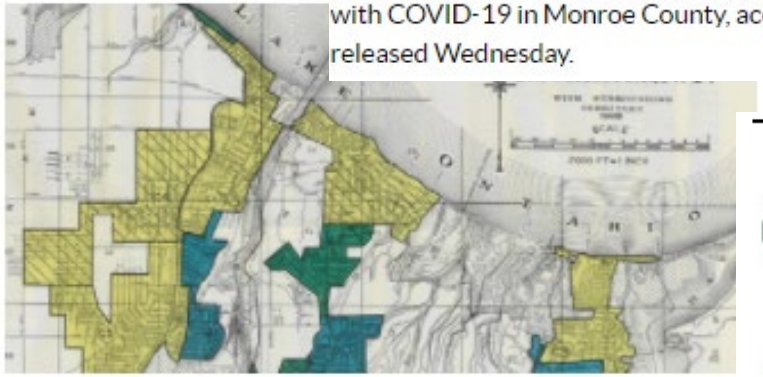
PEPH Webinar
December 3, 2021

A screenshot of Mayor Lovely Warren's news conference held via Zoom on Wednesday, April 8.

People of color are disproportionately represented among people who are hospitalized with COVID-19 in Monroe County, according to county Health Department data released Wednesday.

April 8, 2020
CITY paper
"We know the disparities exist, so long before now we should have been acting deliberately to counter the disparities."
James Underwood, CEO, Action for a Better Community

ncrc.org



COVID-19 Disparities In Rochester, NY: The Legacy Of Redlining In The City Of Frederick Douglass And Susan B. Anthony

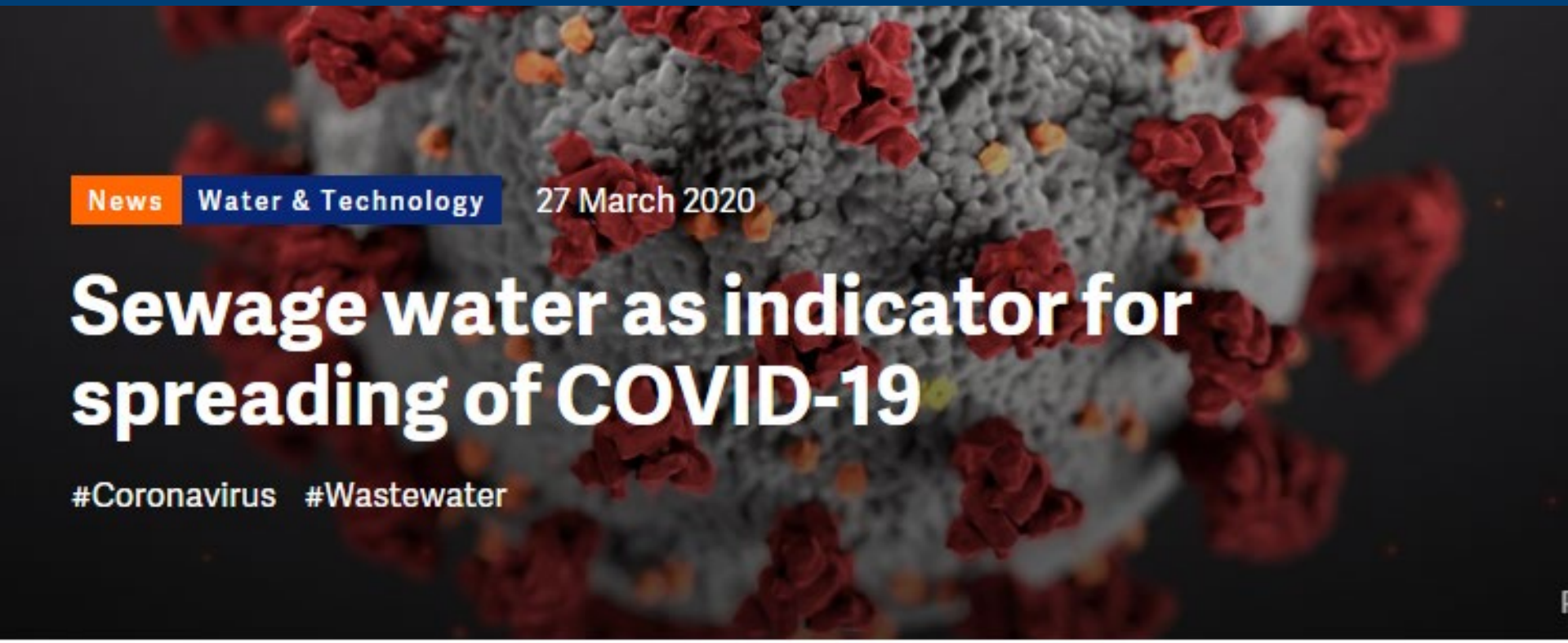
By Barbara Van Kerkhove and Ruhi Maker / October 1, 2020 / Views

News from the Office of
ADAM BELLO
MONROE COUNTY EXECUTIVE

Adam J. Bello
COUNTY EXECUTIVE

For Immediate Release
April 21, 2020

NEW INITIATIVE AIMED AT REDUCING RACIAL AND ETHNIC DISPARITIES RELATED TO COVID-19 LAUNCHED WITH TRILLIUM HEALTH, JORDAN HEALTH, URMC



News Water & Technology 27 March 2020

Sewage water as indicator for spreading of COVID-19

#Coronavirus #Wastewater

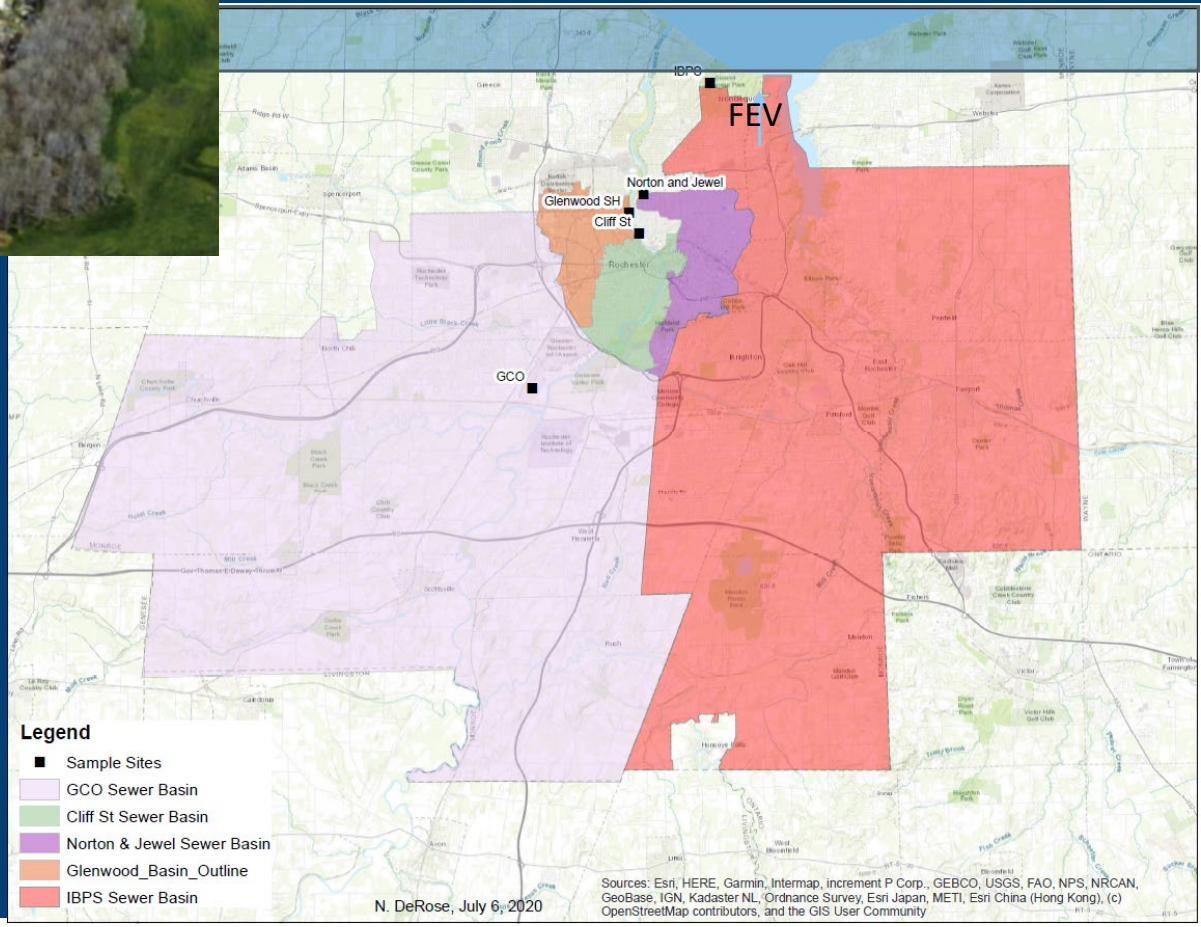
Microbiologists at research institute KWR conducted a series of RNA-analyses at municipal waste water treatment plants (WWTP) in the Netherlands. The analyses showed the presence of RNA gene fragments of the COVID-19 virus in incoming sewage water.

Sewershed of Monroe County, NY

Frank E. Van Lare (FEV)
Wastewater treatment plant

https://www.rochestersubway.com/topics/2015/03/frank-van-lare-wastewater-treatment-plant/

Substations within sewershed



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Initial questions about Waste Water Surveillance (WWS)

- Can we do this?
- How much will it cost?
- What will it tell us, with what certainty?
- What scale can we do it at?
- How can WWS results inform decisions by
  - Community members
  - Institutions
  - Local government

SARS-CoV-2 Early Warning Wastewater Surveillance Platform

(SARS2-EWSP) aka ““The Syracuse Team”

Team lead:
Dr. David Larsen – epidemiology - Syracuse University

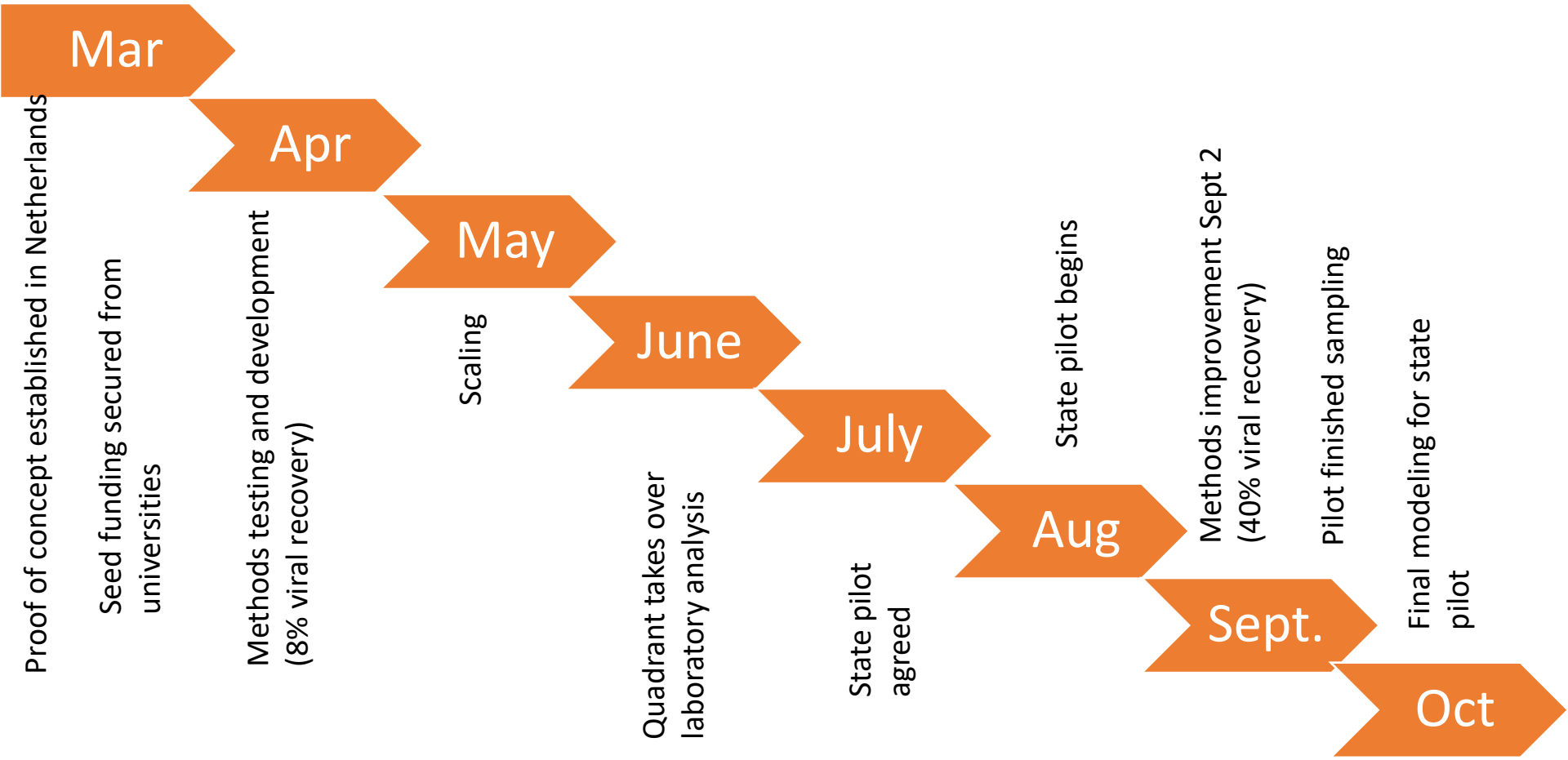
Laboratory analysis team:
Dr. Qian Du – microbiology – Quadrant Biosciences
Dr. Hyatt Green – environmental microbiology – SUNY ESF
Dr. Frank Middleton – clinical microbiology – SUNY Upstate
Dr. Dave Monk – analytical chemistry – Arcadis
Ms. Darcy Sachs – environmental science – Arcadis
Dr. Teng Zeng – wastewater chemistry – Syracuse University

Modeling team:
Dr. Mohan Chilukuri – computer science – Syracuse University
Dr. Mary Collins – environmental science – SUNY ESF
Dr. Tabassum Insaf – epidemiology – NYSDOH
Dr. Brittany Kmush – epidemiology – Syracuse University
Mr. Dan Lang – environmental health – NYSDOH
Dr. David Larsen – epidemiology - Syracuse University
Dr. Stacy Konkle - epidemiology – CDC
Dr. Roger Sokol – environmental health – NYSDOH
Dr. Pramod Varshney – computer science – Syracuse University

Information science team:
Dr. Mary Collins – environmental science – SUNY ESF
Dr. Lenny Grant – science communication – Syracuse University
Dr. Lee McKnight – computer science – Syracuse University

Syracuse Project Background - 2020

SARS2-EWSP



Monroe County Wastewater Coronavirus Surveillance Working Group

(2020)

June County Env. Services provides WWTP influent samples for research

July Monroe County Wastewater Coronavirus Working Group begins meeting weekly
- Monroe County Environmental Services
- Public Health Department (local/state)
- Private contractors
- Local colleges (St. John Fisher, RIT)
- Guests

Aug. Two samples/week at FEV Wastewater Treatment Plant

Pilot: weekly sample at substations

Sept. St. John Fisher and RIT begin biweekly sampling

Dec. Sampling at FEV WWTP ends due to lack of funding

(2021)

Jan. St. John Fisher and RIT sample on campus through Spring

July Biobot begins sampling at WWTPS through DHHS 'pilot' Phase 2

August St. John Fisher and RIT resume sampling; County stops sampling

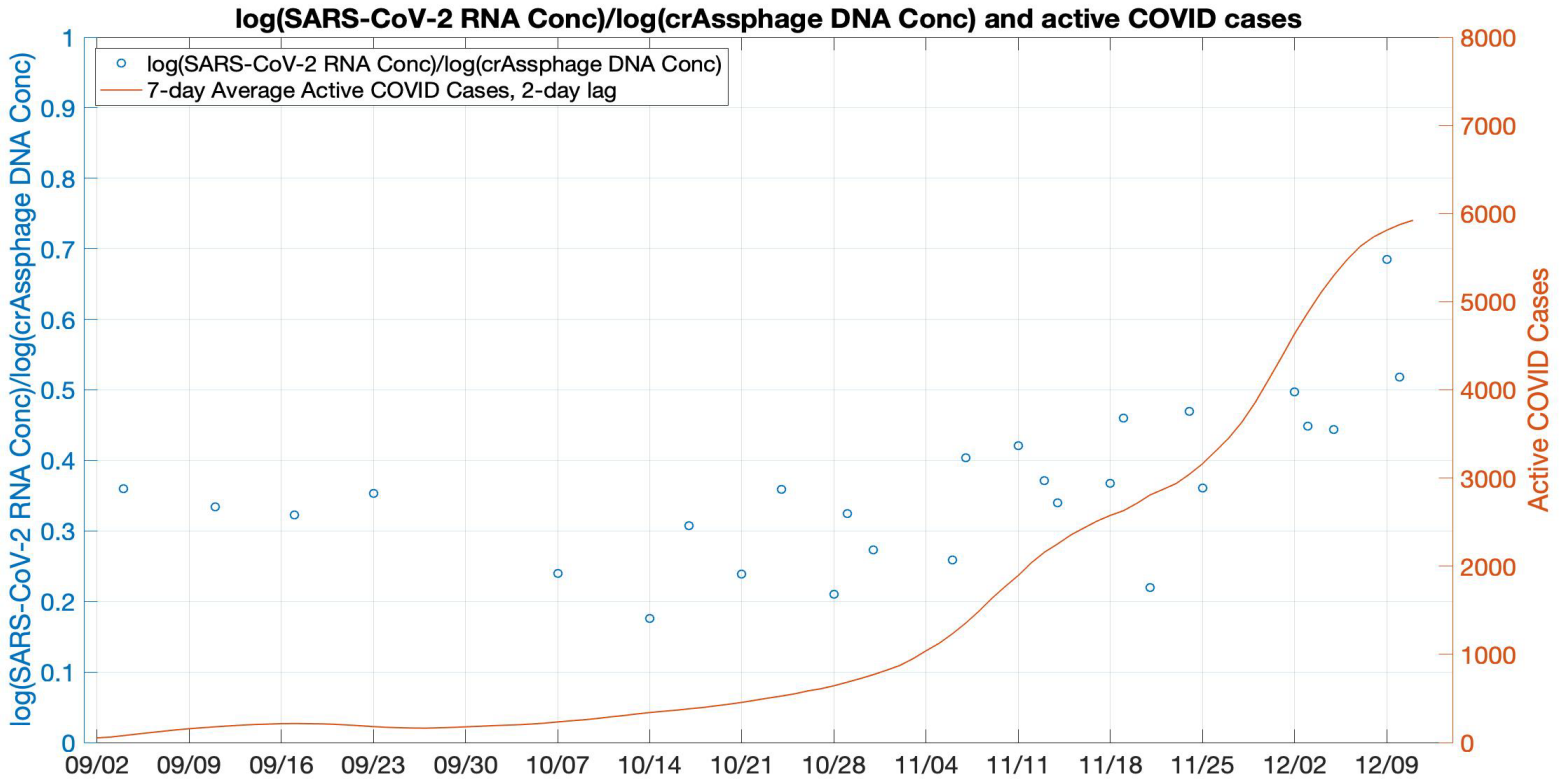
Sept. Genesee/Orleans County health dept. join; setting up own lab

Nov. NYSDOH initiating statewide network and dashboard; join NWWS

Wastewater Surveillance in Monroe County

Building a plane while flying it

FEV Wastewater Treatment Plant data and COVID Cases in Monroe County, Sept-Dec. 2020



Kara Maki and Nathan Cahill, RIT
Personal Communication, 1/29/21

3 Western New York Colleges:
Similar systems, different experiences

- 24-hour composite samplers placed in or near manholes
- Most sites sampled twice per week
- $200/sample (+ collection and transport to Syracuse)
- Sample collection by contractor
- Analysis by private lab (24-48 hr turnaround)

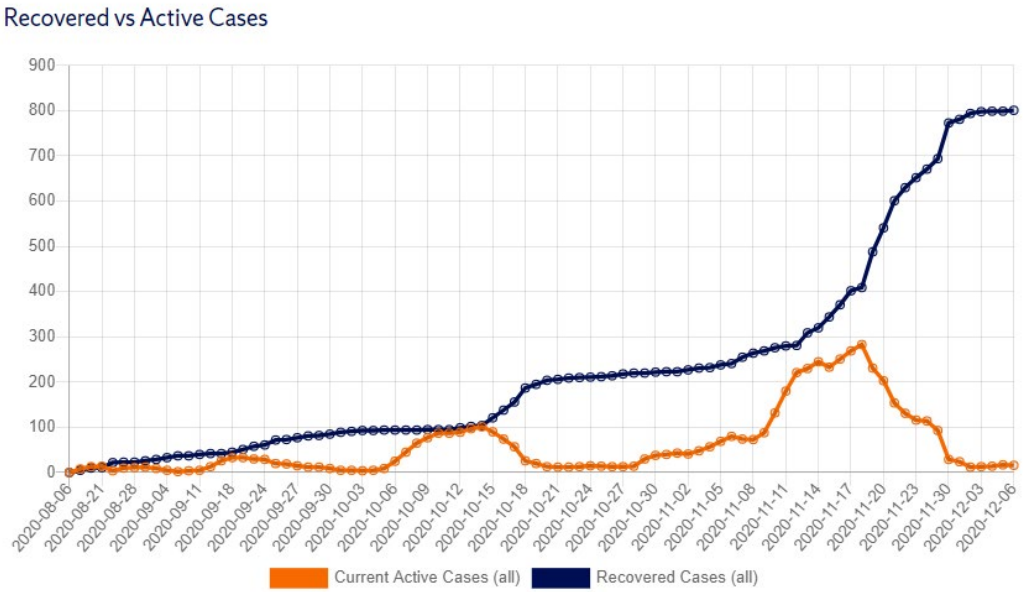
Syracuse University

St. John Fisher College

RIT

Syracuse University

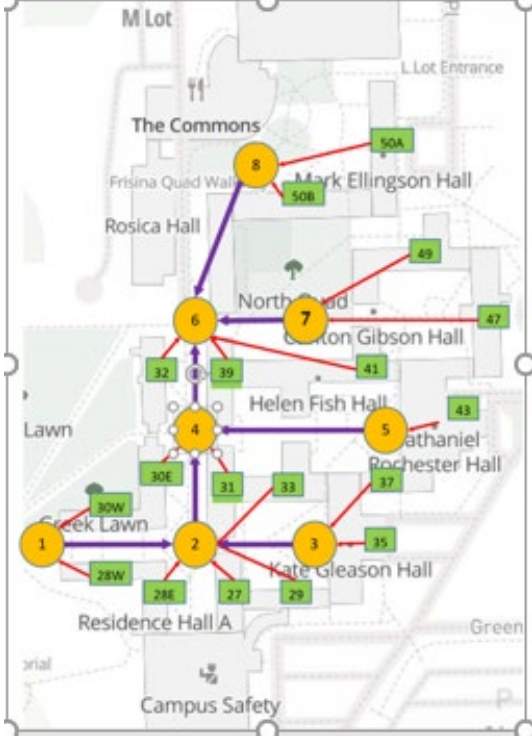
- Private university,
- 15,000 undergrads
- Around half live on campus
- 16 campus sampling sites, collected by students and staff
- Testing of students guided by WWS in Fall 2020
- Continued sampling Spring 2021 with widespread clinical testing
- Sept 2021 (monitor community transmission)



St. John Fisher College

- Small liberal arts college
- 4200 students; half live on campus
- 6 above-ground sampling locations for 10 dorms
- Samples collected by contractor
- Positive wastewater => Student testing (saliva, on-campus lab)
- Positive saliva samples confirmed with nasal swab
- Mitigated 4 “alerts” in Sept. & early Oct. 2020
- Wastewater showed rapid increase in mid-Oct, all dorms positive
- Voluntarily closed campus Oct. 22 2020 to avoid transmission
- Continued sampling through 2021; guide clinical testing

Rochester Institute of Technology

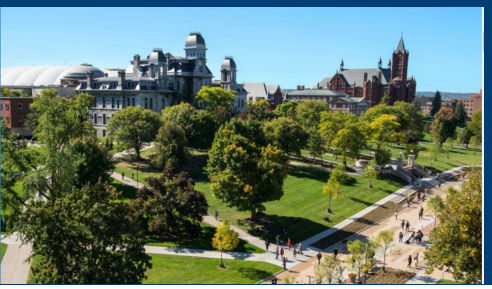


- 2020: 4,500 students on campus, 8,500 off
- Sampled 15 sites in Fall 2020
- Autosamplers below-ground; collected by contractors
- “Orange level” alert in mid-Nov. 2020 -> new rules
- Campus remained open
- Fall 2021 sampling:
  - 4 sites
  - Four times per week
  - Provides ‘population surveillance’
  - Informs messaging

Learning from colleges' experiences

- Wastewater surveillance valuable part of overall testing system
- "Public health" versus individual approach to using information required multidisciplinary engagement
- Approach changed over time as context changed
- No one "right way" – depends on each college's physical constraints, case rate, testing capacity, staffing, resources
- Importance of structures for collaborative learning
- Communication is key – support depends on perceived value

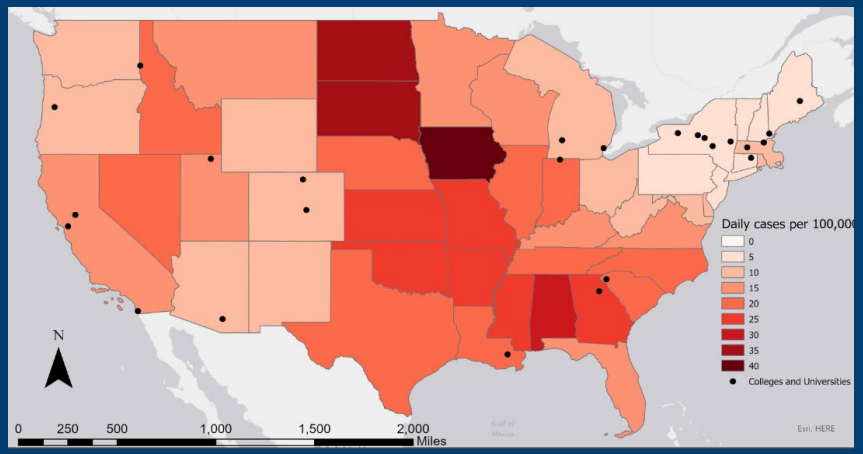
Syracuse University



St. John Fisher College

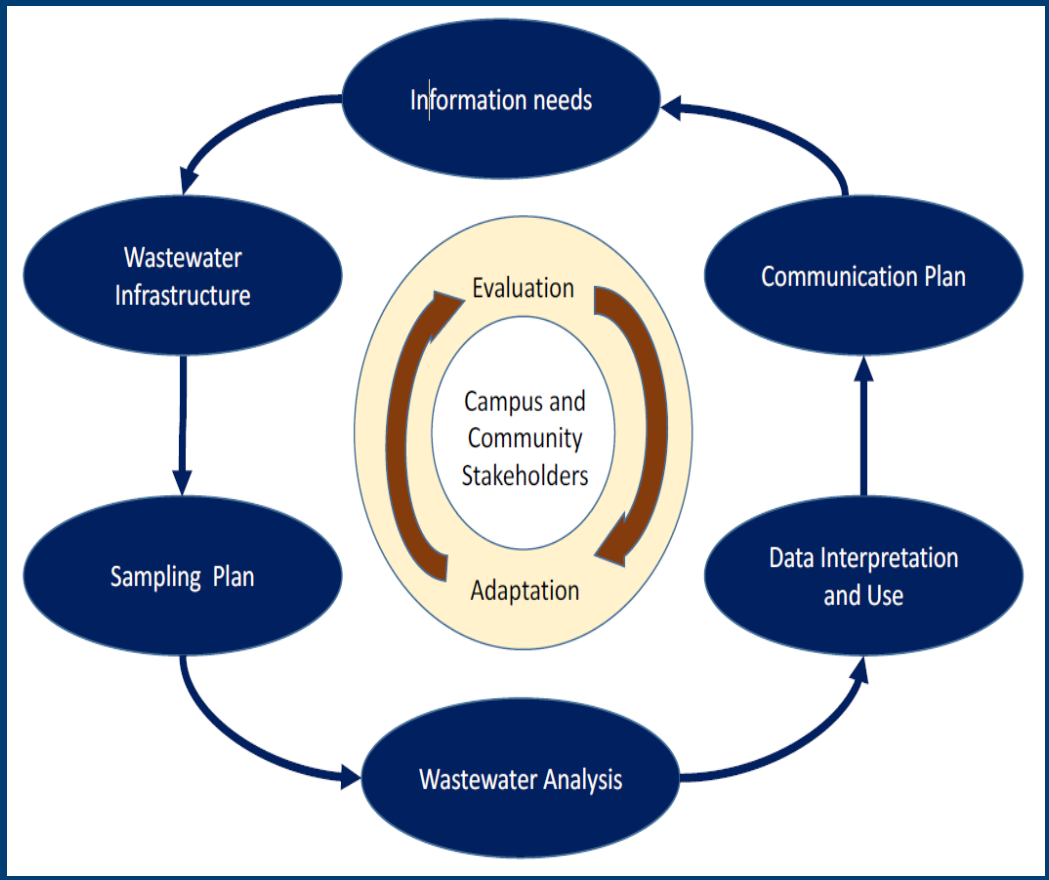
RIT

"Wastewater surveillance for SARS-CoV-2 on college campuses: Initial efforts, lessons learned and research needs"
Harris-Lovett et al.. 2021 Int. J. of Environmental Public Health,
https://www.mdpi.com/1660-4601/18/9/4455



25 case study colleges and state COVID case rate (9/1/20)

Colleges have developed a wide variety of approaches, depending on their financial and technical resources, physical characteristics of their campus infrastructure, and decision needs.



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What can colleges teach communities about using WWS to inform decisions?

"…wastewater surveillance has not fully realized its promise for informing public health decision making. In addition to technical challenges…there are also uncertainties about how best to communicate, interpret, and use this new data."

- Understanding end users: need two-way dialogue about decision makers' needs and capabilities of WWS
- Social, cultural, and institutional context matters: partner with communities and social scientists to understand unique characteristics, values, and concerns
- Interpretation and communication of results: engage stakeholders in design of dashboards, approaches, and messages

Campus Collaborations As a Model for Transforming SARS-CoV-2 Wastewater Surveillance Research into Public Health Action. 2021. Korfmacher et al. *Environ. Sci. Technol.* 2021, 55, 19, 12770–12772
https://pubs.acs.org/doi/abs/10.1021/acs.est.1c03351

New questions

- What are the ethical, cultural, and political considerations for different diseases, populations, institutions, and geographies? (cities, nursing homes, prisons, colleges)
- How do diverse decision makers use this information?
- How can we bridge silos between environmental, health, and community institutions to implement WWS sustainably and equitably?

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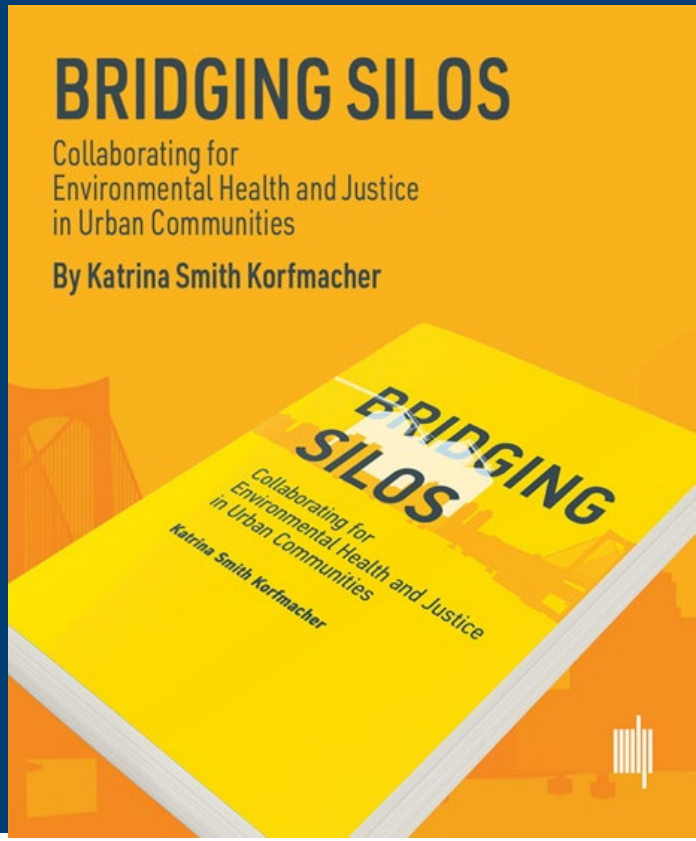

Bridging Silos: Collaborating for Environmental Health and Justice in Urban Communities.
MIT Press, 2019

download **free pdf** at:
https://mitpress.mit.edu/books/bridging-silos

With thanks to….

- Monroe County Wastewater Surveillance Working Group
- SARS-2 –EPWG (“Syracuse Team”)