

# A Compendium of U.S. Wastewater Surveillance to Support Covid-19 Public Health Response

Kathryn Kazior, U.S. EPA

10/26/2021

Presented at Roundtable Discussion for Utilities on  
A Compendium of U.S. Wastewater Surveillance to  
Support COVID-19 Public Health Response



# Overview

- ▶ Purpose
- ▶ Approach
- ▶ Financial Support
- ▶ Program Development
- ▶ Implementation Projects
  - ▶ States
  - ▶ Cities
  - ▶ Universities
- ▶ Available online:  
<https://www.epa.gov/system/files/documents/2021-09/wastewater-surveillance-compendium.pdf>

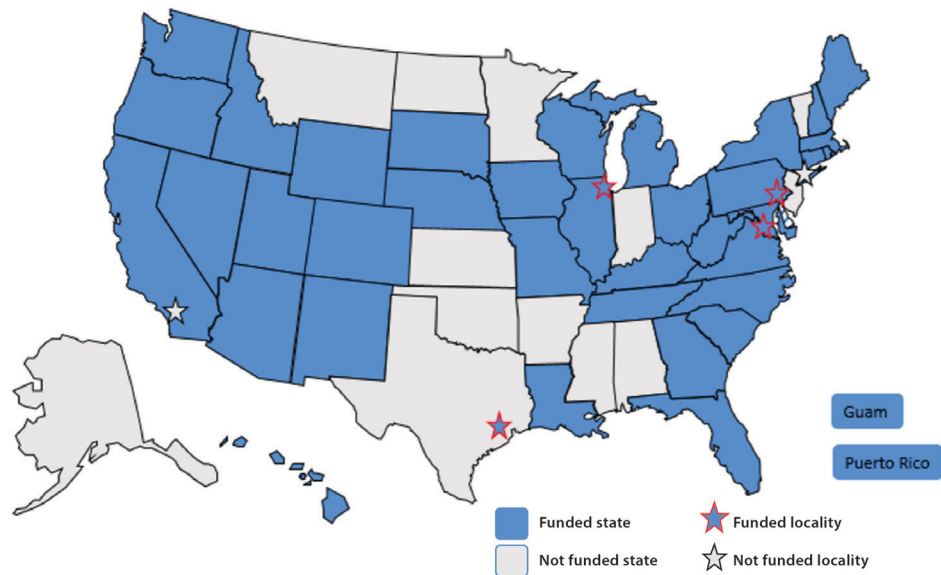
# Purpose

- ▶ This report is intended to provide information, lessons learned, and examples to assist communities in designing, developing, and implementing these programs.
- ▶ Documents notable and unique efforts used to develop and use wastewater surveillance to detect and monitor the SARS-CoV-2 virus genetic material in untreated wastewater throughout 2020 and into early 2021.
- ▶ Not intended to serve as a comprehensive summary of all wastewater surveillance efforts or as a guidance/framework document.
- ▶ The report and EPA do not endorse or make any judgement or provide guidance on a specific model for wastewater surveillance programs.

# Approach

- ▶ EPA searched and reviewed federal agency, non-governmental organization, and other stakeholder websites with a focus on wastewater and public health.
- ▶ Relied on publicly available information such as:
  - ▶ Press releases and news articles
  - ▶ Publicly available grant/contracting documents
  - ▶ Webinars/virtual conference presentations
  - ▶ Research projects
- ▶ Conversations with the 10 unique programs that are presented as case studies

# Financial Support for Implementation and/or Research



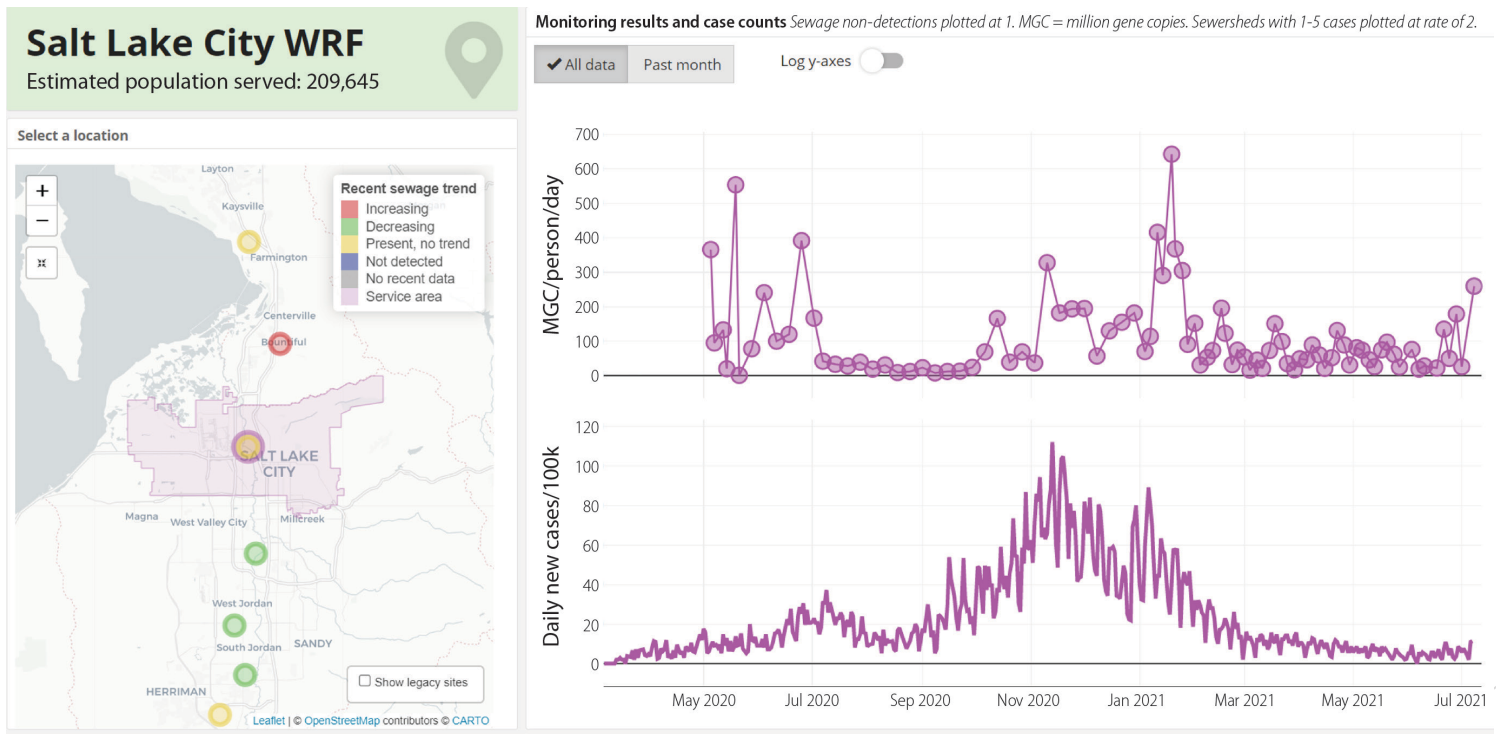
## Jurisdictions using CDC funds to support wastewater surveillance for SARS-CoV-2 as of August 2021.

*(National wastewater surveillance system - implementation for COVID-19 and beyond. Amy Kirby, Centers for Disease Control and Prevention, presented to National Tribal Water Council)*

- ▶ Centers for Disease Control and Prevention
- ▶ Environmental Protection Agency
- ▶ National Institute of Health
- ▶ National Science Foundation
- ▶ U.S. Department of Health and Human Services
- ▶ Water Environment Federation
- ▶ Water Research Foundation

# Wastewater Surveillance Program Development Elements

- Peer-to-peer communication and resource sharing
- Research and development of analytical methods
- On-going wastewater surveillance support and reporting
- Public health response
- Inclusion of rural and underserved populations
- Ethical and legal considerations
- Worker safety



Utah SARS-CoV-2 Wastewater Surveillance Dashboard demonstrating recent wastewater trend (left), SARS-CoV-2 million gene copies per person, per day (top right), and daily new cases per 100,000 residents (bottom right) (Utah DEQ, 2021).



# Case Studies

Indiana, Michigan, New Mexico, Ohio, Wyoming, Hampton Roads  
Sanitation District, Houston, Tempe, Clemson University, University of  
Arizona

Wastewater Surveillance Program		Unique Aspects of the Program Highlighted in the Case Study
State Programs	<b>Indiana</b>	<ul style="list-style-type: none"> <li>• Led by the Indiana Finance Authority (IFA)</li> <li>• Participating utilities conducted sample collection at individual facilities and WWTPs</li> <li>• Focused on communities with universities/colleges due to the transient nature of student populations</li> <li>• Published a report documenting their decision-making process</li> </ul>
	<b>Michigan</b>	<ul style="list-style-type: none"> <li>• Statewide program included 20 different projects led by universities and utilities</li> <li>• Used an existing state laboratory network and workflow used to support the beach water monitoring program</li> </ul>
	<b>New Mexico</b>	<ul style="list-style-type: none"> <li>• Sampled at individual facilities (e.g., correctional facilities, youth shelters)</li> <li>• Collected at multiple locations to divide the facilities into smaller populations</li> <li>• Developed a public-facing dashboard summarizing results</li> <li>• Published a press release highlighting a success story at a facility</li> </ul>
	<b>Ohio</b>	<ul style="list-style-type: none"> <li>• Large-scale collaboration between multiple state agencies and entities like the Ohio Water Resource Center, U.S. EPA ORD, and numerous universities to sample WWTPs</li> <li>• Created an analytical methods group—which includes eight laboratories—to foster SARS-CoV-2 methods development</li> <li>• Developed a public-facing dashboard that depicts trends in wastewater results</li> </ul>
	<b>Wyoming</b>	<ul style="list-style-type: none"> <li>• Provided financial incentives to participating utilities</li> <li>• Created a public-facing dashboard of wastewater results as well as modeled predictions for the percent of the population infected with COVID-19, based on wastewater data</li> </ul>



Wastewater Surveillance Program		Unique Aspects of the Program Highlighted in the Case Study
Local Programs	Hampton Roads Sanitation District in Hampton Roads, Virginia	<ul style="list-style-type: none"> <li>Collected samples throughout the collection system and analyzed them for SARS-CoV-2 at their own laboratory</li> <li>Analyzed wastewater samples from other utilities and organizations throughout the state</li> <li>Published a peer-reviewed journal article on their approach</li> </ul>
	Houston, Texas	<ul style="list-style-type: none"> <li>Collected wastewater samples from all WWTPs within the city, individual facilities, and other locations</li> <li>Used wastewater data, with other data like COVID-19 individual testing results and vaccination rates, to identify “hot spots” for targeted public health intervention</li> <li>Recruited members of the local community to support outreach efforts</li> </ul>
	Tempe, Arizona	<ul style="list-style-type: none"> <li>Developed and implemented a SARS-CoV-2 wastewater surveillance program based off its well-established community-focused opioid wastewater monitoring program</li> <li>Compared local events to the wastewater results</li> <li>Targeted outreach programs for underserved communities</li> </ul>
University Programs	Clemson University in Clemson, South Carolina	<ul style="list-style-type: none"> <li>Categorized wastewater results by “impact level” on a public-facing dashboard (includes variant results)</li> <li>Used the wastewater data to support its COVID-19 response</li> <li>City of Clemson used the wastewater results to support its mask mandate in June 2020</li> </ul>
	University of Arizona in Tucson, Arizona	<ul style="list-style-type: none"> <li>Began analyzing samples for SARS-CoV-2 from utilities across the country and then began analyzing samples collected on campus</li> <li>Developed action levels for their campus wastewater surveillance program and used the wastewater data to prevent an outbreak in a dorm—a story that garnered national attention</li> </ul>

# Lessons Learned

- ▶ Collaboration, flexibility, and transparent communication
- ▶ Data analysis and interpretation
- ▶ Public health connection for decision making
- ▶ Need for funding to establish an enduring capability
- ▶ Need for standard methods and sampling approaches





**CONTACT INFO: Smiti Nepal, P.E.**  
**Office of Wastewater Management**  
[Nepal.smiti@epa.gov](mailto:Nepal.smiti@epa.gov)  
**202-564-2457**

**Kathryn Kazior, P.E.**  
**Office of Wastewater Management**  
[Kazior.Kathryn@epa.gov](mailto:Kazior.Kathryn@epa.gov)  
**202-564-2696**

**Sally Gutierrez**  
**Office of Research and Development**  
[Gutierrez.Sally@epa.gov](mailto:Gutierrez.Sally@epa.gov)  
**202-779-0622**