

Building Wastewater Surveillance with Tribal Communities to Strengthen Public Health

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The Foundations of Wastewater Surveillance

Wastewater surveillance at-a-glance

Wastewater surveillance (WWS) is the use of untreated wastewater samples to detect markers of pathogens (germs) transmitted in a community.



1

Wastewater is tested coming into the treatment plant

2

Markers of a pathogen (germ) are detected

3

Data are shared quickly

The process of wastewater surveillance

Individuals use toilet on sewer system

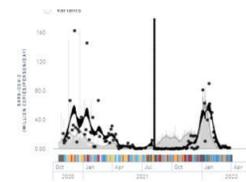
At a centralized treatment plant, or sampling point, a grab or composite sample is collected

The sample is processed, concentrated, and genomic material is extracted

The genomic material of the pathogen is then amplified and detected

Raw data are received, analyzed, and visualized

Metrics can be used to inform public health decisions



On average, 7 days

The opportunities and limitations of wastewater surveillance can inform community participation

Opportunities

- Community level samples provide infection information for many individuals in one sample
- Better understand disease trends in a community
- Captures asymptomatic infections
- Independent of healthcare-seeking behavior and testing access
- Multiple targets (pathogens) can be tested at once

Limitations

- Unable to include septic systems
- Decentralized wastewater treatment facilities will not be captured
- Cannot be used to “clear” a community or facility
- Each pathogen that is monitored needs enough wastewater data to understand the best metrics and what they mean.

Wastewater data can be used to inform timely public health action

Wastewater data can provide information on rising levels of infection in a community days before this can be detected by other metrics, such as hospitalizations

- For **COVID-19**, SARS-CoV-2 levels have been used to inform
 - Public health interventions
 - Vaccination campaigns
 - Communications surrounding new variants and their spread
- **Mpox** detections have been used to focus testing and prioritize vaccination clinic locations

Wastewater surveillance offers additional perspective on community health



Captures community-level data in a single sample to understand changes in disease transmission and infection levels



Wastewater provides a flexible matrix that can be tailored to monitor different targets according to community public health needs



Provides timely data that can be used to enhance public health action



The National Wastewater Surveillance System Infrastructure

Timeline for NWSS Growth and Enhancement



2023

- Sites began testing for influenza and RSV
- Evaluated new targets and assays
- Enhanced data visualization



Early 2024

- Pilot new targets in NWSS Centers of Excellence
- Evaluate pilot data for public health action
- Continue looking at additional targets for inclusion such as West Nile Virus, norovirus, and antibiotic resistant genes



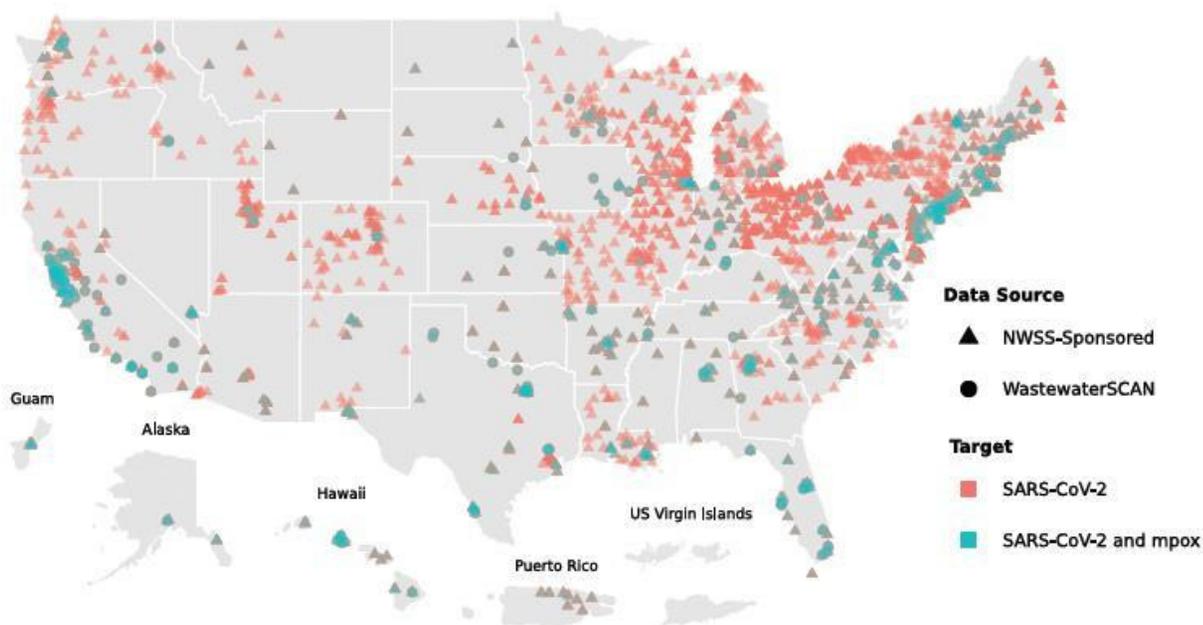
Mid-late 2024

- Anticipated system-wide rollout of some new targets

National Wastewater Surveillance System (NWSS) Implementation | 2020 – 2023

SARS-CoV-2 and Mpox

NWSS sampling sites



- >1,500 sites in 50 states, Puerto Rico, USVI, Guam, and 5 Tribal communities
- Representing ~150M people
- 4 Centers of Excellence: California, Colorado, Houston and Wisconsin

Engagement with Tribal Communities is Ongoing and Evolving

The NWSS team ultimately wants to best serve tribal communities by learning about each community's unique needs and capacity for wastewater surveillance and developing government-to-government relationships.



2021

NWSS Testing Contract

- Providing twice weekly testing
- Real time data
- Engagement with NWSS community

2022

NWSS Testing Contract and OTASA CoAg

- Expanded the testing contract
- Funded one recipient directly to support WWS engagement

2023

NWSS Testing Contract and OTASA CoAg

- Expanded the testing contract
- Funded 5 recipients directly to support ongoing WWS work and support new efforts

Finding solutions to best collaborate with tribal communities

For tribal communities, we work with each partner to learn their priorities in:

- infrastructure
- data
- communication

At the core of our work is ongoing efforts to earn and maintain trust. How we do that is informed by each community's history and needs.



Relationship building and sovereignty



Data protections



Ongoing conversation within communities

An aerial photograph of a river winding through a lush green landscape. The river is a prominent blue line, and the surrounding land is a mix of vibrant green fields and darker green wooded areas. The image is slightly blurred, giving it a sense of depth and movement.

Learning how to further support tribal communities' public health with wastewater surveillance

Finding ways to grow wastewater surveillance in tribal communities

Opportunities

- Community-led surveillance priorities
- Creative sampling and testing methods
- Translating wastewater data into public health action
- Effectively serving public health and the community

Challenges

- Current funding mechanisms
- Hard to reach communities served primarily by septic systems
- Resource considerations
- Outreach and relationship building
- Data use

Continued relationship building with NWSS and tribal communities and organizations

Future efforts:

- Learn about tribes' ongoing WWS efforts
- Identify new mechanisms of support for WWS in tribal communities
- Continue to improve our processes to make sense for tribes
- Prioritize and integrate ethics into WWS practices

Photos courtesy of Getty Images, Rachel West



NWSS Goals for learning from the TAC

- Gain insights on ways to encourage participation by tribes in wastewater surveillance
- Seek partnerships with tribes and others to address specific technical challenges with WW surveillance in remote and resource constrained environments
- Work collaboratively with tribal community members to communicate ww surveillance findings and translate into public health action for tribal community members
- Discuss considerations on data protection and sharing considerations surrounding wastewater surveillance
- Learn about NWSS targets and priority pathogens for monitoring through wastewater surveillance within tribal communities

Thank you

Please feel free to email (nwss@cdc.gov)
with any questions

Visit [NWSS webpage](http://www.cdc.gov/NWSS) for more
(www.cdc.gov/NWSS)



For more information, contact CDC
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The findings and conclusions in this report are
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