# The Future of NWSS

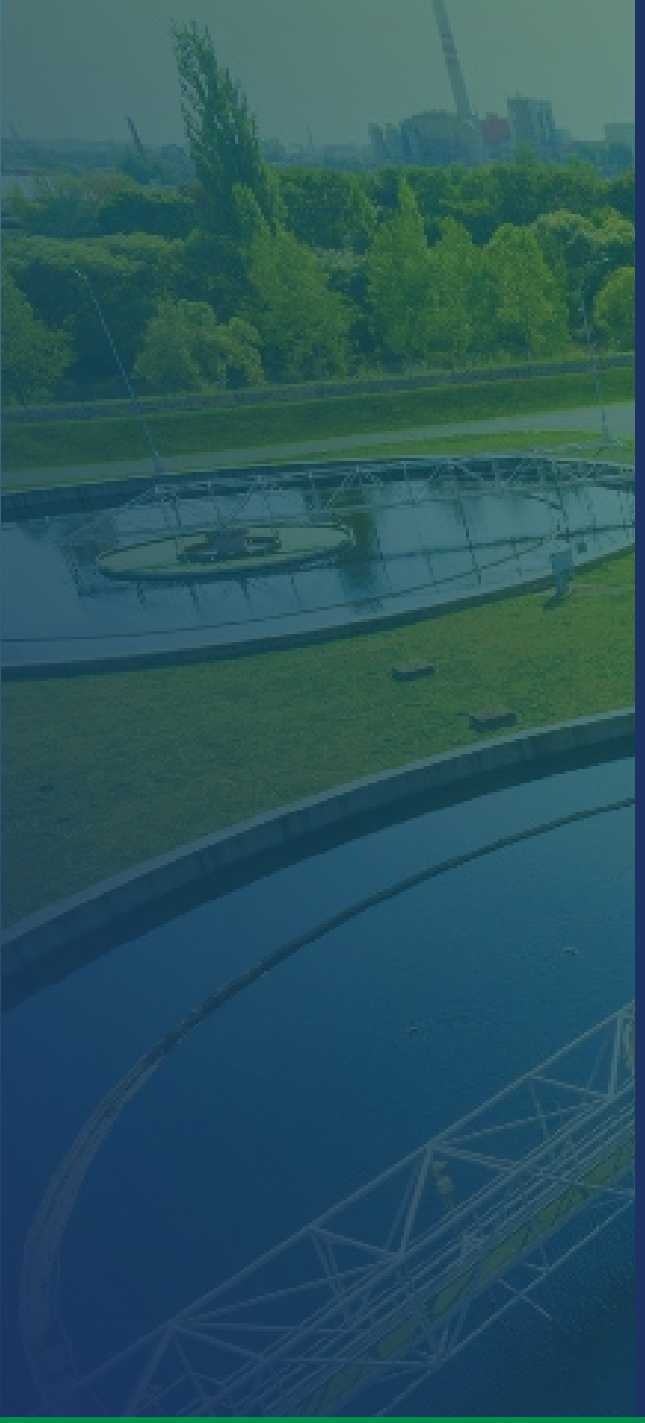
**John D. Person, MPH**

State, Territorial, Local, and Tribal Support Lead

National Wastewater Surveillance System

Waterborne Disease Prevention Branch

Division of Foodborne, Waterborne and Environmental Diseases



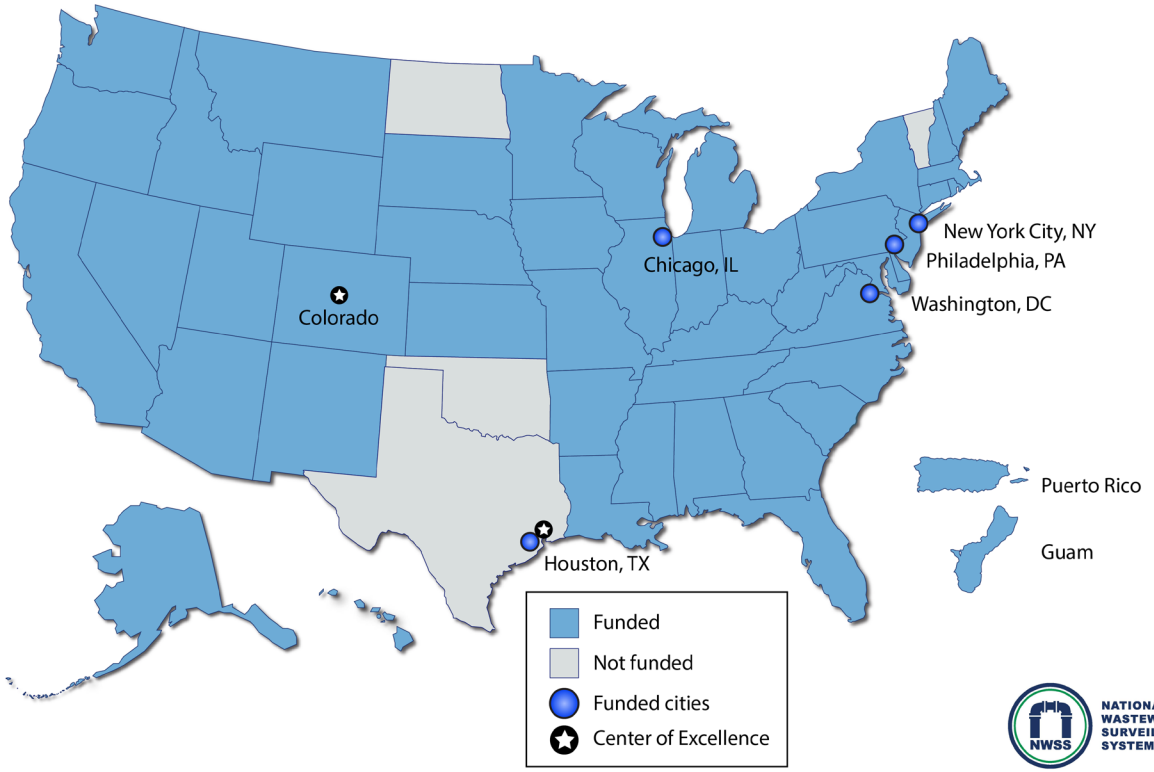
# Old NWSS

Looking back and improving

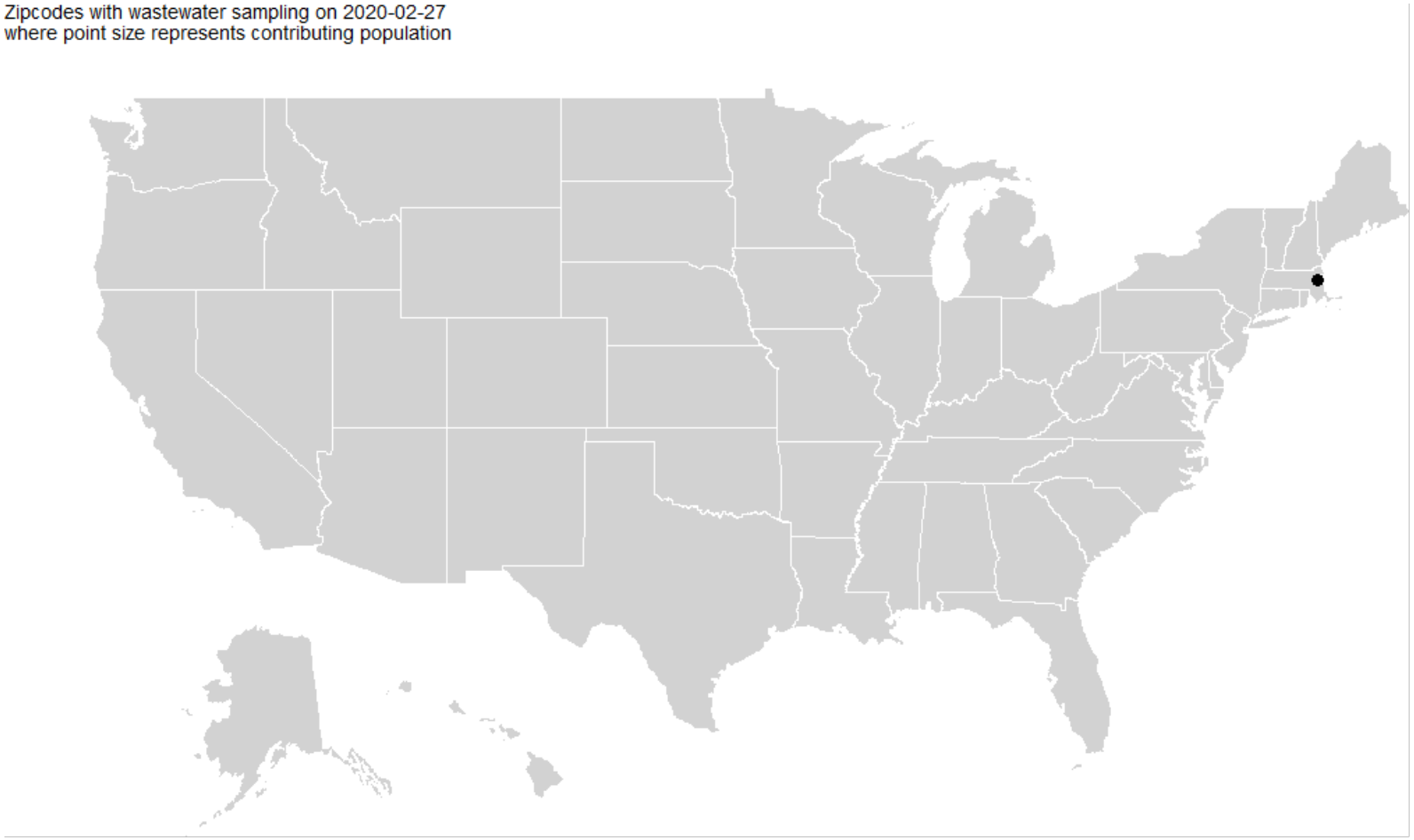
NATIONAL ™ WASTEWATER SURVEILLANCE SYSTEM


# NWSS Implementation

## CDC Funds Jurisdictions to Support Wastewater Surveillance




- **46 States**
- **5 Cities**
- **2 Territories**
- **2 CoEs**




# NWSS Growth

- >152,000 unique wastewater samples
- >1400 sites in 50 states, 3 territories, and 7 tribal communities
- Representing >138M people

# NWSS Centers of Excellence

COLORADO
Department of Public Health & Environment

+

HOUSTON HEALTH DEPARTMENT

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# NWSS Communities

The National Wasteawater Surveillance System leads and participates in 3 communities of practice.

Other communities supporting NWSS include the NWSS Data Analysis Group, Implementation Cohorts, DCIPHER workgroups, and more to come!

1

**Health Departments**

Hosted by CDC, 200+ participants, 56 jurisdictions, Provides CDC updates, peer-to-peer sharing, coordination

2

**Laboratories**

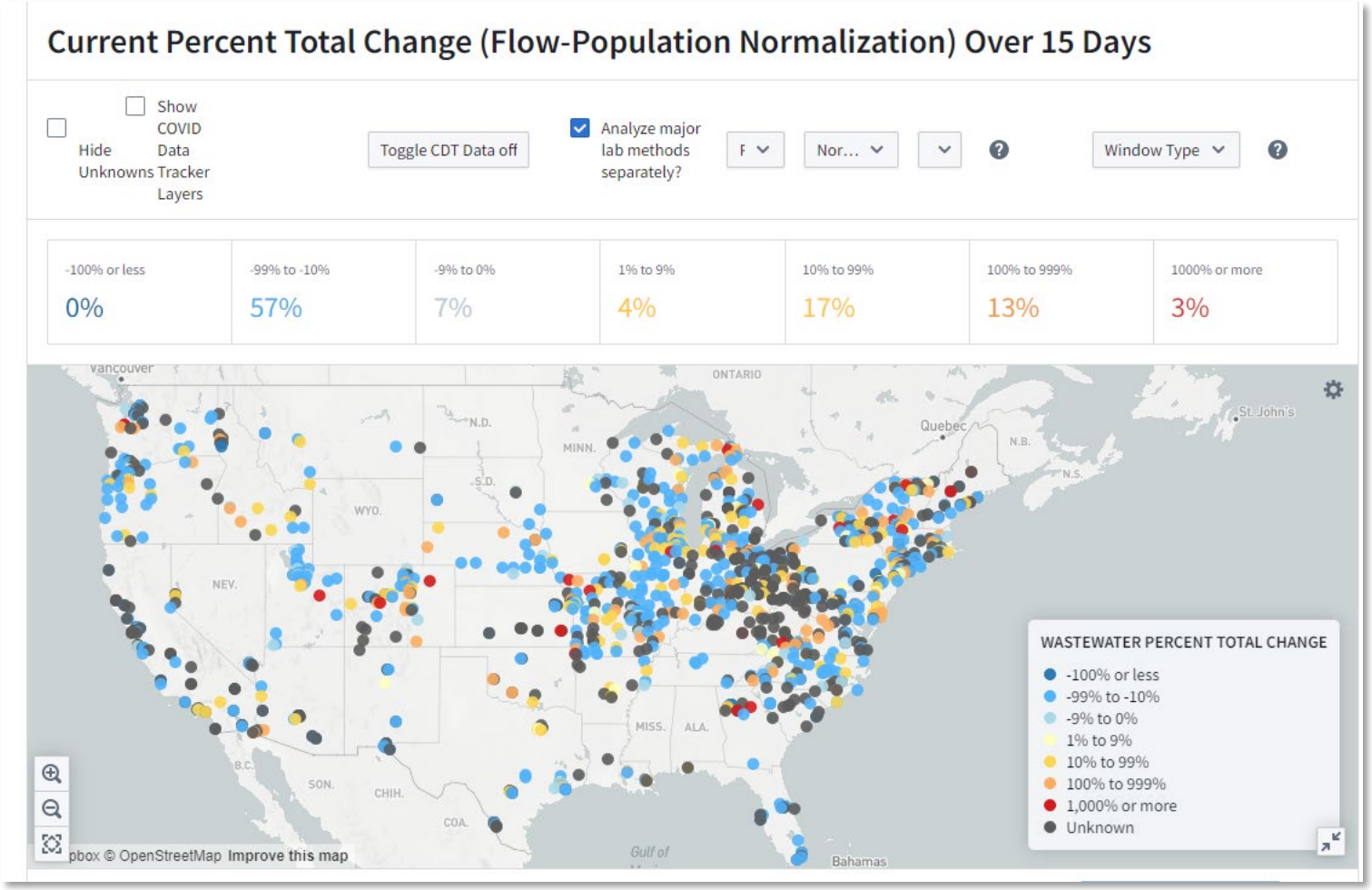
Hosted by APHL, 100+ participants, 39 states, 65+ labs represented.
Provides best practices, corporate pricing, and workflow pilot project

3

**Utilties**

Hosted by WEF. 230+ members, 40+ jurisdictions.
Provides information, discussion, and support

# DCIPHER dashboard | One-stop shop for implementers



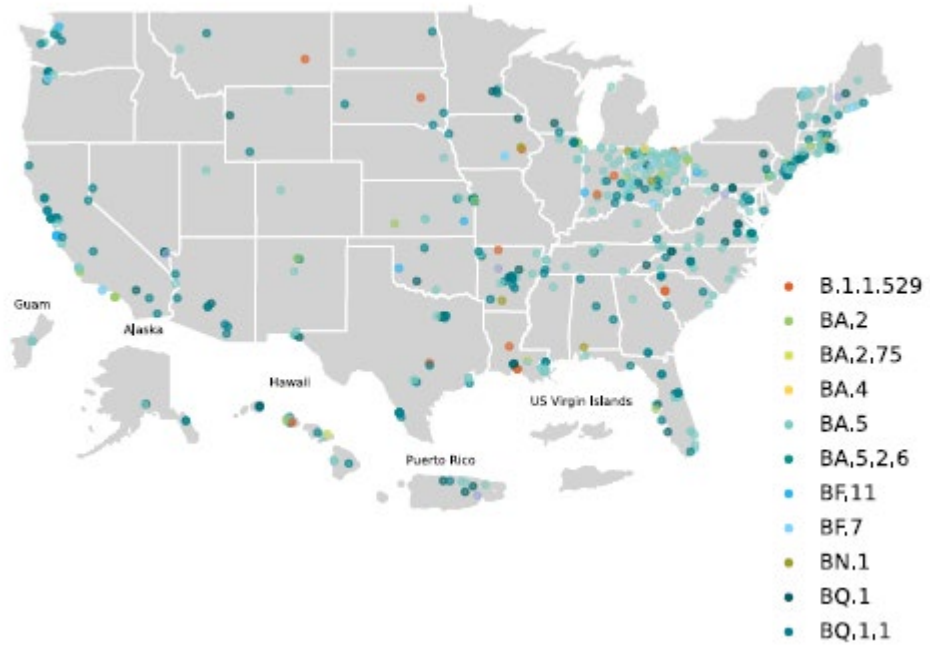

| Metric | What does this show us? |
|---|---|
| Percentiles | Relative levels of virus present in a community over time |
| Percent Change | Magnitude and direction of virus levels in a community |
| Detection Proportion | How frequently is the virus detected in a community |
| Variant Specific Metrics | If a known variant is present, and at what proportion |

Also includes-

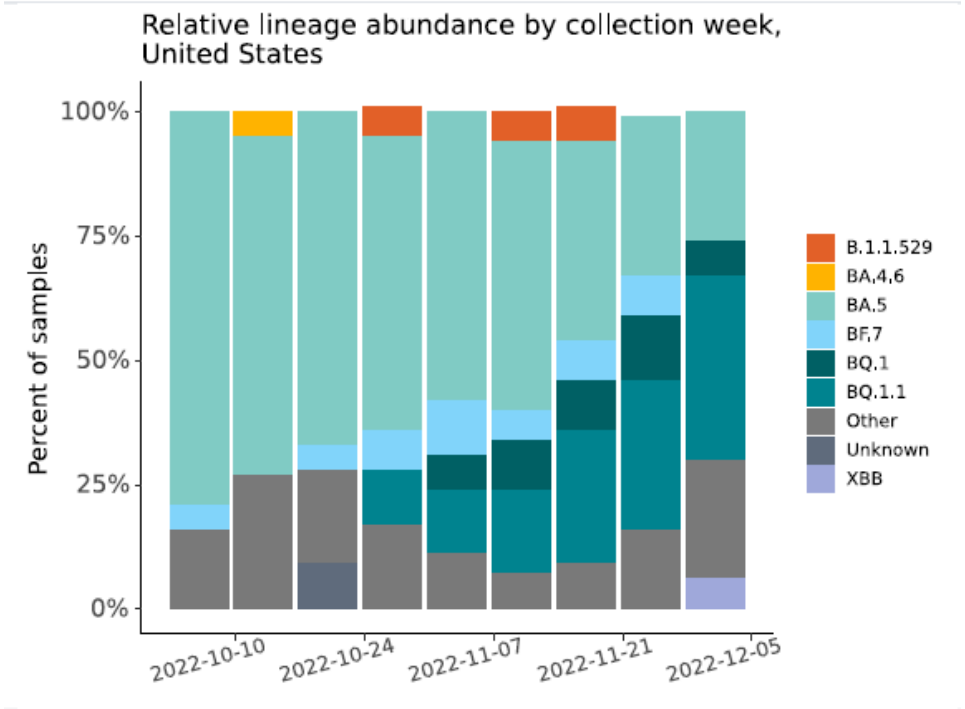
- Resource library
- Contact list
- Automated QC reports
- Automated utility reports
- Support forum

# NWSS Sequence Data Visualization Dashboard

DCIPHER Dashboard Dominant Variant of Concern Map of US

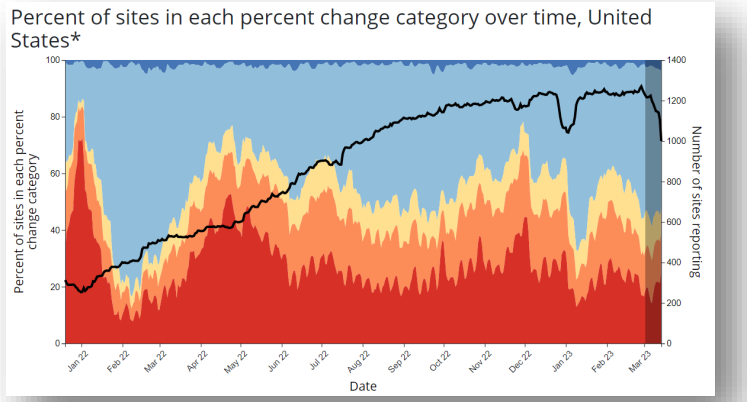



Variant Distribution in Wastewater



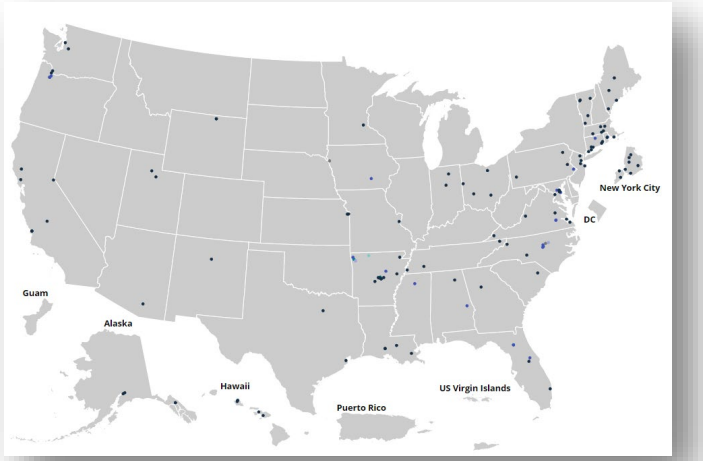
# NWSS Public Dashboards

## SARS-CoV-2 Trends



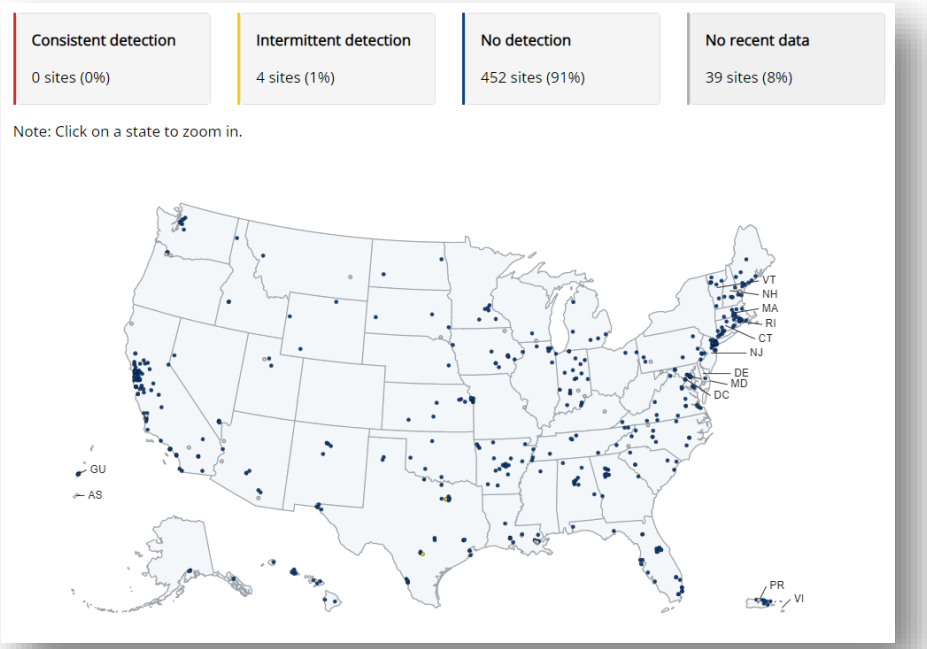

[COVID Data Tracker Wastewater Surveillance]

## SARS-CoV-2 Variants

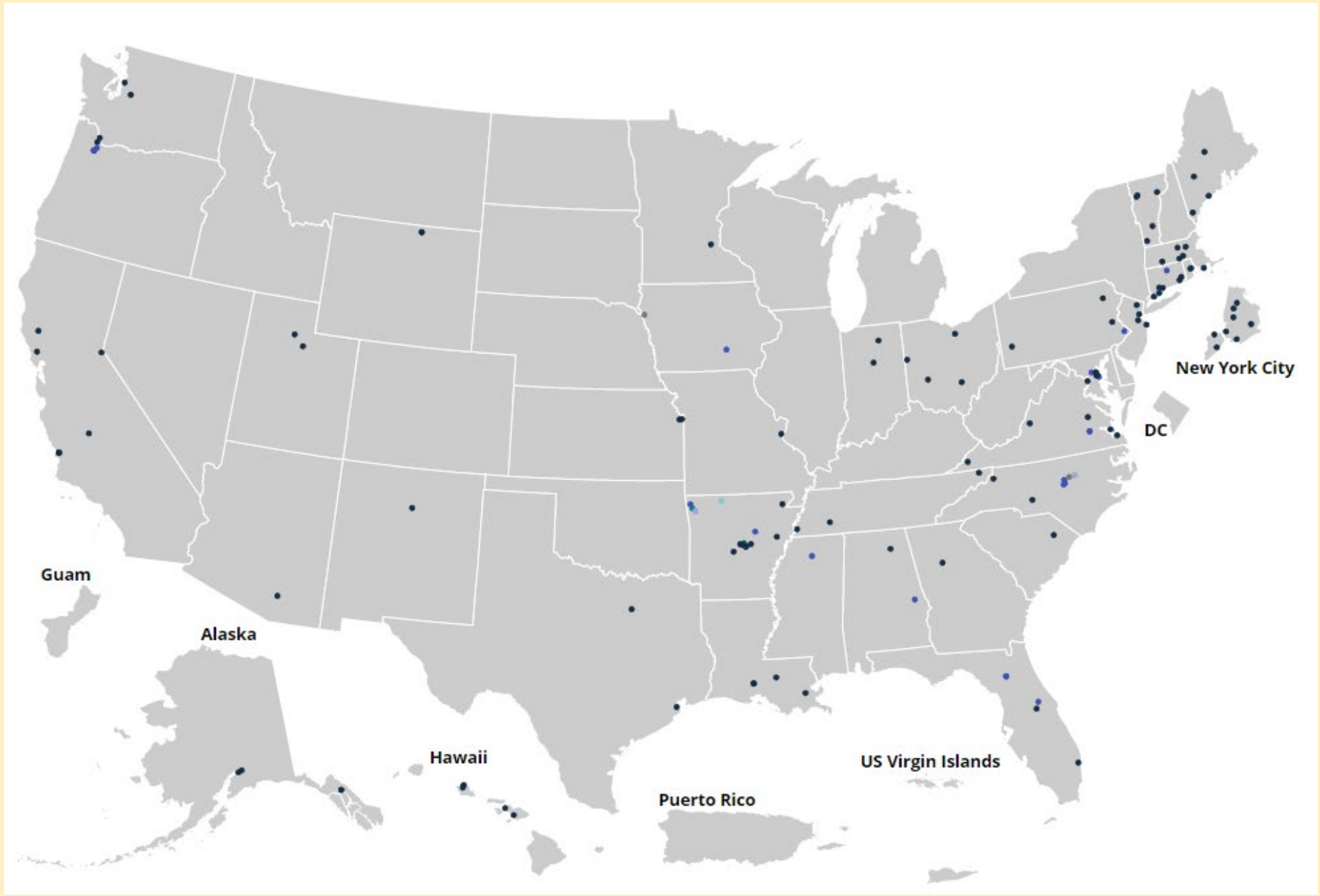



[COVID Data Tracker Variant Surveillance]

## Mpox Detections

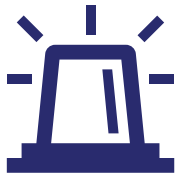



[Mpox Wastewater Public Data]


New York City
DC
Guam
Alaska
Hawaii
US Virgin Islands
Puerto Rico

# Wastewater Surveillance for Rapid Response

## Nimble structure to **rapidly adapt** to changing public health needs

| | | | |
|---|---|---|---|
|  | **Emergency Response**<br>Local or regional activations in the wake of natural disasters to detect outbreaks |  | **Emerging Infections**<br>Short-term activations to assess the prevalence and distribution of emerging threats |
|  | **Pandemic Preparedness**<br>Rapid activation and increased sampling frequency to detect pandemic spread into communities to target mitigation efforts |  | **Bioterrorism**<br>Rapid local or regional activation with increased sampling frequency to detect and track bioterrorism threats |

# What’s coming down the pipe?

More than COVID

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## Phase 1: Core

- Regular surveillance for endemic or **common** diseases, such as flu or antibiotic resistance genes
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## Phase 3: Pandemic preparedness

- Horizon scanning for potential epidemic or pandemic threats
- Evaluation of potential **rare, unexpected** diseases such as Ebola or Mpox
- National Biosecurity Strategy Early Warning

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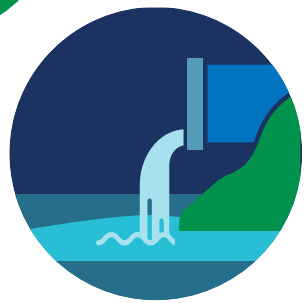

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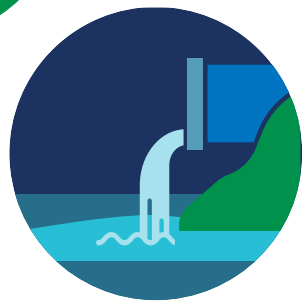

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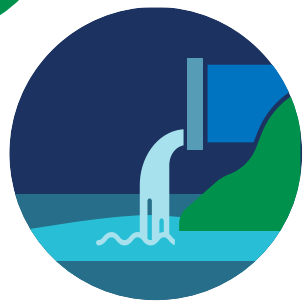

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What is the geographic distribution of cases?

- Are there enough cases in a sewershed to be detectable?
- What is the case ascertainment rate and timing?

# NWSS Panel for Core Targets

- Normalization and Process Controls
  - Pepper Mild Mottle Virus
  - Crassphage
  - Bovine Coronavirus
- Antibiotic resistance genes
  - Carbapenemases
  - ESBLs
  - Colistin resistance
  - Vancomycin resistance
- Pathogen targets
  - SARS-CoV-2
  - Influenza A and B
  - Respiratory Syncytial Virus
  - Adenovirus 40/41
  - Shiga-toxin-producing *E. coli*
  - *Campylobacter*
  - Norovirus
  - *Candida auris*
  - Mpox (non-Variola Orthopox)

Timeline

- Piloted in NWSS Centers of Excellence in early 2023
- Anticipated system-wide rollout August 2023
- Data integrated into DCIPHER for real-time access
- Develop NWSS dashboard for public data sharing
- Reviewed annually by CDC NWSS Advisory Committee

# Transition to a single test type

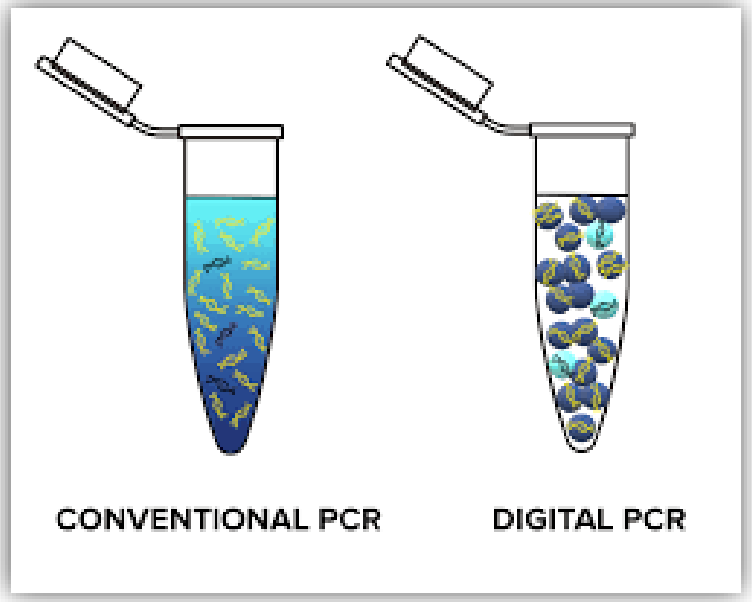



Image: jetmolecular.com

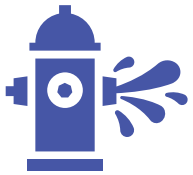
The NWSS testing panel must be
- Quantitative
- Highly parallel or multiplexed
- Readily adapted
- Robust to inhibitors present in wastewater
- Low limits of detection

Digital PCR satisfies all of these requirements and is already in use by many NWSS laboratories
- Developing assays that are compatible with both BioRad and Qiagen dPCR systems

# Challenges for NWSS development and sustainability

Extending coverage, 20% unsewered

Improved metrics including estimating disease prevalence



Optimal geographic and temporal sampling frame for multiple targets

Improved methods, streamlined workflow

Impact of vaccination and variants

Improved data submission, dissemination, messaging

Ethical transparency, especially around sample archiving

# Thank you.

**Visit NWSS webpage for more.**

*https://www.cdc.gov/nwss/wastewater-surveillance/*

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For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 | www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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