



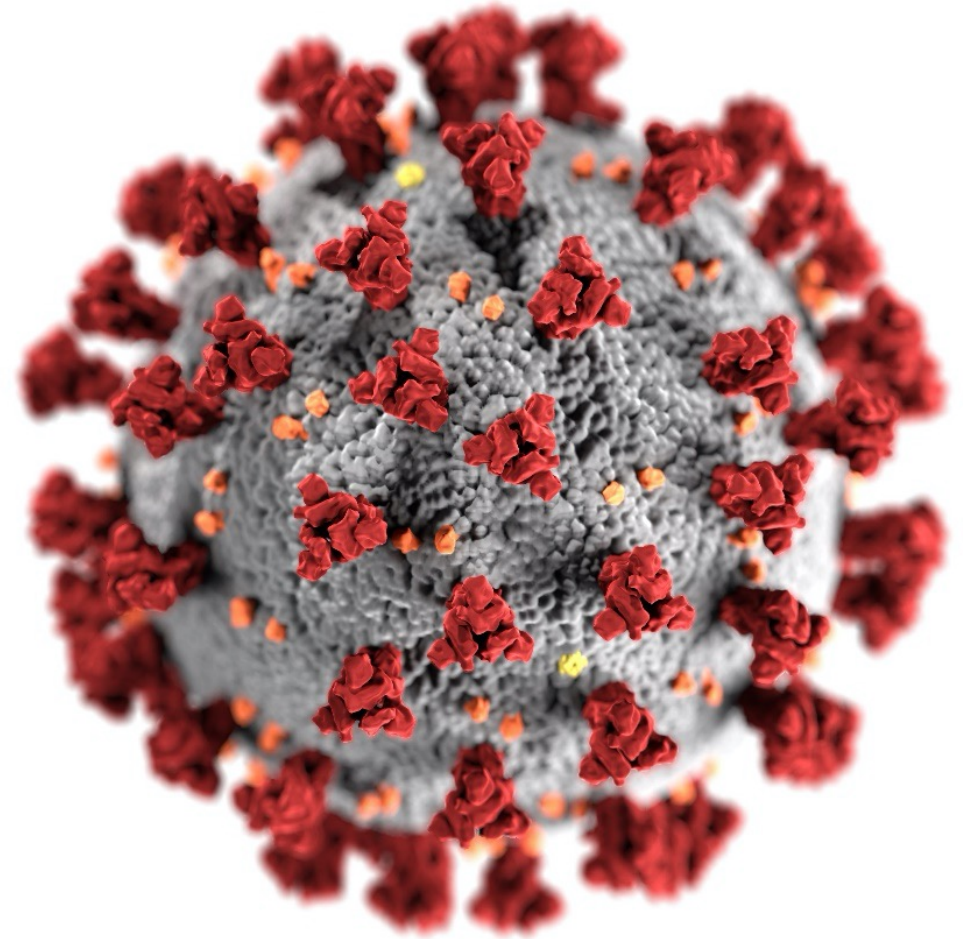
NATIONAL™ WASTEWATER SURVEILLANCE SYSTEM

Available Data Tools: National Wastewater Surveillance System

15 June 2021

Waterborne Disease Prevention Branch

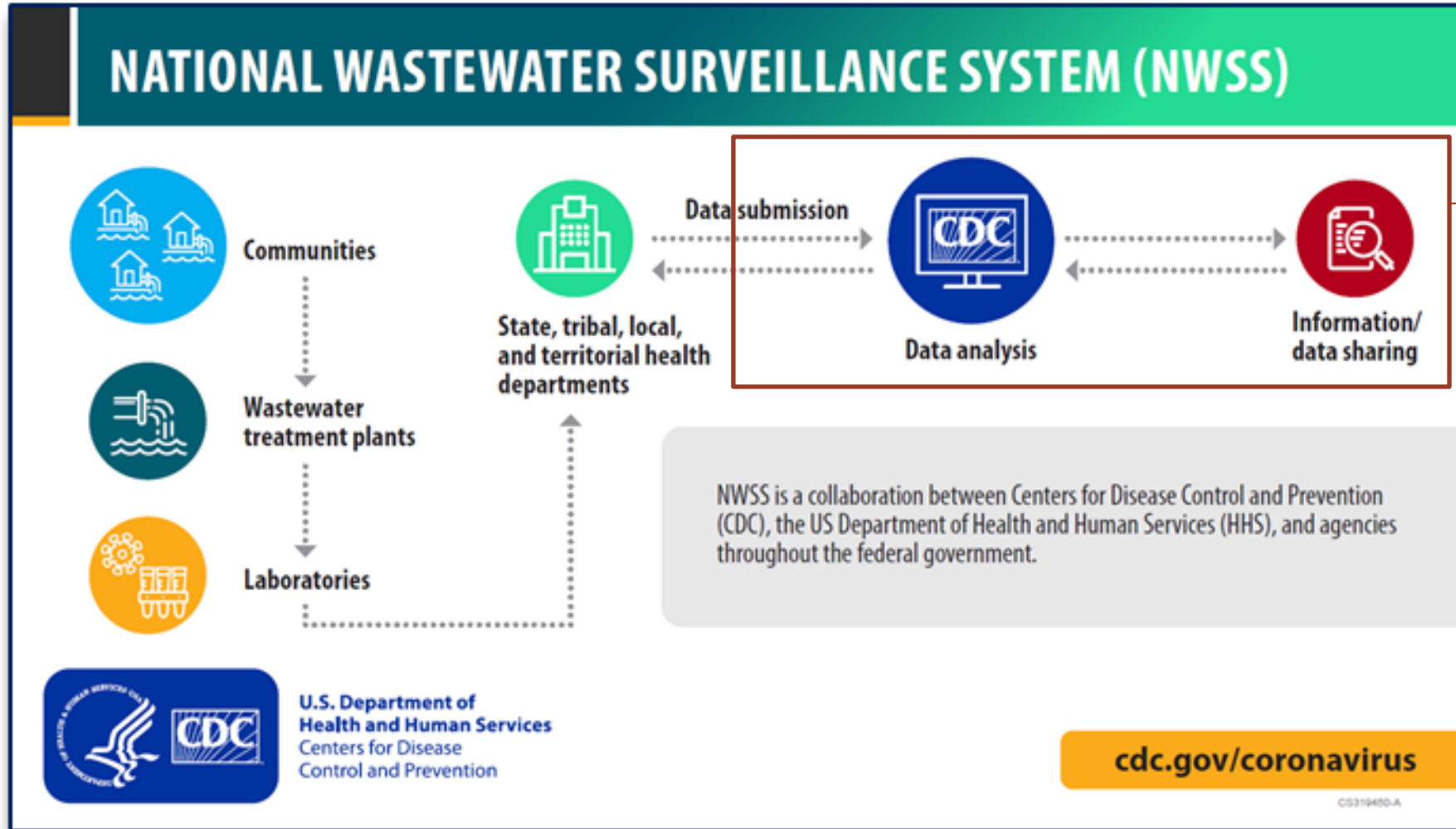
Division of Foodborne, Waterborne and Environmental Diseases



cdc.gov/coronavirus

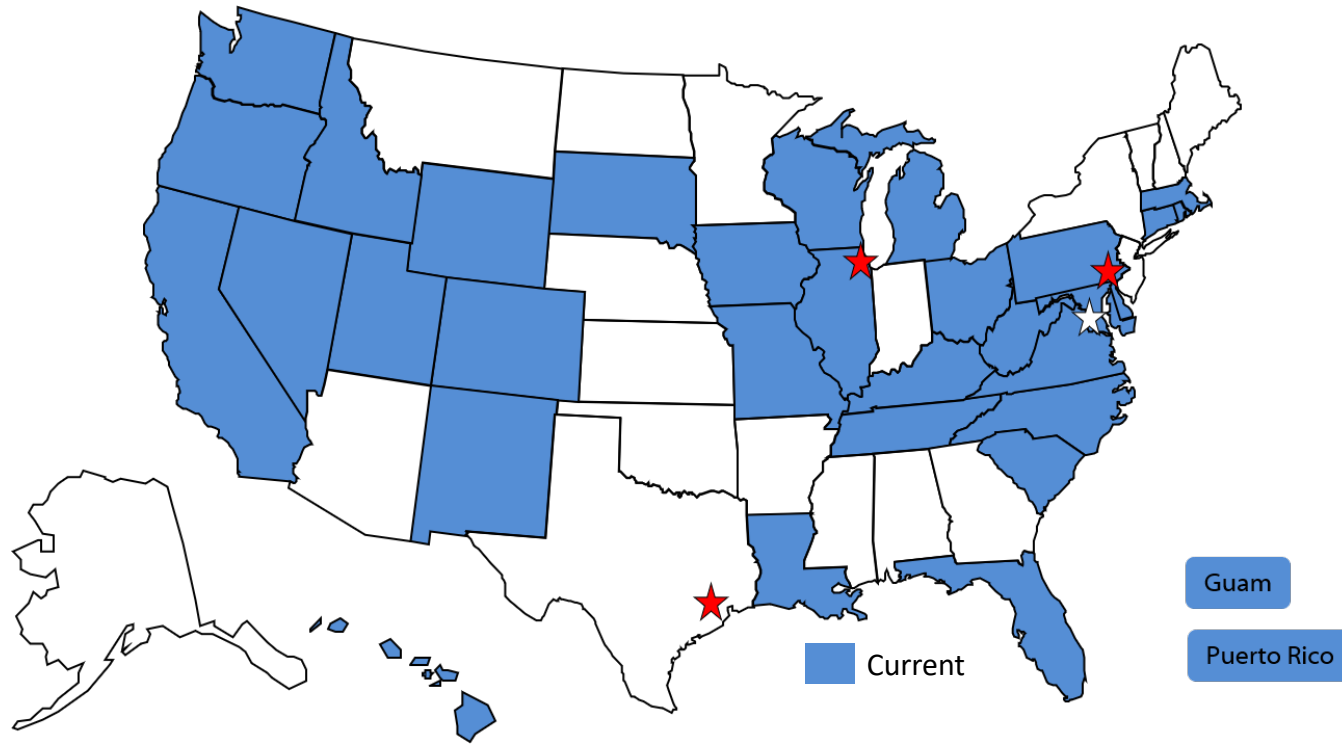


NWSS System overview

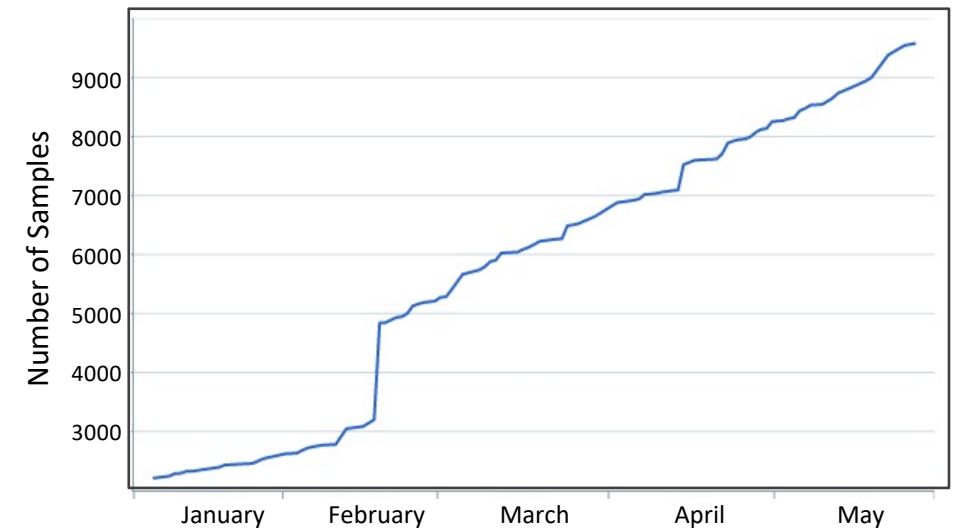




Participation in NWSS is growing quickly



Cumulative Samples in DCIPHER
Since January 2021



- Currently, 36 ELC-funded jurisdictions totaling \$223M for wastewater surveillance activities
- Additional \$34M pending award will increase number of jurisdictions

Data elements

1. Wastewater data – minimum requirement
 - CSV upload
2. Sewershed spatial boundaries
3. Sewershed COVID-19 case data
4. Laboratory protocols





DCIPHER features

- Data Collation and Integration for Public Health Event Response platform
- Unified system for data submission, management, and analysis
 - Merging of multiple data submission flows
 - Integration of disparate data sources: HHS Protect, other DCIPHER surveillance systems
 - Version control
 - Build scheduling
 - Analysis code
 - Dashboards
 - Document repository
 - User access permissions
 - Built-in tools for quality control
 - Collaboration and communication



DCIPHER features: receive and merge multiple data streams



NWSS Quantification Method Entry Edit form

NWSS Quantification Method Entry

* Reporting State i

* PCR Gene Target i

* PCR Target Reference i

* PCR Type i

* Limit of Detection Calculation Method Reference i

Human Normalization Target - Microbial i

Human Normalization Reference - Microbial i

9 issues identified Submit

NWSS CSV Uploader

Welcome to the CSV uploading tool, WILEY!

Foundry Dataset Path: /DCIPHER/COVID-19 National Wastewater Surveillance System (NWSS)/Data/bulk_upload/
Dataset Status: READY FOR UPLOAD
Feel free to upload your file(s).
Last Dataset Uploader: User: [redacted] Time: 2021-02-01T21:45:55.521267Z

File Selections Schema Check (No file selected)

Ontology Schema	File Schema	Column Found
epaid		No
wwtp_name		No
state		No
county_names		No
other_jurisdiction		No
zipcode		No
capacity_mgd		No
population_served		No
industrial_input		No
stormwater_input		No
influent_equilibrated		No
sewage_travel_time		No
sample_collect_date		No

Upload File

Upload Ready Check:
One file selected: **false**
Not oversized (greater than 300 mb): **false**
File is a text-based .csv: **false**
Schema matches with ontology: **false**





DCIPHER features: exploration and quality control

The screenshot displays the DCIPHER interface for exploring 'NWSS Sample Metadata'. The interface includes a search bar for properties, a 'Results' tab with 1,780 results, and two bar charts: 'Sample Collect Date' and 'Test Result Date'. The 'Sample Collect Date' chart shows data from July 2020 to January 2021. The 'Test Result Date' chart shows data from December 2020 to October 2021. A 'Results' panel on the right lists two CSV files and provides options to view all results and explore linked objects. A 'Filter linked objects' search bar is also present. A 'New exploration' button is visible at the top left, and an 'Add chart' button is at the bottom center.

Sample Collect Date

Month	Count
Jul 2020	12
Aug 2020	98
Sep 2020	160
Oct 2020	260
Nov 2020	400
Dec 2020	410
Jan 2021	440

Test Result Date

Month	Count
Dec 2020	0
Jan 2021	0
Feb 2021	0
Mar 2021	0
Apr 2021	0
May 2021	0
Jun 2021	0
Jul 2021	0
Aug 2021	0
Sep 2021	0
Oct 2021	0
Nov 2021	0
Dec 2021	0

Results 1,780

Sort by ▾

- CSV0000cfd14666d4405e47b...
- CSV000785738a294542b1baf...

[View all results](#) →

Explore linked objects 3

Filter linked objects...

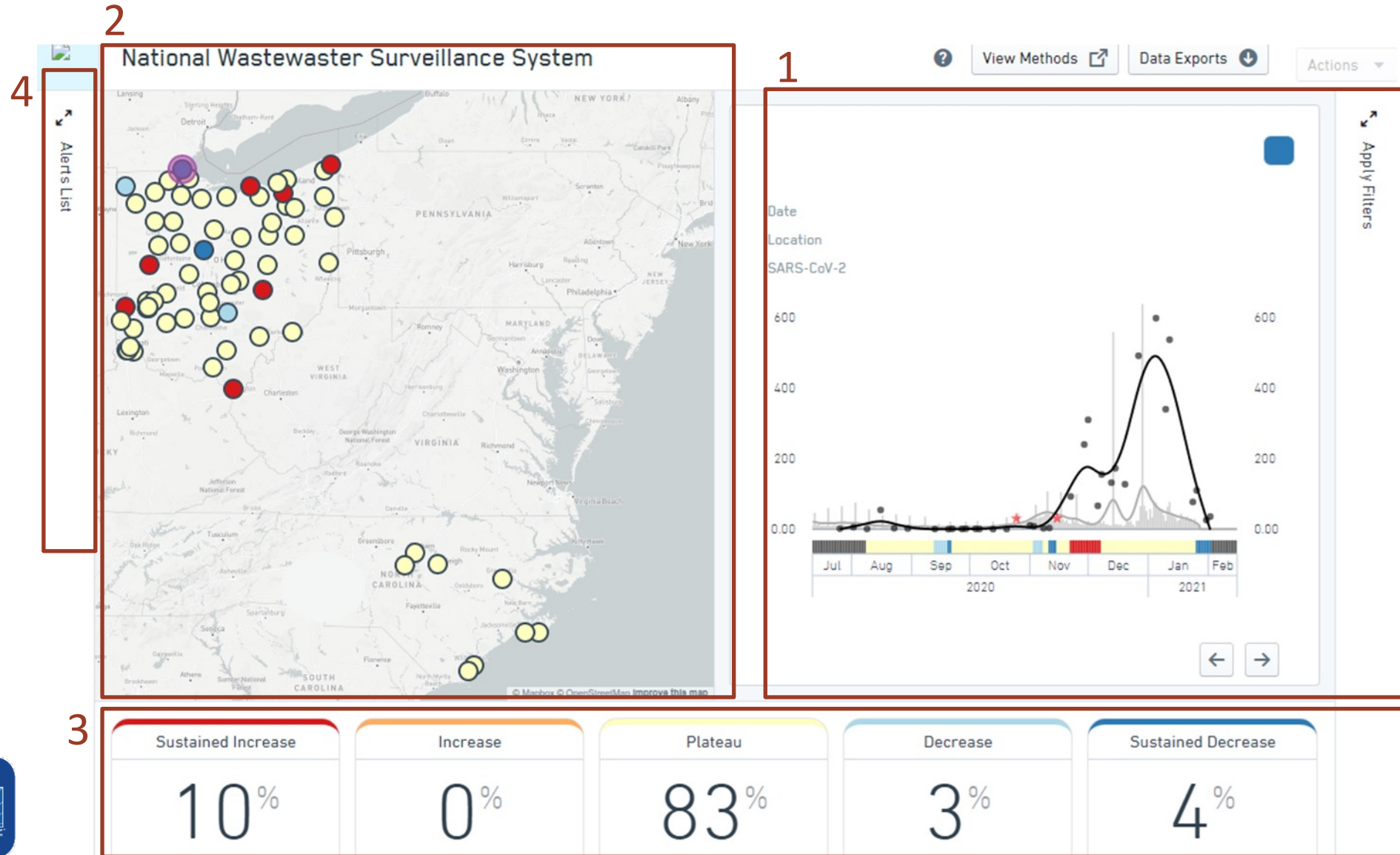
- NWSS Quantification Results

[Add chart](#)





DCIPHER features: internal dashboard





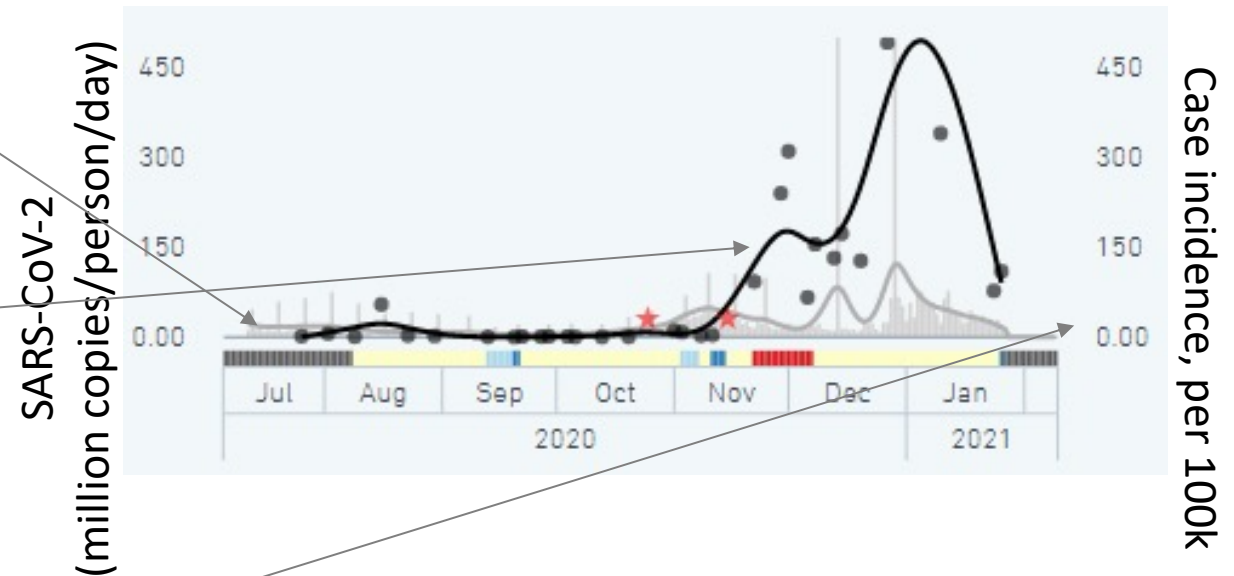
Analytics: wastewater normalization

- Current approach
 - Flow and population normalization of SARS-CoV-2 RNA concentrations
 - Adjusted by site-specific median RNA recovery
- Standardization (and inter-laboratory comparison) need:
 - Endogenous control
 - Matrix spike recovery control
 - PCR type (RT-qPCR vs RT-dPCR) with common standards



Analytics: overlaying wastewater & cases

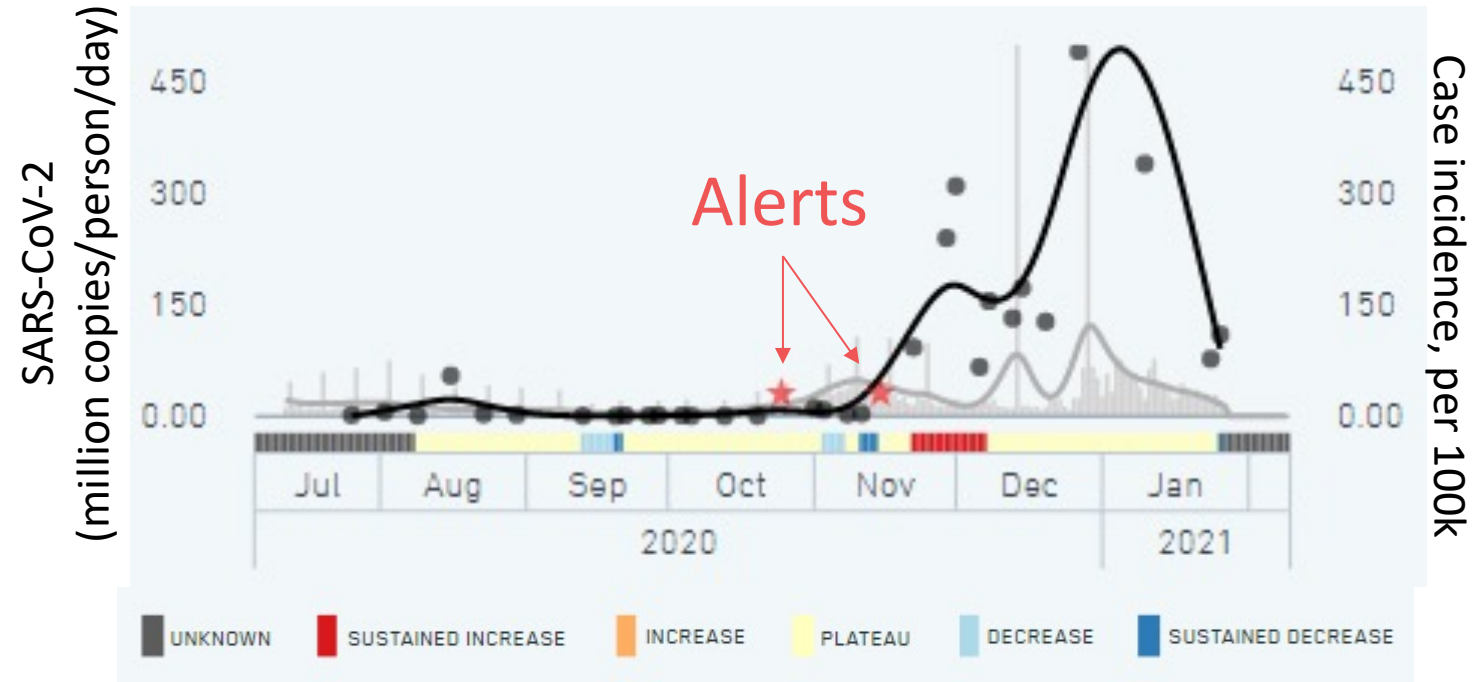
- Contextualizes wastewater data
- Date considerations
- Smoothing – data frequency impacts smoothing approach
- Scaling
 - Currently believe shape of curve, not absolute values, is what's reliable
 - Additive (not just multiplicative) changes matter





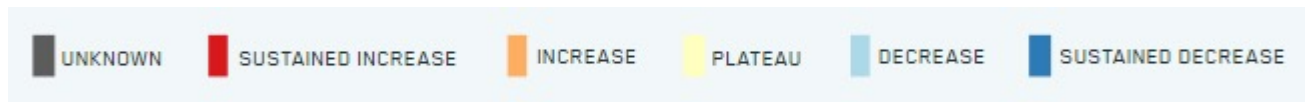
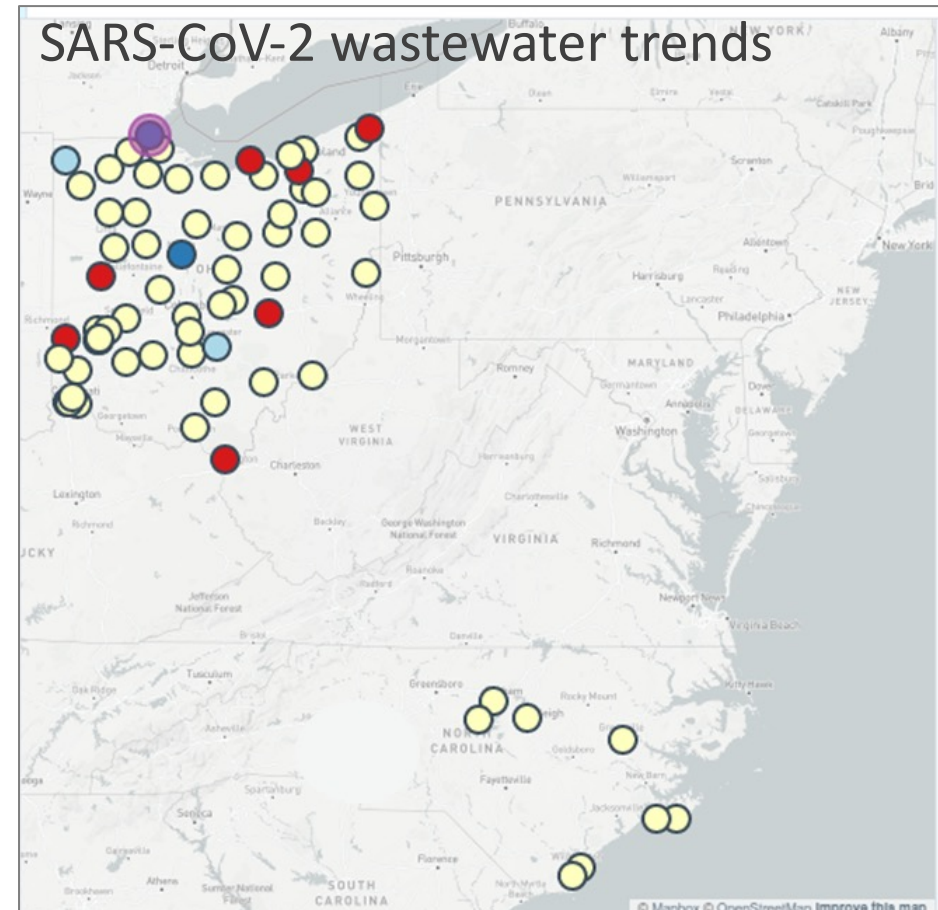
Analytics: wastewater trends & alerts

- Trend analysis
 - Sustained trend: 5 measurements
 - Trend: 3 measurements
 - Linear regression
 - Log transform
 - Inverse variance weighting
 - Significance level: 0.05
- Alerts analysis
 - Value higher than expected given 5 previous measurements
 - 1-sided prediction interval



Analytics: wastewater spatial representation

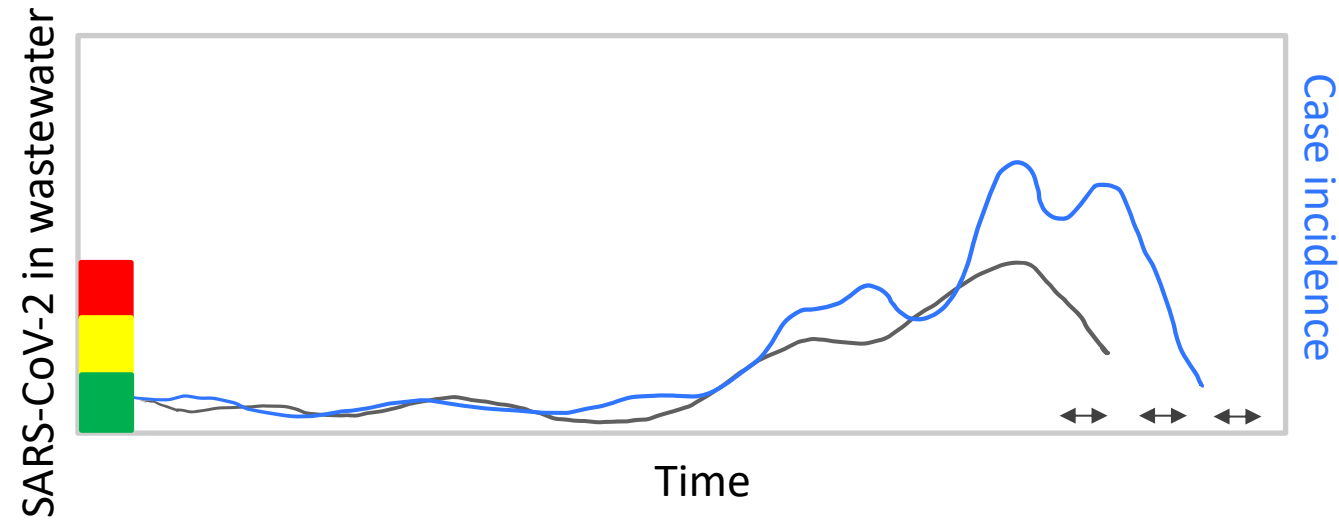
- Metric must be comparable across sites: trends
- Sewershed boundaries used if available
- Sampling location zip code used if not

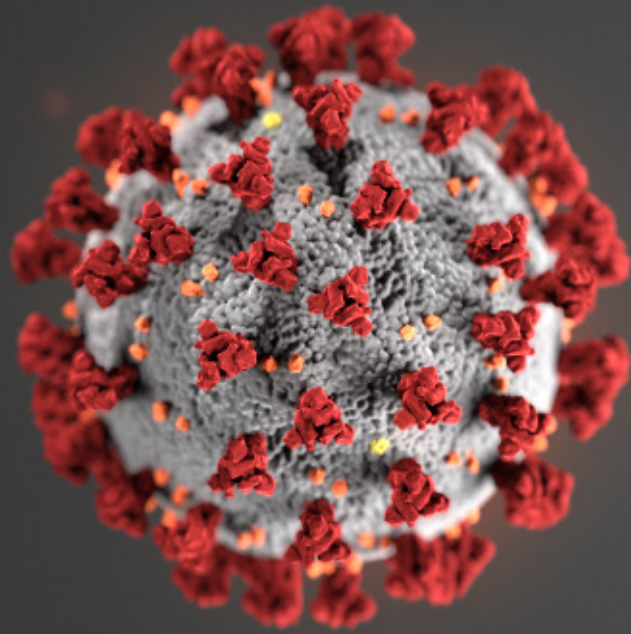




Analytics: under consideration

- Measure of similarity between SARS-CoV-2 wastewater levels and case rates
- Site-specific measure of relative SARS-CoV-2 level





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



NWSS@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.

