

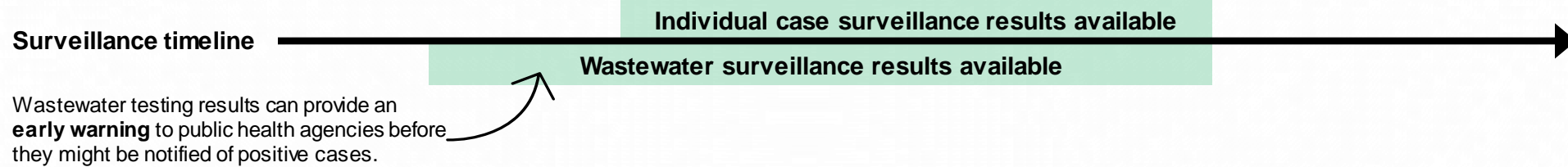
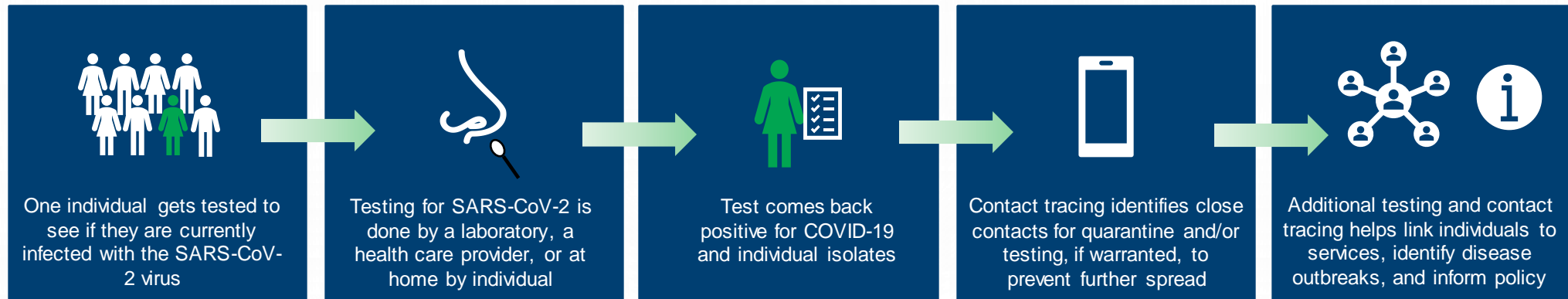
# MICHIGAN COVID-19 WASTEWATER MONITORING

APRIL 20<sup>TH</sup>, 2022

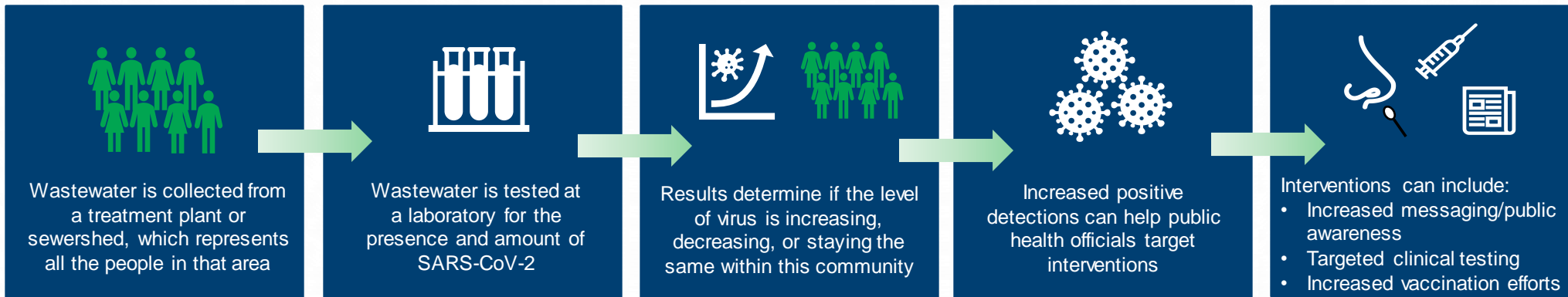
Kelly Geith, MPH  
Wastewater Epidemiologist

# How does wastewater monitoring fit in with overall COVID-19 surveillance?

## Individual Case Surveillance



## Population-Level Wastewater Surveillance



# FALL 2020 PILOT PROJECT

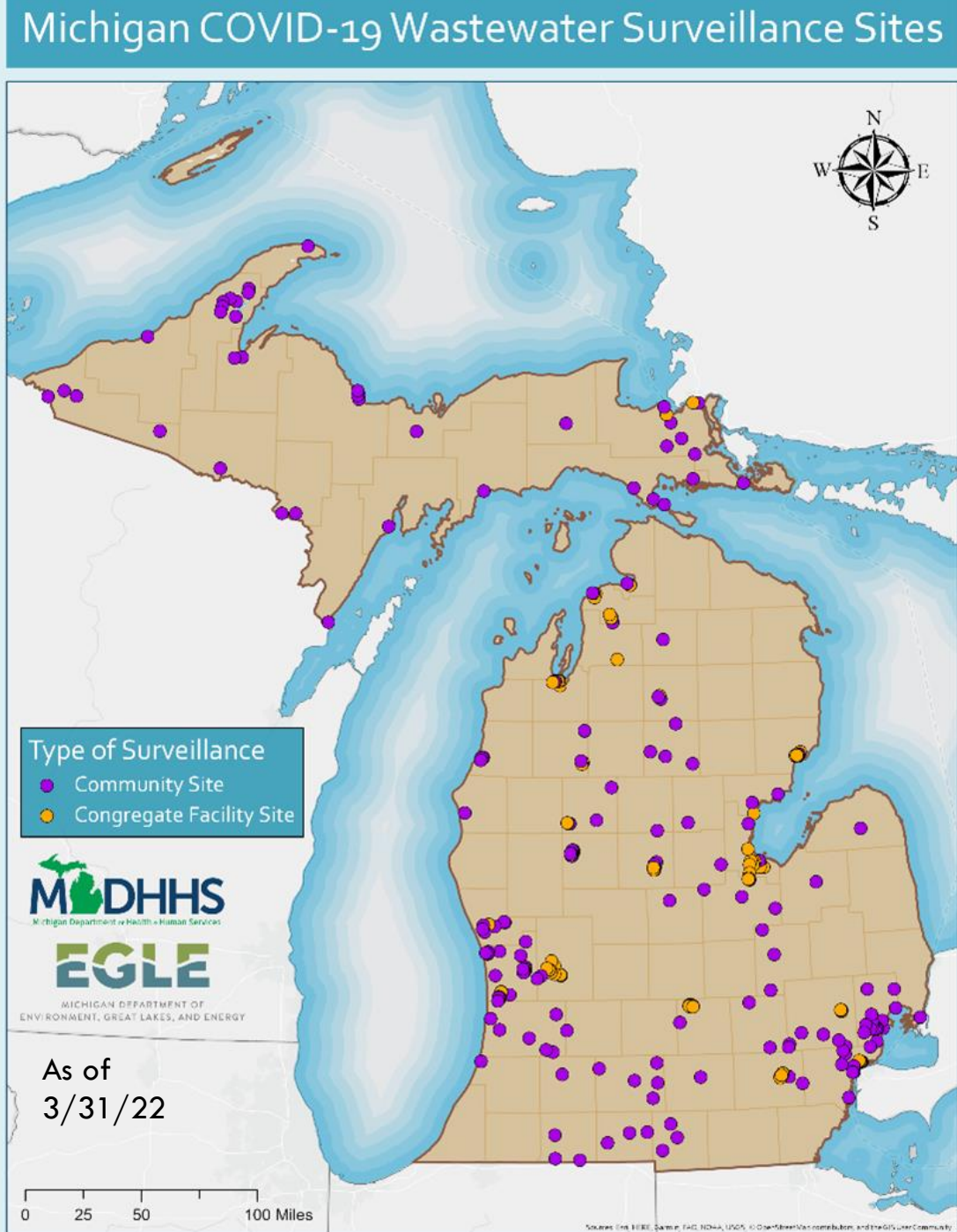
- October 1 – December 31, 2020
- Supported 20 local projects
- ~270 sampling sites in 37 counties plus the City of Detroit
- Used two monitoring strategies:
  - **Wastewater treatment plant monitoring** provides community-level data in the region to help evaluate trends
  - **Congregate facility monitoring** provides targeted testing of specific, known populations.
    - Examples include long-term care and/or assisted living facilities, K-12 schools, universities, prisons/jails, etc.
- Project goals:
  - Determine feasibility of wastewater testing
  - Standardize methods
  - Track trends
  - Inform local responses to the pandemic





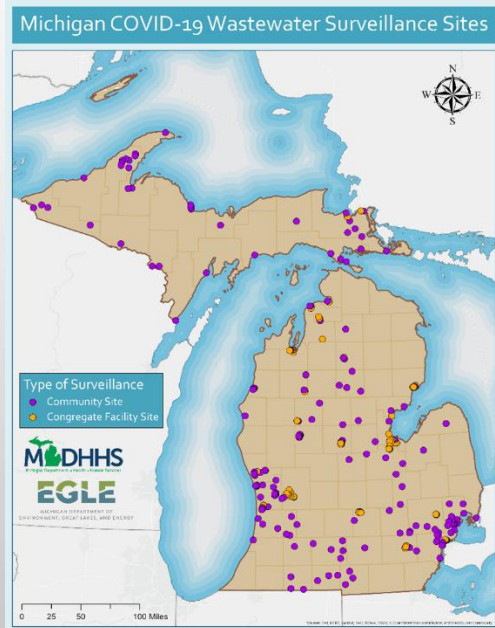
# SARS-COV-2 EPIDEMIOLOGY – WASTEWATER EVALUATION AND REPORTING (SEWER) NETWORK

- June 2021 – July 2023
- Supports 19 local projects:
  - 18 laboratories (14 academic, 2 LHDs, 2 private)
  - 36 local health departments
  - 5 Tribal nations
- Still using both WWTP monitoring and congregate facility monitoring
- 437 sampling sites:
  - 105 wastewater treatment plants
  - 95 sewersheds
  - 237 congregate facilities
- Covers sites in 59 counties and the City of Detroit



# DATA FLOW

## 437 sampling sites



18  
Laboratories

MICHIGAN STATE UNIVERSITY



Project Dashboard



SWEEP Dashboard



COVID Data  
Tracker

5 Tribal  
Nations

36 Local  
Health  
Departments

Additional  
Stakeholders



# LABORATORY METHODS

Sample  
collection



Sample  
concentration



RNA  
extraction



PCR  
quantification



Wayne State University  
Engineering and Facilities Teams



Michigan State University  
Xagorarakis Laboratory and team  
member

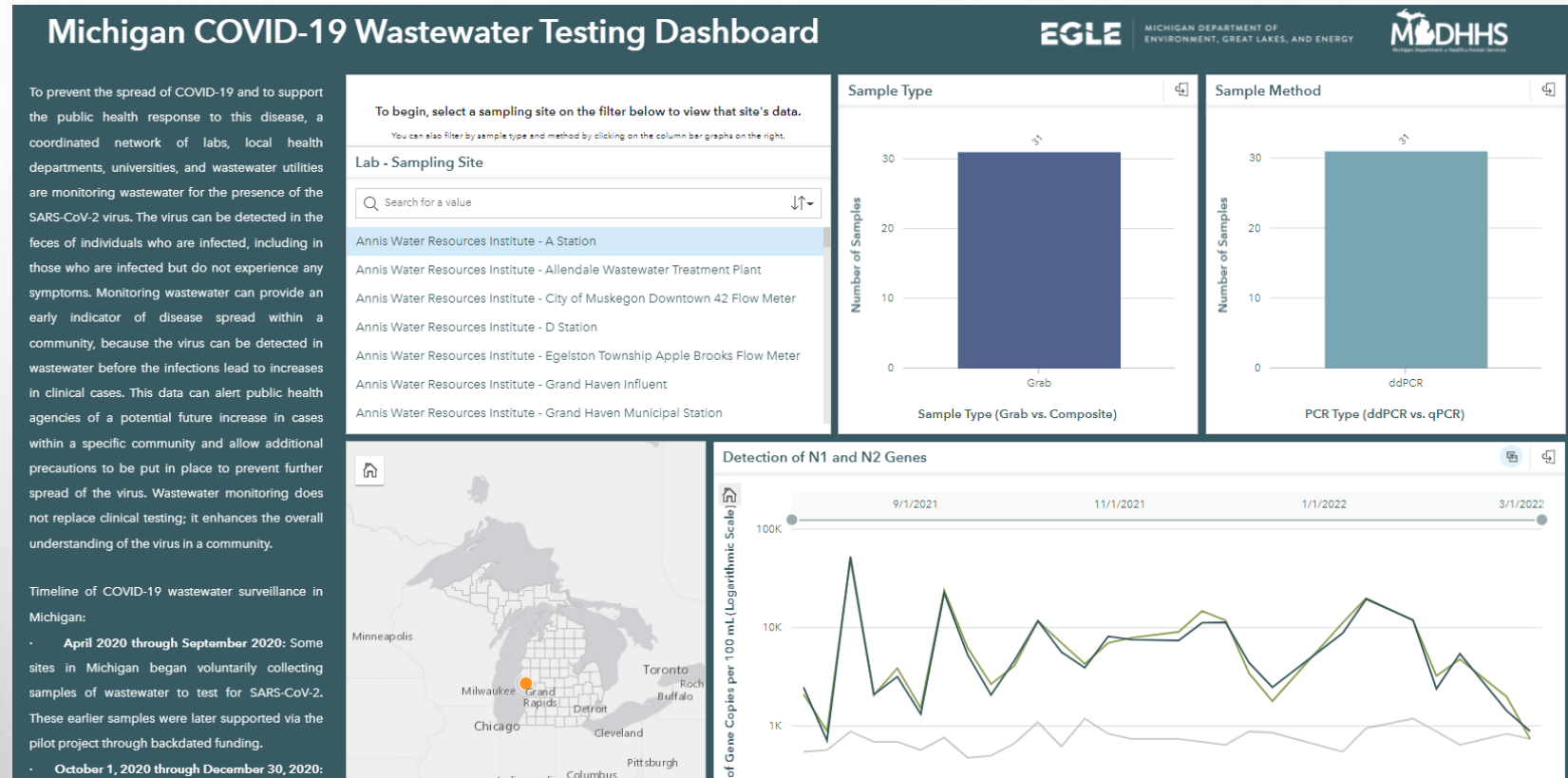


Lab equipment at the Grand Valley State University Annis Water Resources Institute



# PROJECT DASHBOARD - EGLE

- Purpose: display data for all sampling sites
- 400+ sites
- Metrics:
  - Viral concentrations over time
  - Total positive samples
  - Sample type
  - PCR method



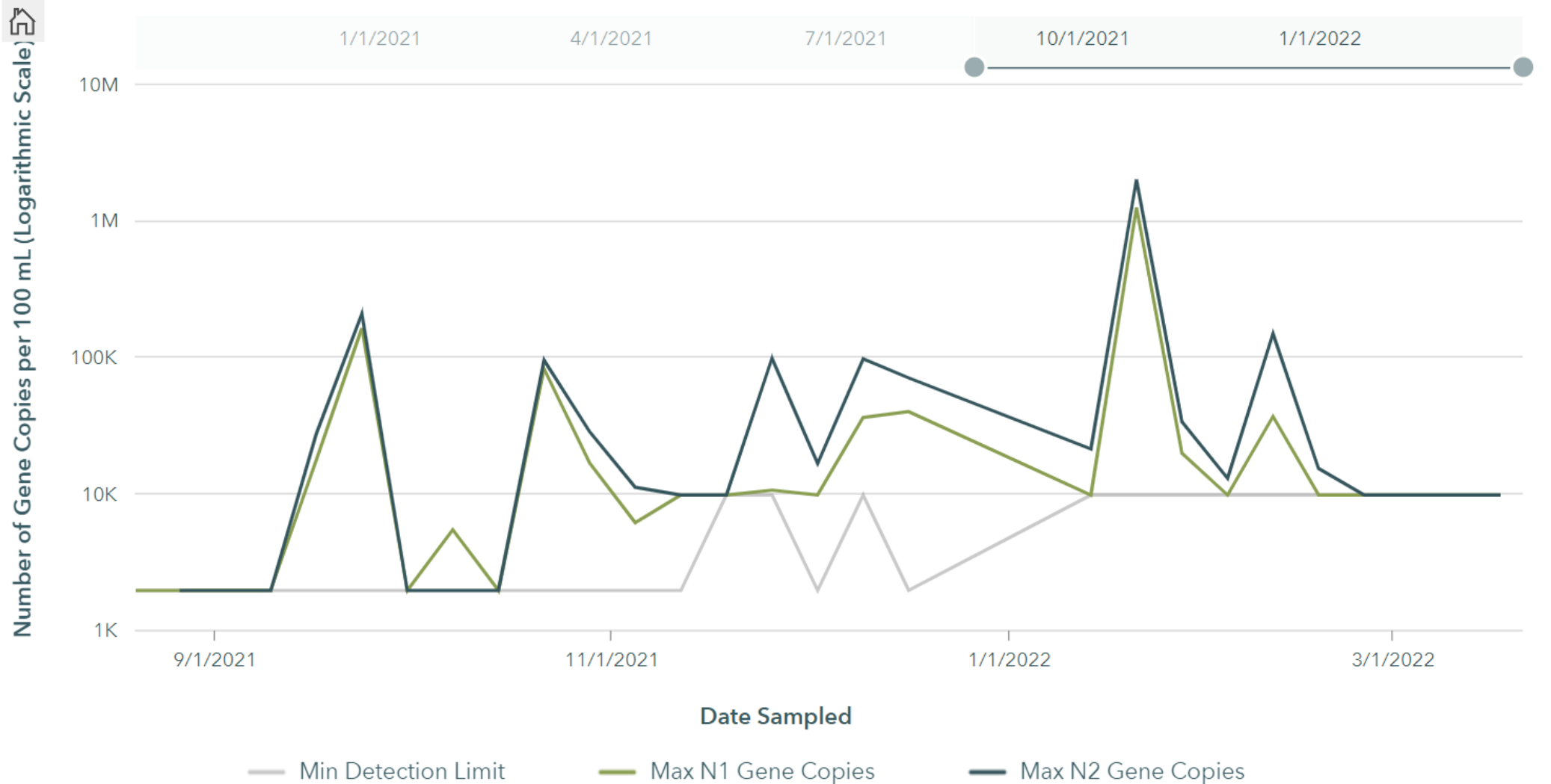
Available at: <https://gisportal.state.mi.us/portal/apps/insights/index.html#/view/52bbb104ed574887918f990af9f3debe>

# WASTEWATER DATA EXAMPLE

Detection of N1 and N2 Genes

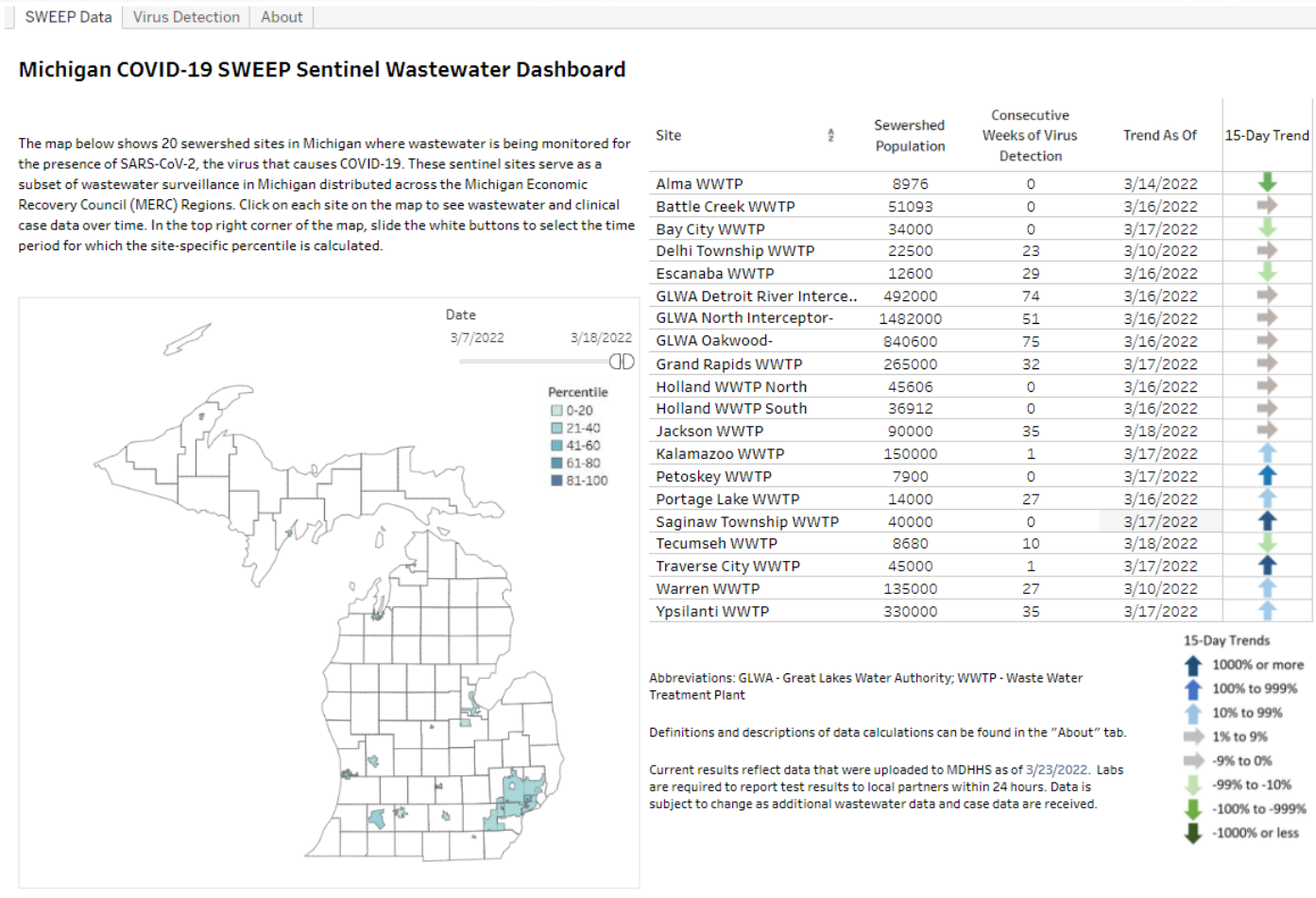


Hope College  
Wastewater  
Zone 5  
(Congregate  
Facility Site)





# SENTINEL WASTEWATER EPIDEMIOLOGY EVALUATION PROJECT (SWEEP)



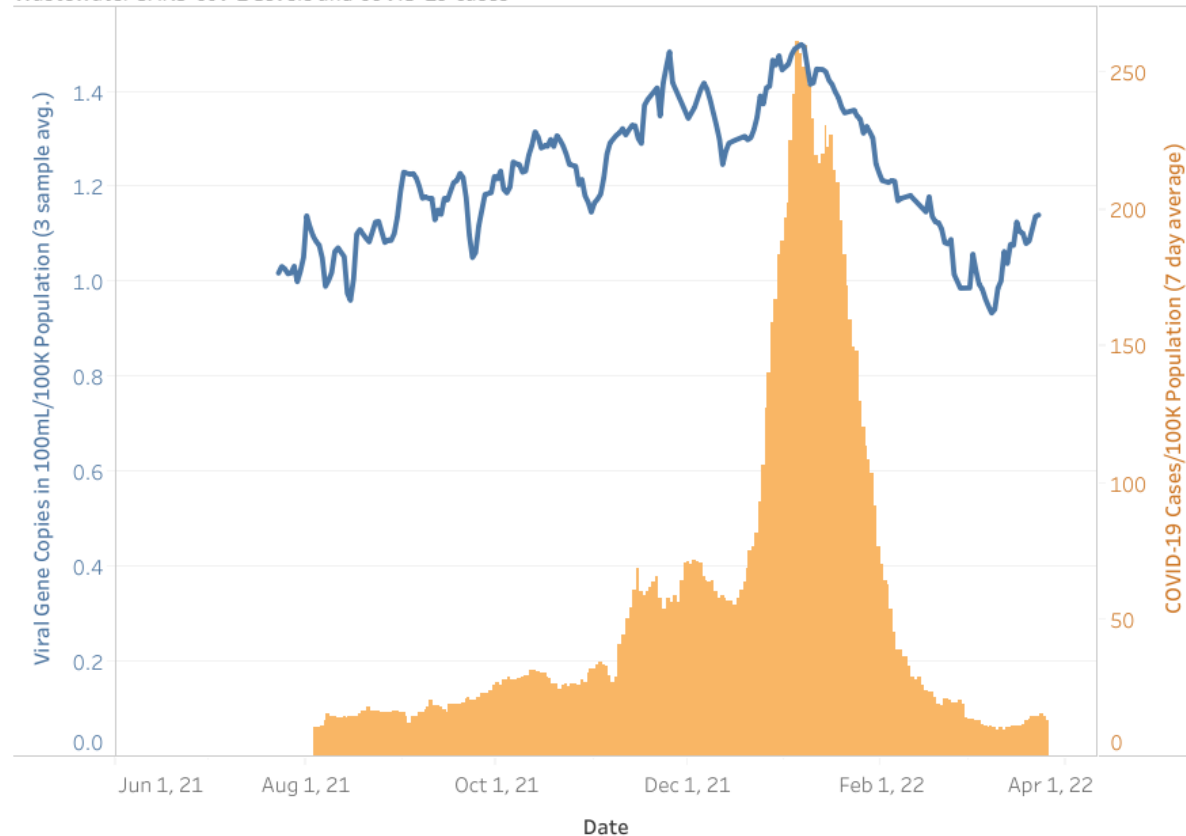
- Purpose: provide a regional and statewide overview of wastewater data
- 20 WWTPs in 18 counties and the City of Detroit
- Metrics:
  - Consecutive weeks of positive tests
  - Trend over the past 15 days and size of the change
  - Level of SARS-CoV-2 in the most recent sample compared to prior samples
  - Sewershed boundaries and population
  - Corresponding COVID-19 case data

Available at: <https://www.michigan.gov/covidwastewater>

# WASTEWATER DATA EXAMPLES

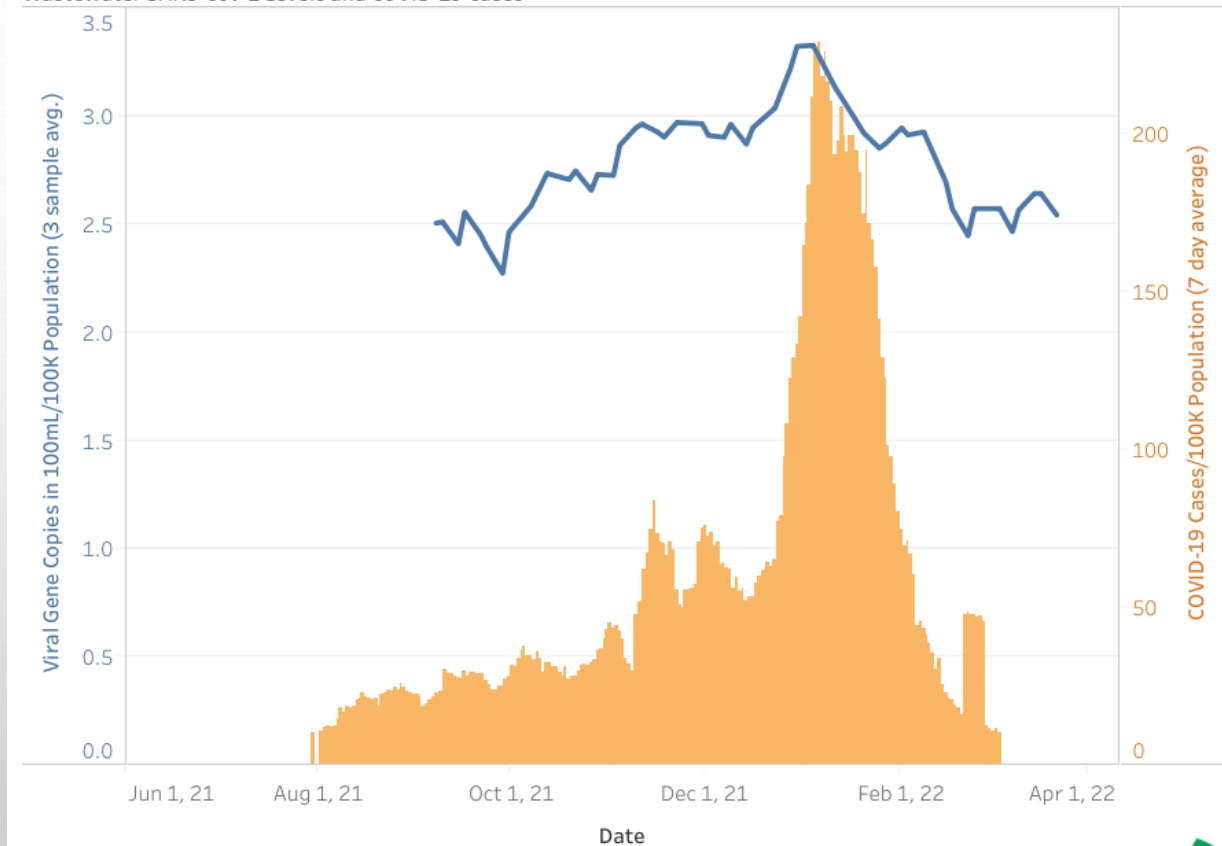
## Ypsilanti Wastewater Treatment Plant

Wastewater SARS-CoV-2 Levels and COVID-19 Cases



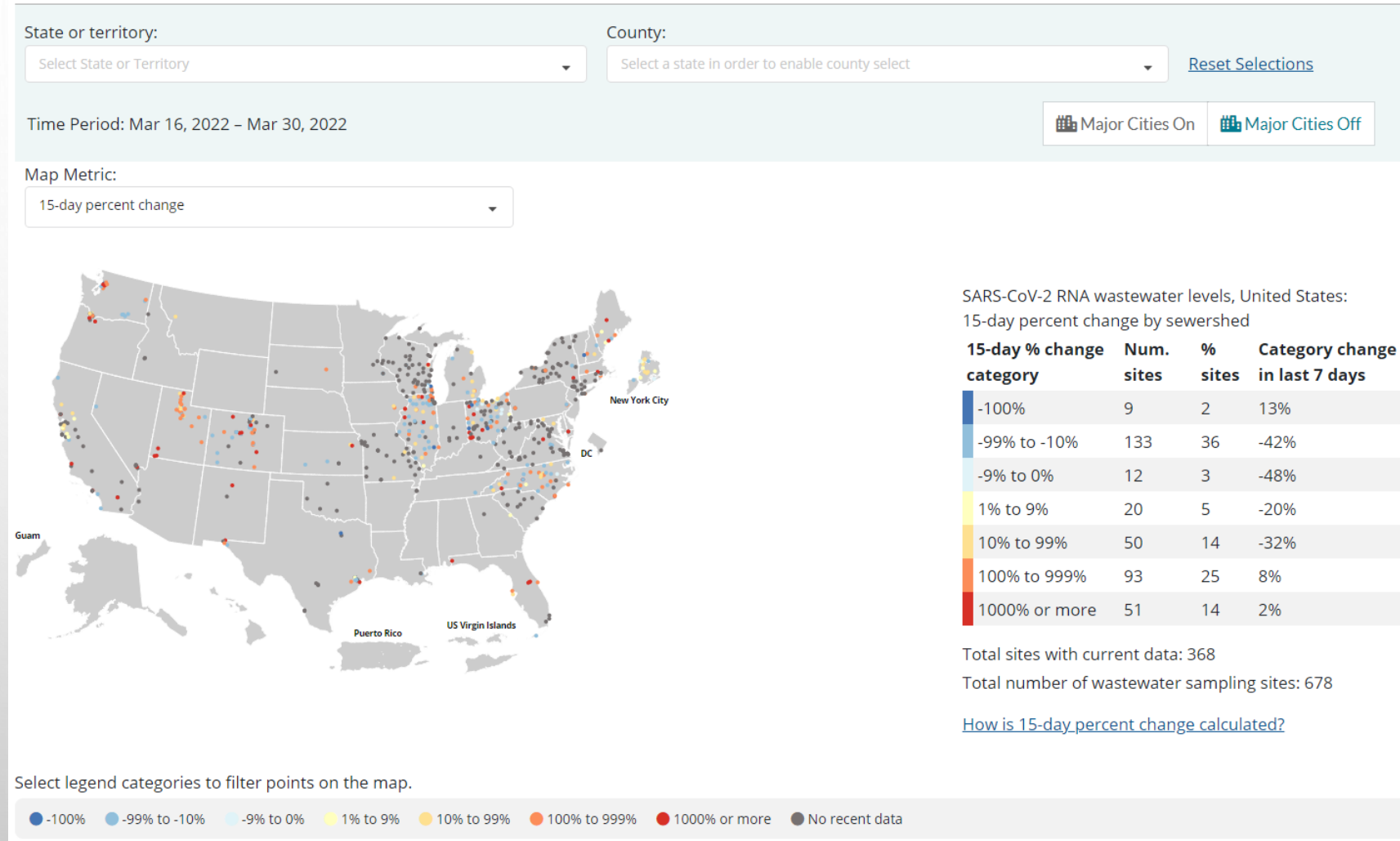
## Kalamazoo Wastewater Treatment Plant

Wastewater SARS-CoV-2 Levels and COVID-19 Cases



# CDC'S COVID DATA TRACKER

- 'Wastewater surveillance' section was added 2/3/22
- Sampling locations serving 3,000+ people, identifiable by county
- Metrics:
  - Percentile
  - 15-day percent change
  - 15-day detection proportion
- Accompanying publicly-available downloadable dataset



Available at: <https://covid.cdc.gov/covid-data-tracker/#wastewater-surveillance>

# WASTEWATER DATA CONSIDERATIONS

- Wastewater monitoring is still new and evolving
- Results are variable due to factors such as:
  - Mobile populations
  - Frequency of sampling
  - Unknown inhibitory chemicals in wastewater
  - Slight variations in testing methods between laboratories
  - SARS-CoV-2 variants producing different patterns
  - Environmental impacts (storm water, road salt, etc.)
- Cannot compare viral concentrations across sampling sites
- Amount and duration of viral shedding in feces is unknown
- Cannot determine:
  - Total number of infected persons in a community
  - Percent of the population that is infected

## Therefore...

- Recommend evaluating presence/absence and trends over time
- Wastewater data should be viewed in conjunction with clinical data



# WASTEWATER DATA COMPLEMENTS CLINICAL DATA

- Wastewater data can provide an early indication of a forthcoming increase in COVID-19 cases in a community
- The lead time is variable because of:
  - Clinical and wastewater testing resources/requirements
  - Data reporting delays
  - Lab processing time
  - Viral shedding in feces is variable
- Useful to identify re-emergence of the virus in a community
- Wastewater data can capture unreported cases in a changing clinical testing landscape

# PUBLIC HEALTH ACTIONS TAKEN BY LHDS

- LHDs can incorporate wastewater data into their COVID-19 public health response based on what works best for their community
- Examples of public health actions taken by LHDs:
  - Increased clinical testing, vaccination, public communication, and outreach efforts in affected community
  - Alerted healthcare and other public health response stakeholders
  - Alerted community leaders
  - Coordinate with universities to implement testing and isolation for students
  - Sent extra clinical samples to MDHHS Bureau of Laboratories for sequencing in response to variant testing results
  - Monitored clinical case data in conjunction with wastewater data



Available at: [https://www.michigan.gov/documents/coronavirus/Wastewater\\_Pilot\\_Project\\_Success\\_Stories\\_728695\\_7.pdf](https://www.michigan.gov/documents/coronavirus/Wastewater_Pilot_Project_Success_Stories_728695_7.pdf)

# POSSIBLE FUTURE DIRECTIONS OF WASTEWATER TESTING

- Current funding through 2023
  - CDC has secured funding through 2025
- Enhanced data analytics
  - Correlations between wastewater and clinical case data
  - Determine length of lead time for each site
- Regular sequencing of wastewater samples
  - To confirm preliminary results from PCR variant testing
- Potential for monitoring other pathogens or chemical targets
  - Some potential examples of other pathogens include norovirus, influenza, RSV, *Salmonella*, *Cyclospora*, antimicrobial resistance genes, etc.

## ACKNOWLEDGEMENTS

Michigan Department of Environment, Great Lakes, and Energy (EGLE)

# Michigan State University

# Central Michigan University

# City of Traverse City

# Great Lakes Environmental Center

# Ferris State University

# Grand Valley State University

Grand Valley State University – Annis Water Resources Institute

# Health Department of Northwest Michigan

Hope College

# Kent County Health Department

# Lake Superior State University

# Macomb County Public Works

Northern Michigan University

# Oakland County Health Division

Oakland University

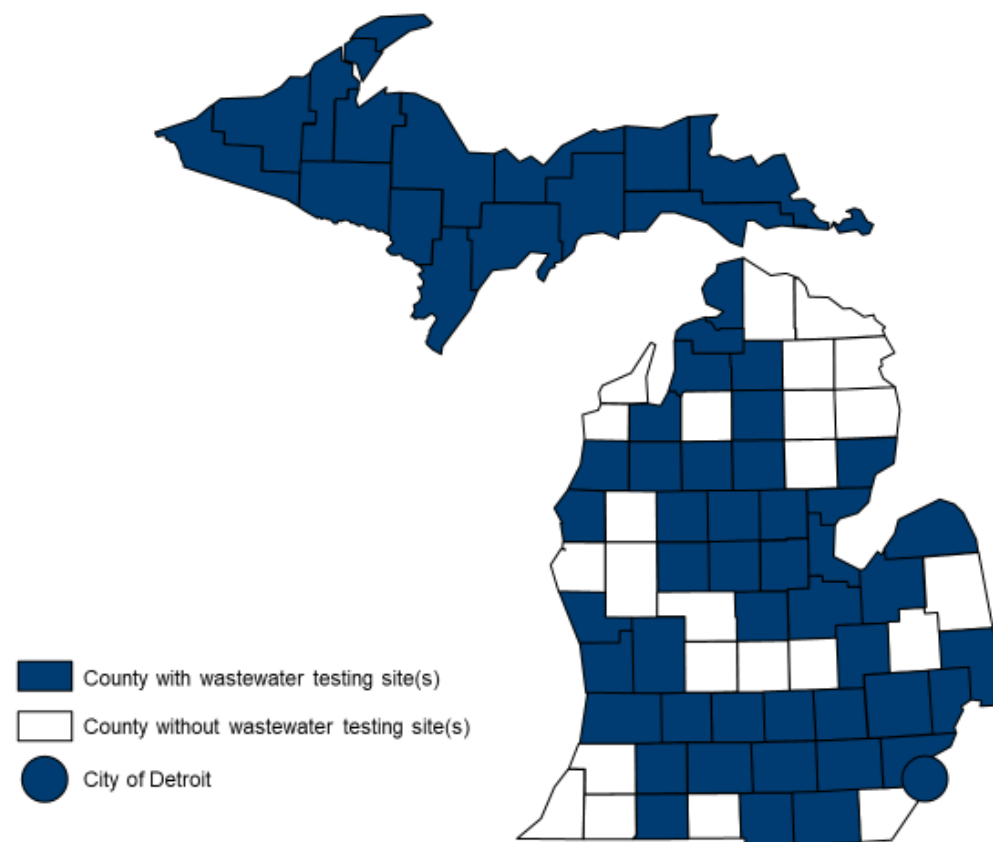
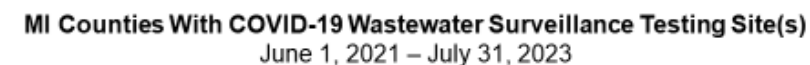
# Saginaw Valley State University

University of Michigan

# Wayne State University

# White Water Associates Inc.

Local Health Departments and Tribal Nations that serve the following counties:



Funded by the Centers for Disease Control and Prevention through the  
Epidemiology and Laboratory Capacity Cooperative Agreement



# THANK YOU!

## ANY QUESTIONS?

- For more information, visit [www.michigan.gov/covidwastewater](http://www.michigan.gov/covidwastewater)
  - Provides general project information
  - Links to the EGLE Dashboard and SWEEP Dashboard
  - Includes resource documents such as a data interpretation guide, infographic, etc.
- Email us at [MDHHS-SEWERNetwork@michigan.gov](mailto:MDHHS-SEWERNetwork@michigan.gov)

