

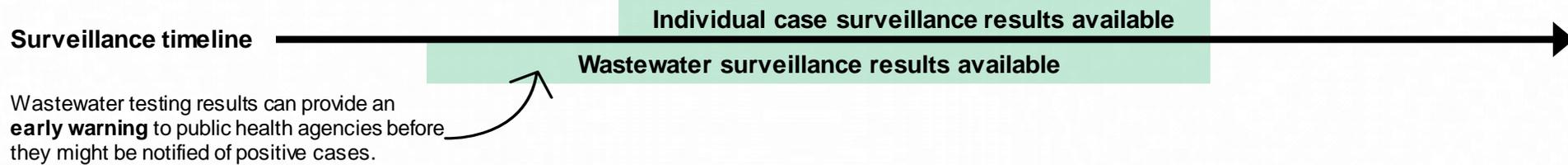
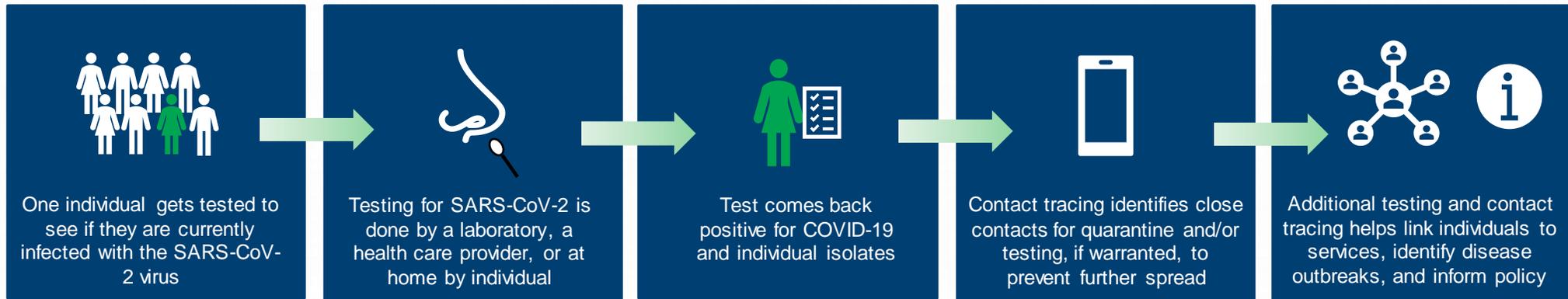
MICHIGAN COVID-19 WASTEWATER MONITORING

APRIL 20TH, 2022

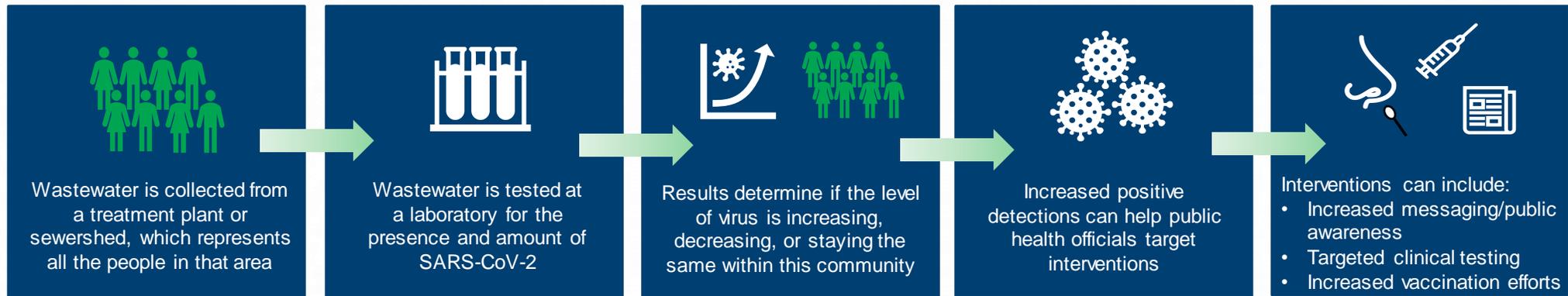
Kelly Geith, MPH
Wastewater Epidemiologist

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

Individual Case Surveillance



Population-Level Wastewater Surveillance



FALL 2020 PILOT PROJECT

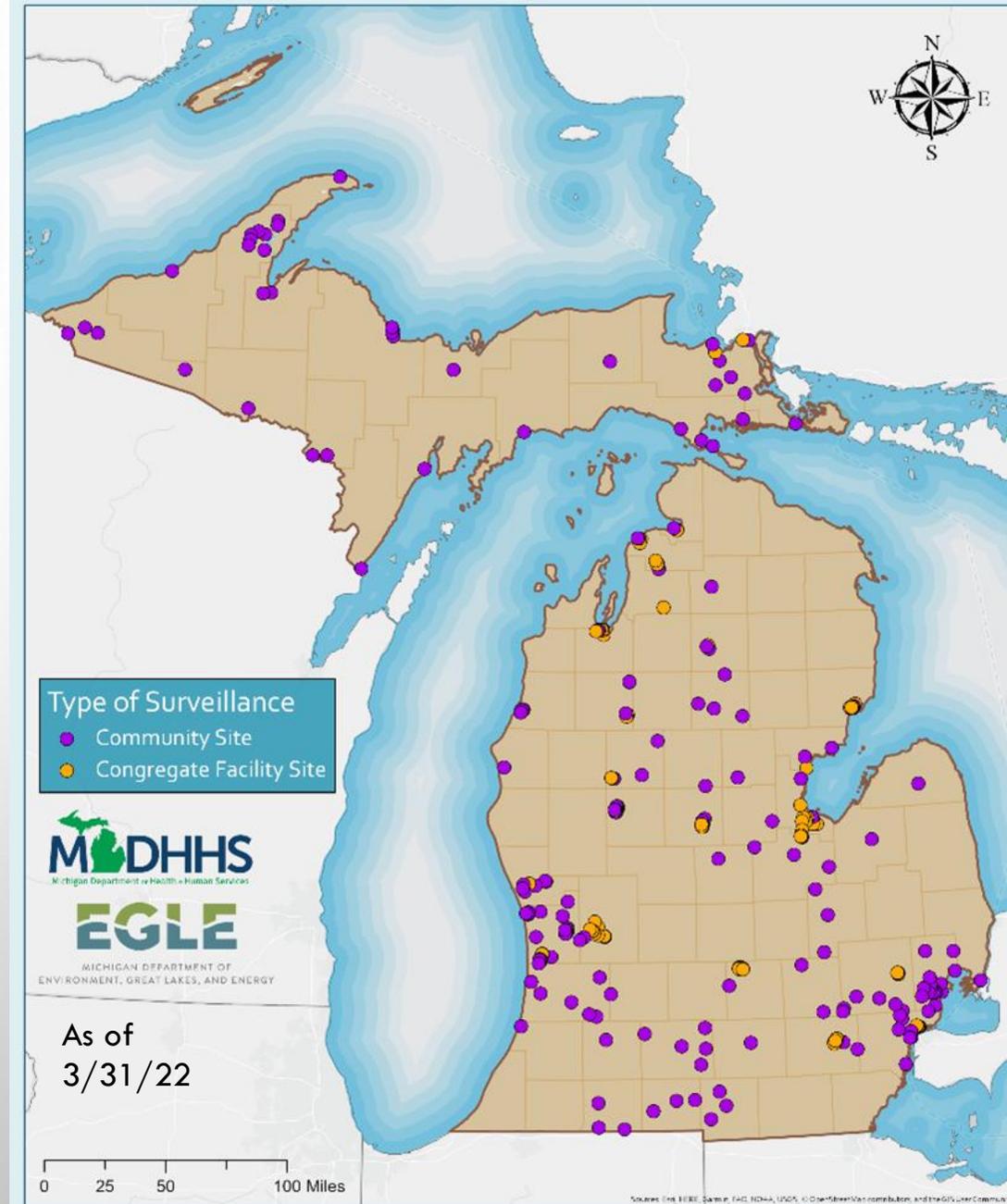
- October 1 – December 31, 2020
- Supported 20 local projects
- ~270 sampling sites in 37 counties plus the City of Detroit
- Used two monitoring strategies:
 - **Wastewater treatment plant monitoring** provides community-level data in the region to help evaluate trends
 - **Congregate facility monitoring** 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

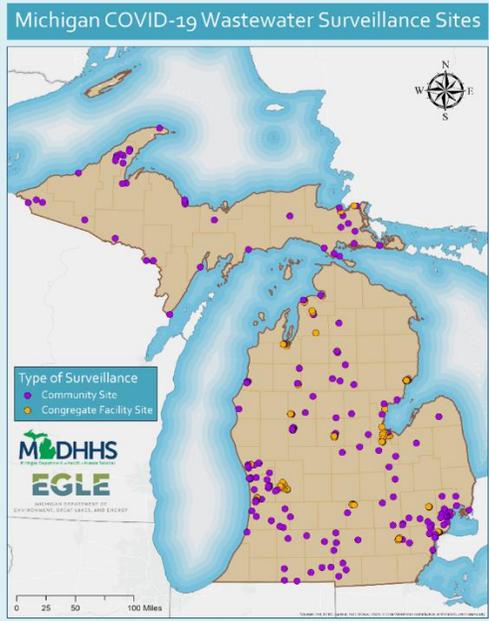
- June 2021 – July 2023
- Supports 19 local projects:
 - 18 laboratories (14 academic, 2 LHDs, 2 private)
 - 36 local health departments
 - 5 Tribal nations
- Still using both WWTP monitoring and congregate facility monitoring
- 437 sampling sites:
 - 105 wastewater treatment plants
 - 95 sewersheds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

Michigan COVID-19 Wastewater Surveillance Sites



DATA FLOW

437 sampling sites



18
Laboratories

MICHIGAN STATE UNIVERSITY

EGLE



Project Dashboard

MDHHS



SWEEP Dashboard

CDC
CENTERS FOR DISEASE
CONTROL AND PREVENTION



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

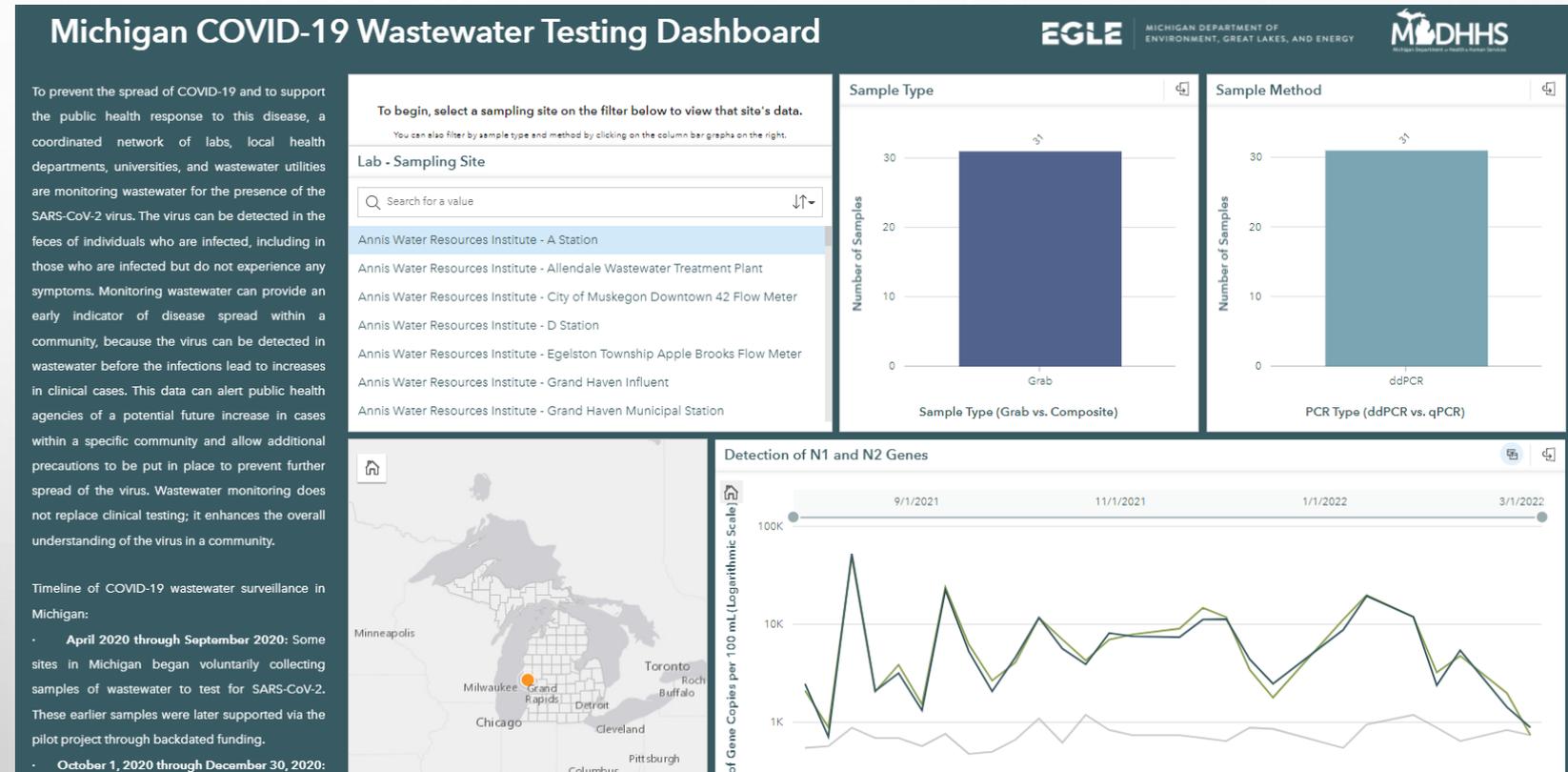


Lab equipment at the Grand Valley State University Annis Water Resources Institute



PROJECT DASHBOARD - EGLE

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



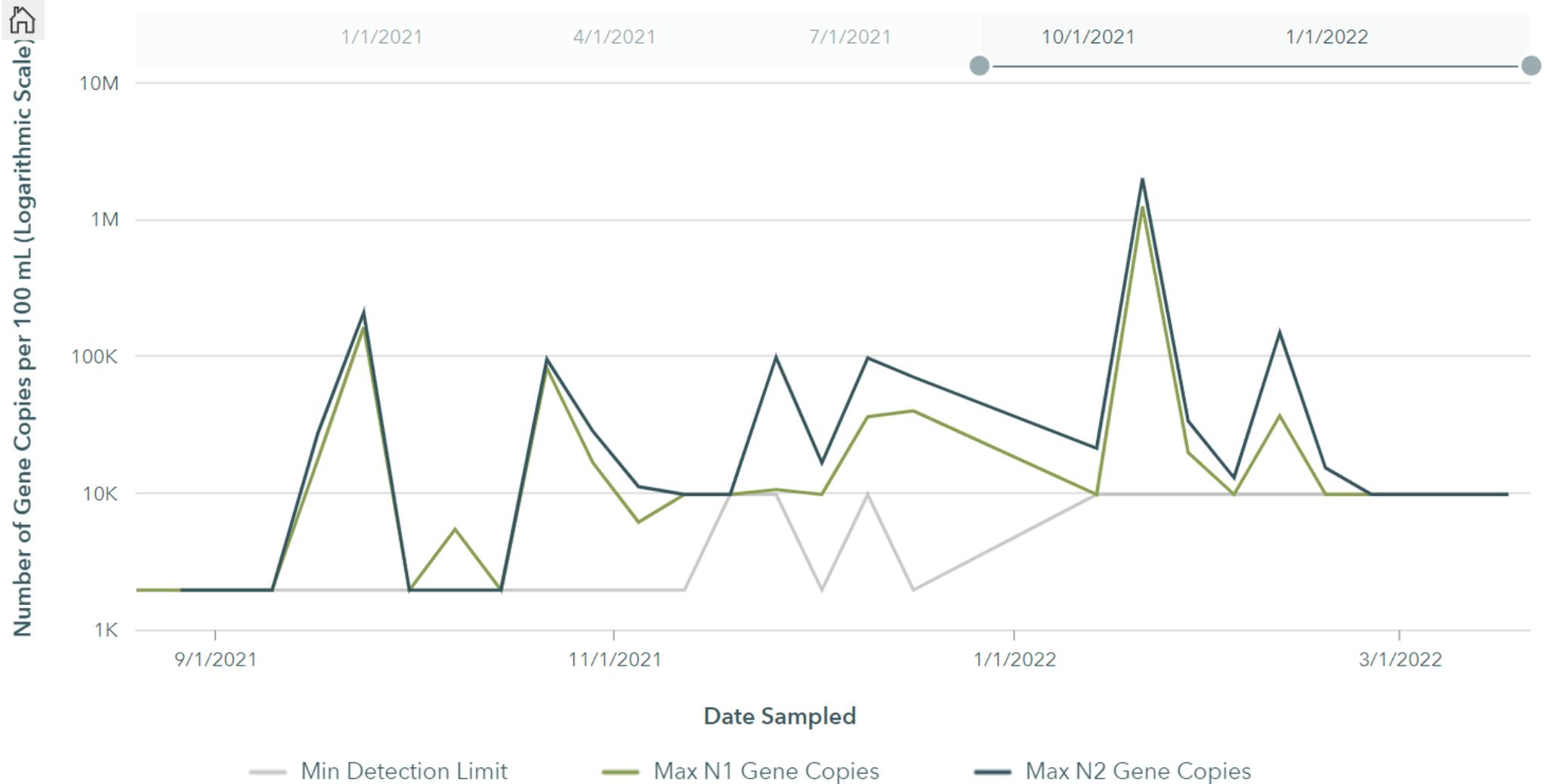
Available at: <https://gisportal.state.mi.us/portal/apps/insights/index.html#/view/52bbb104ed574887918f990af9f3debe>

WASTEWATER DATA EXAMPLE

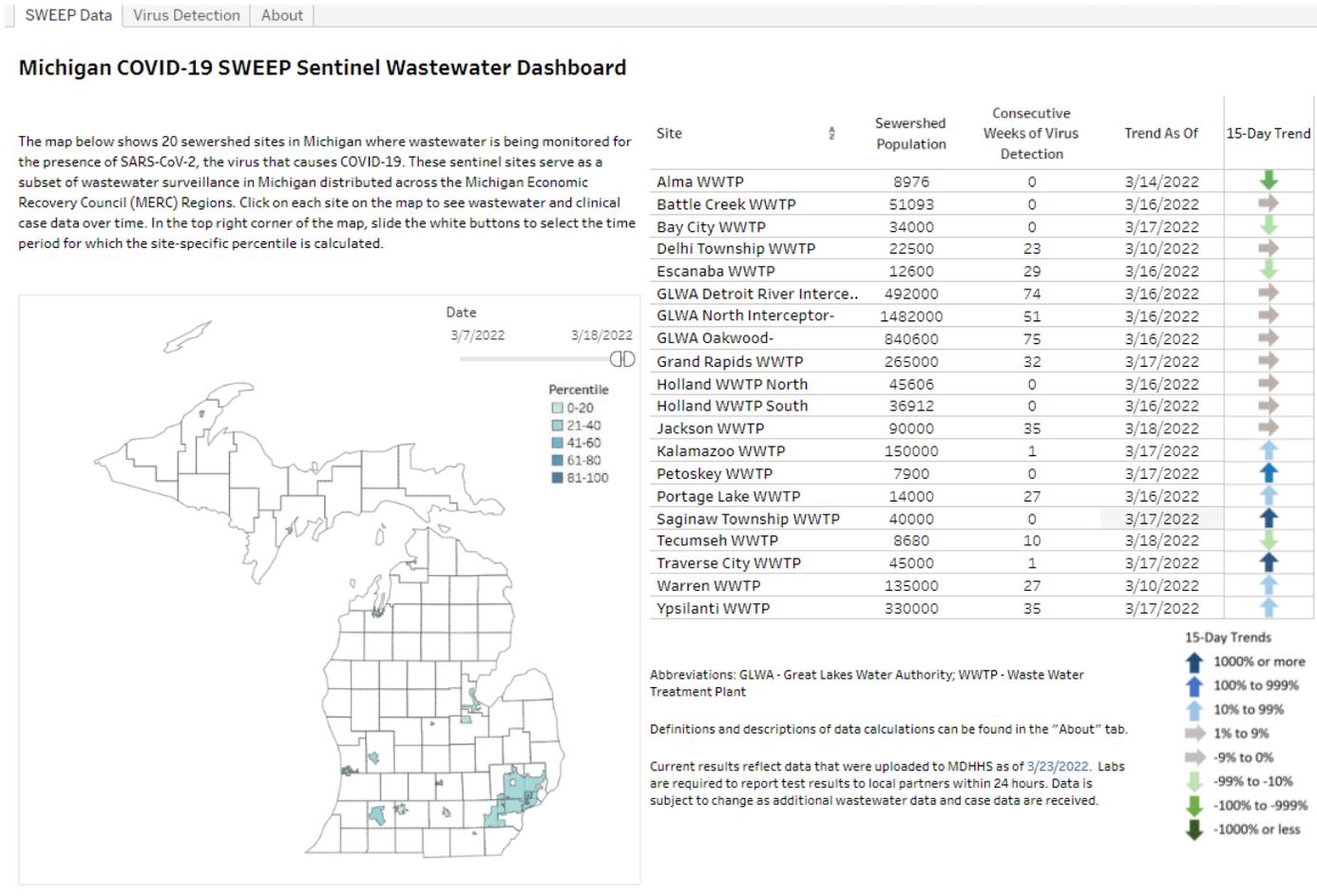
Detection of N1 and N2 Genes



Hope College
Wastewater
Zone 5
(Congregate
Facility Site)



SENTINEL WASTEWATER EPIDEMIOLOGY EVALUATION PROJECT (SWEEP)



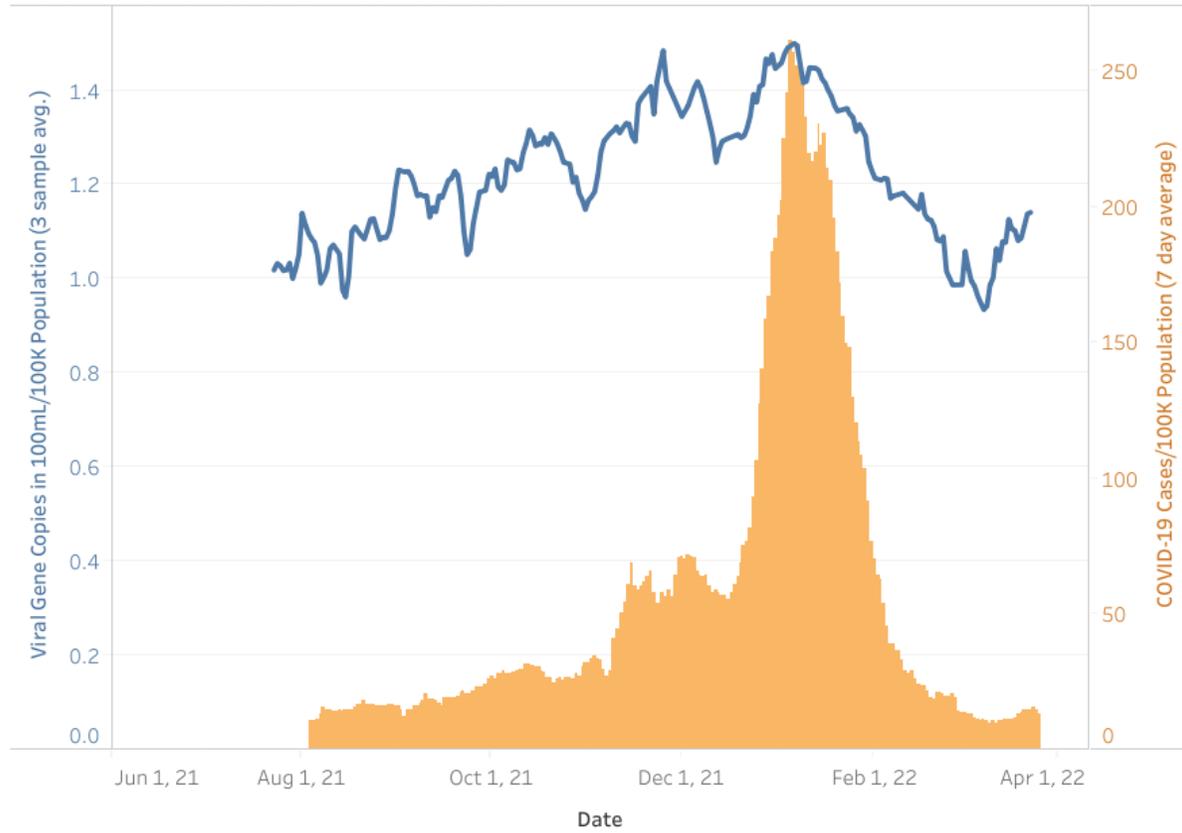
- Purpose: provide a regional and statewide overview of wastewater data
- 20 WWTPs in 18 counties and the City of Detroit
- Metrics:
 - Consecutive weeks of positive tests
 - Trend over the past 15 days and size of the change
 - Level of SARS-CoV-2 in the most recent sample compared to prior samples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

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

WASTEWATER DATA EXAMPLES

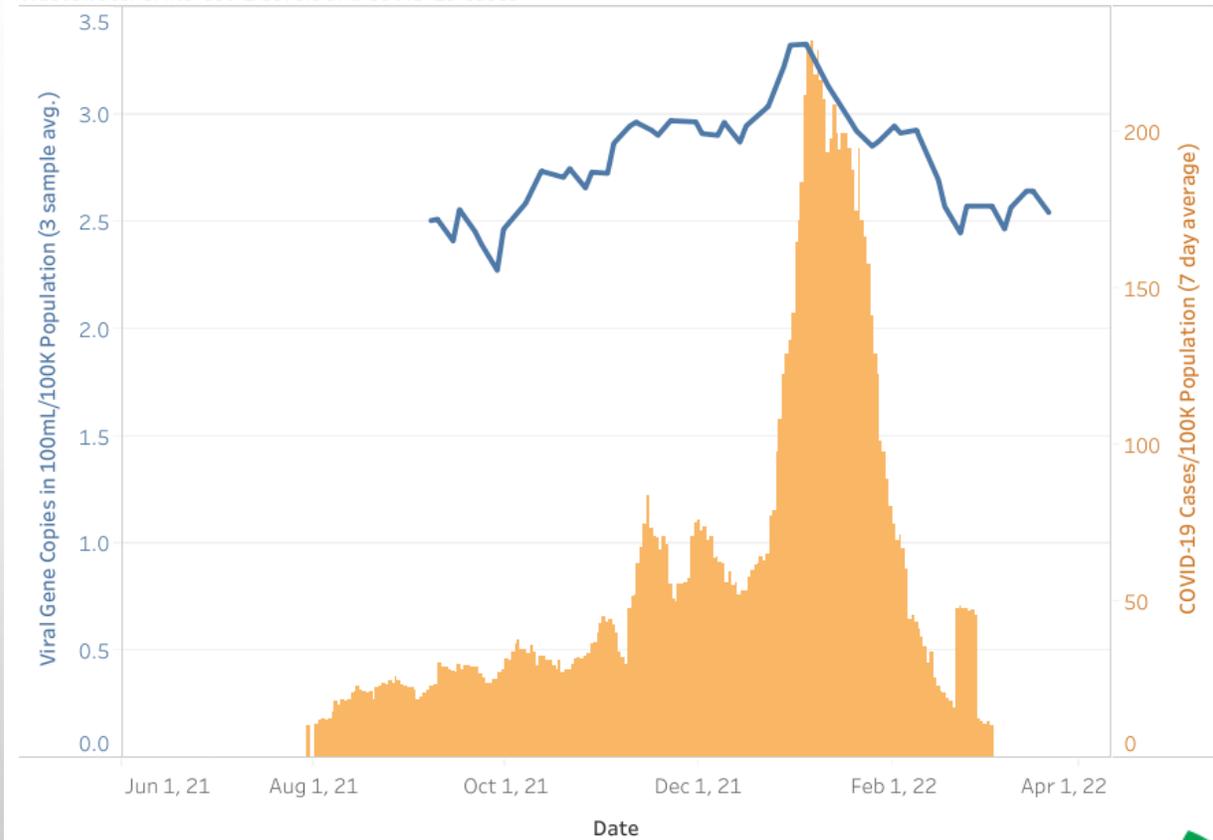
Ypsilanti Wastewater Treatment Plant

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



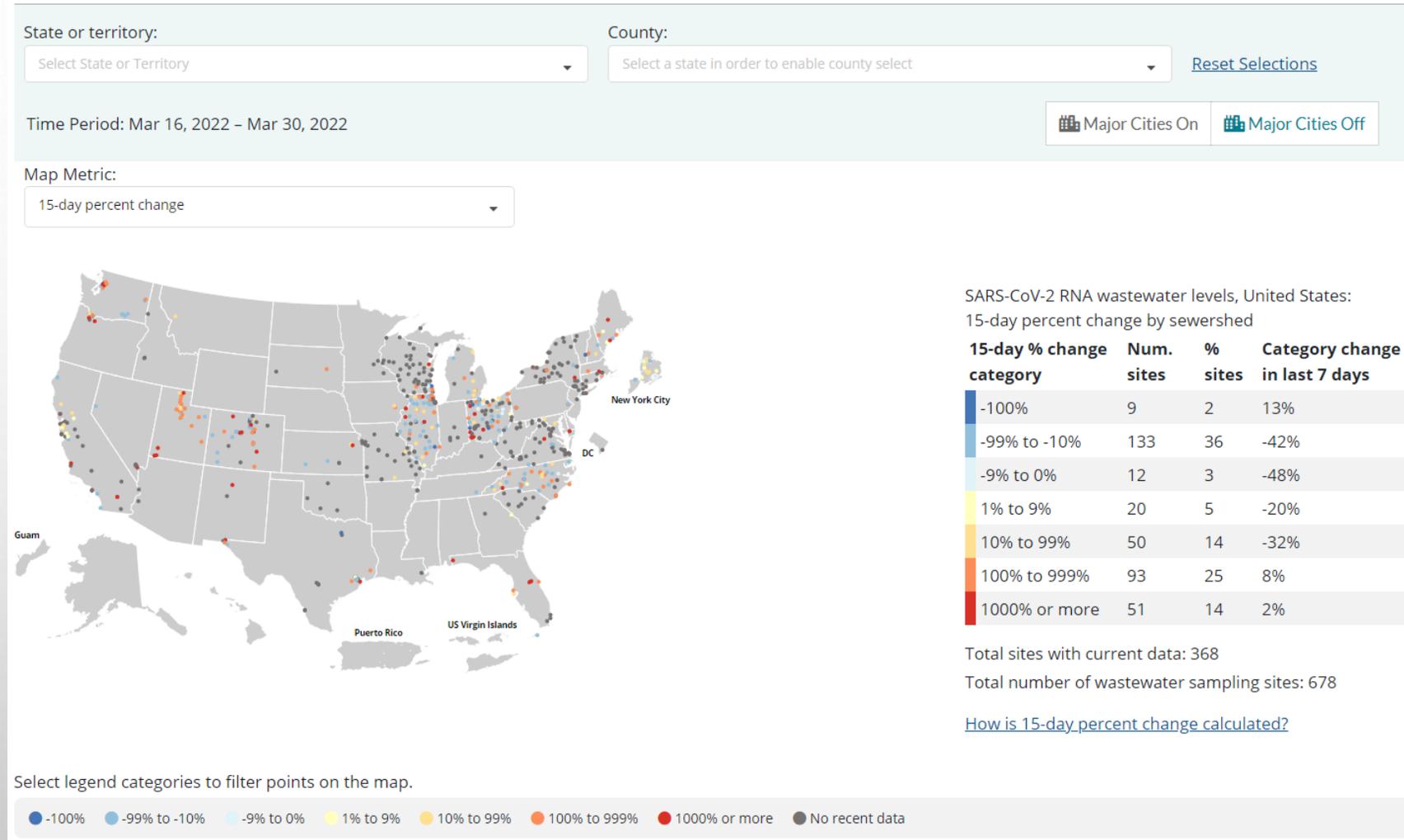
Kalamazoo Wastewater Treatment Plant

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

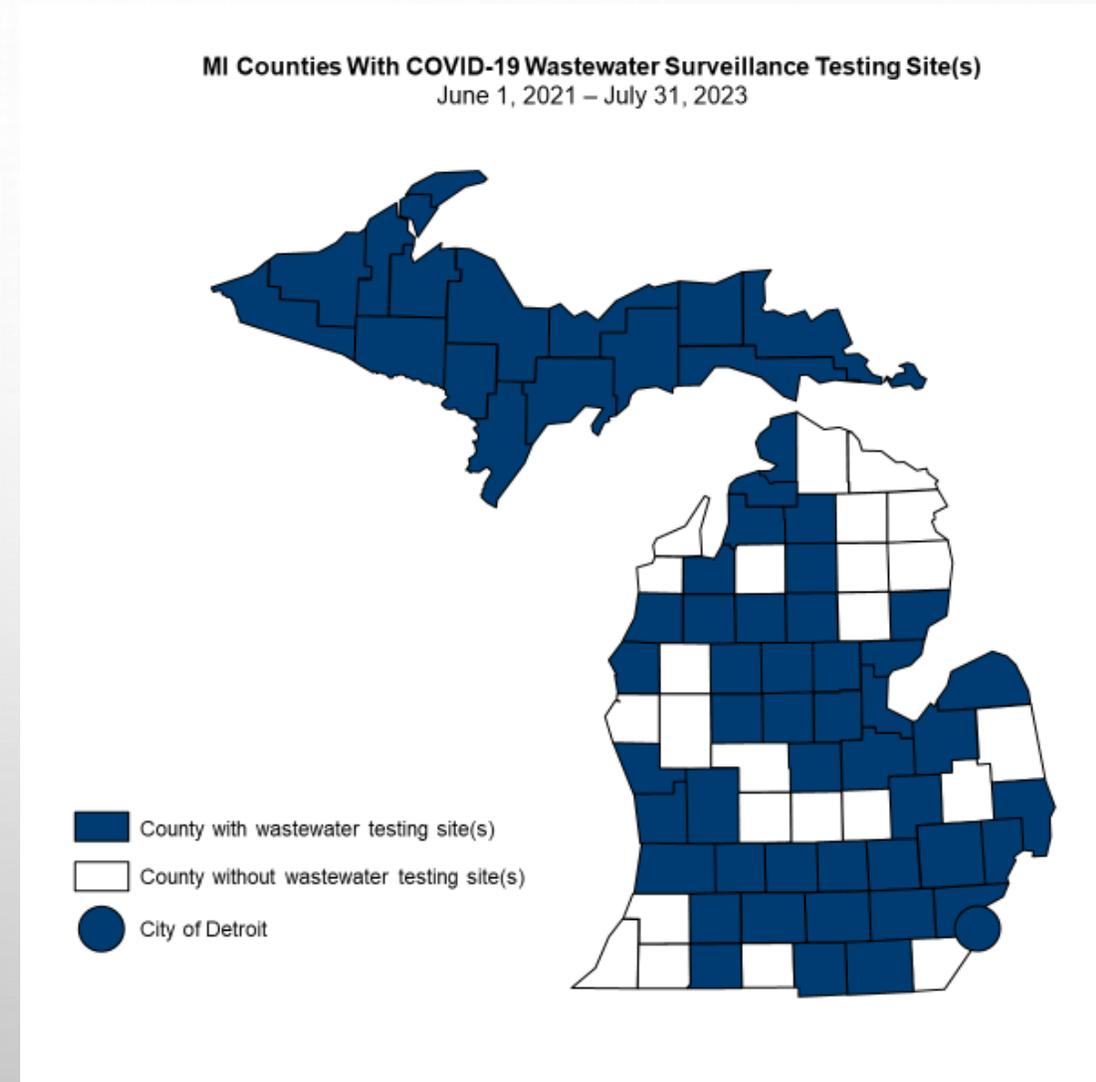
POSSIBLE FUTURE DIRECTIONS OF WASTEWATER TESTING

- 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
 - 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

