NATIONAL GOVERNORS ASSOCIATION

Wastewater Testing to Track and Respond to COVID-19

November 4, 2020

NGA Center for Best Practices

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Today's Speakers

Erica Gaddis

Director, Division of Water Quality, Utah Department of Environmental Quality

Dr. Nathan LaCross

Assessment Manager and
Epidemiologist, Environmental Epidemiology Program,
Utah Department of Health

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Today's Speakers

Nicole Rowan

Clean Water Program Manager, Colorado Department of Public Health and Environment

Dr. Brian Erly

Medical Epidemiologist, Colorado Department of Public Health and Environment

Suzanne E. Dorsey, PhD

Assistant Secretary, Maryland Department of the Environment

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
WATER QUALITY

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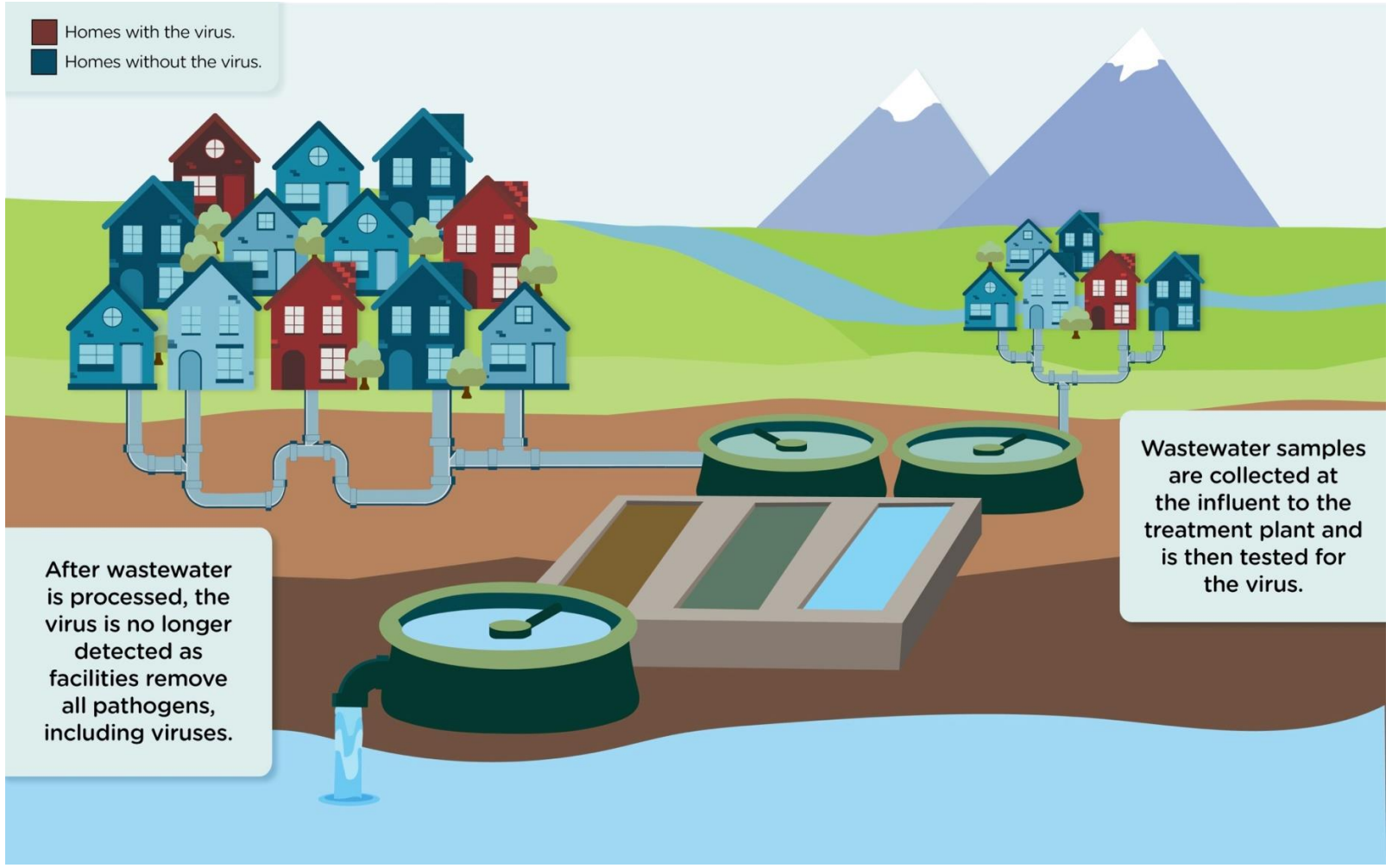
Wastewater Surveillance: Supporting Utah's response to COVID-19

November 2020

Wastewater Surveillance for Public Health



Utah’s Approach

Goal: Support Utah’s response to COVID-19 by tracking trends in wastewater virus across the state

Sample locations

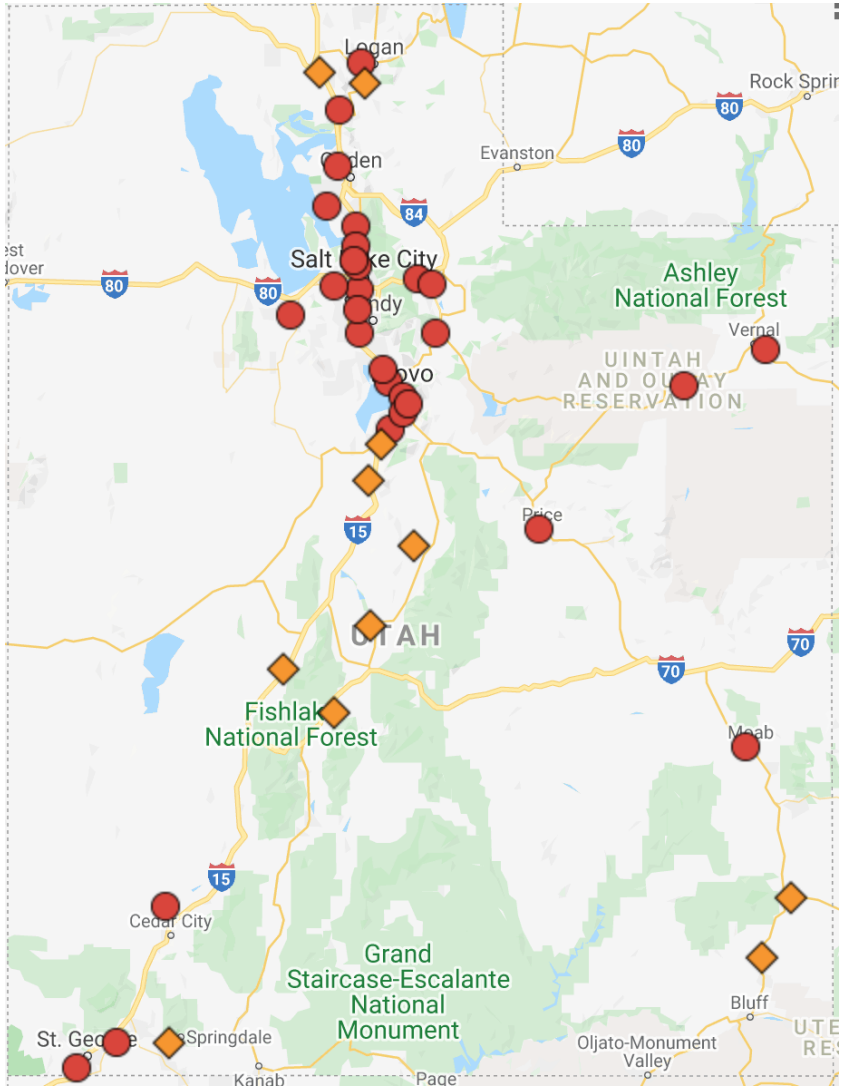
- 30 large treatment plants (>10,000 people)
- 14 rural treatment plants
- ~85% of Utah’s population

Frequency

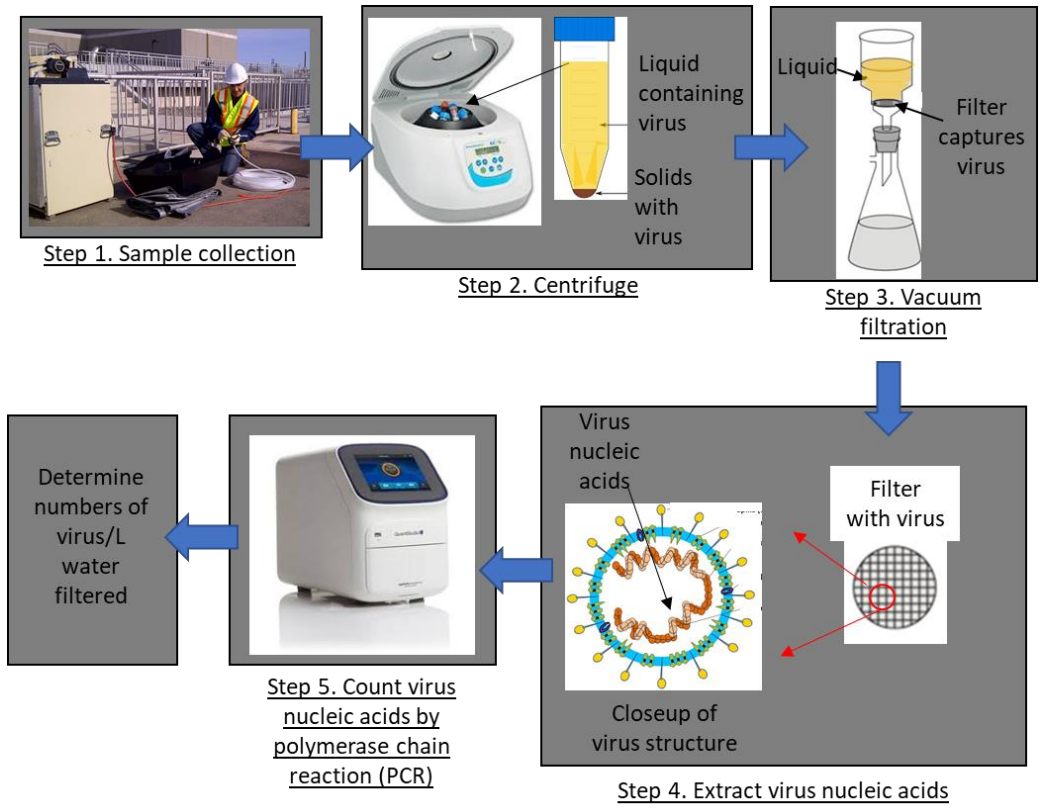
- Weekly samples July – December
- Surge sampling available and used as needed

Costs

- Total estimated cost over 6 months: $475,000 (sample collection and transport costs are significant)
- Funding source: CARES Act through 2020

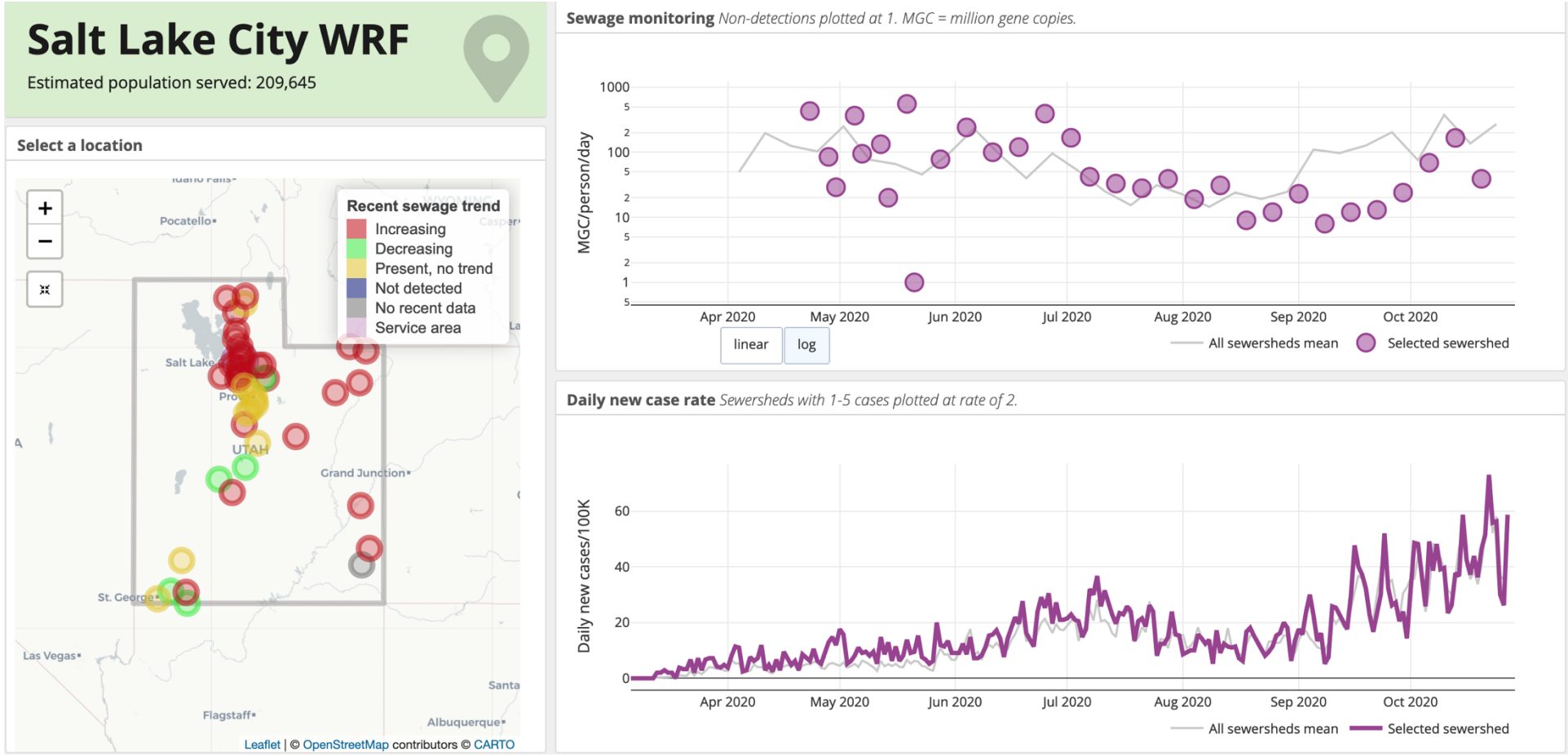


Analytical Methods



- RT-qPCR method
- Consistency in sample preparation is critical
- Results are expressed as gene copies per mL and converted to gene copies/100k pe
- Utah standardizes data to account for seasonal infiltration and industrial flows

Data Dashboard



wastewatervirus.utah.gov

Roles and responsibilities

Wastewater Treatment Facilities

- Sample collection
- Chain of custody

University Laboratories

- Sample analysis
- Analytical method development

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Utah Division of Water Quality

- Project coordination
- Data management
- Sample transport

Utah Department of Health

- Data interpretation
- Communication to local health and health response teams

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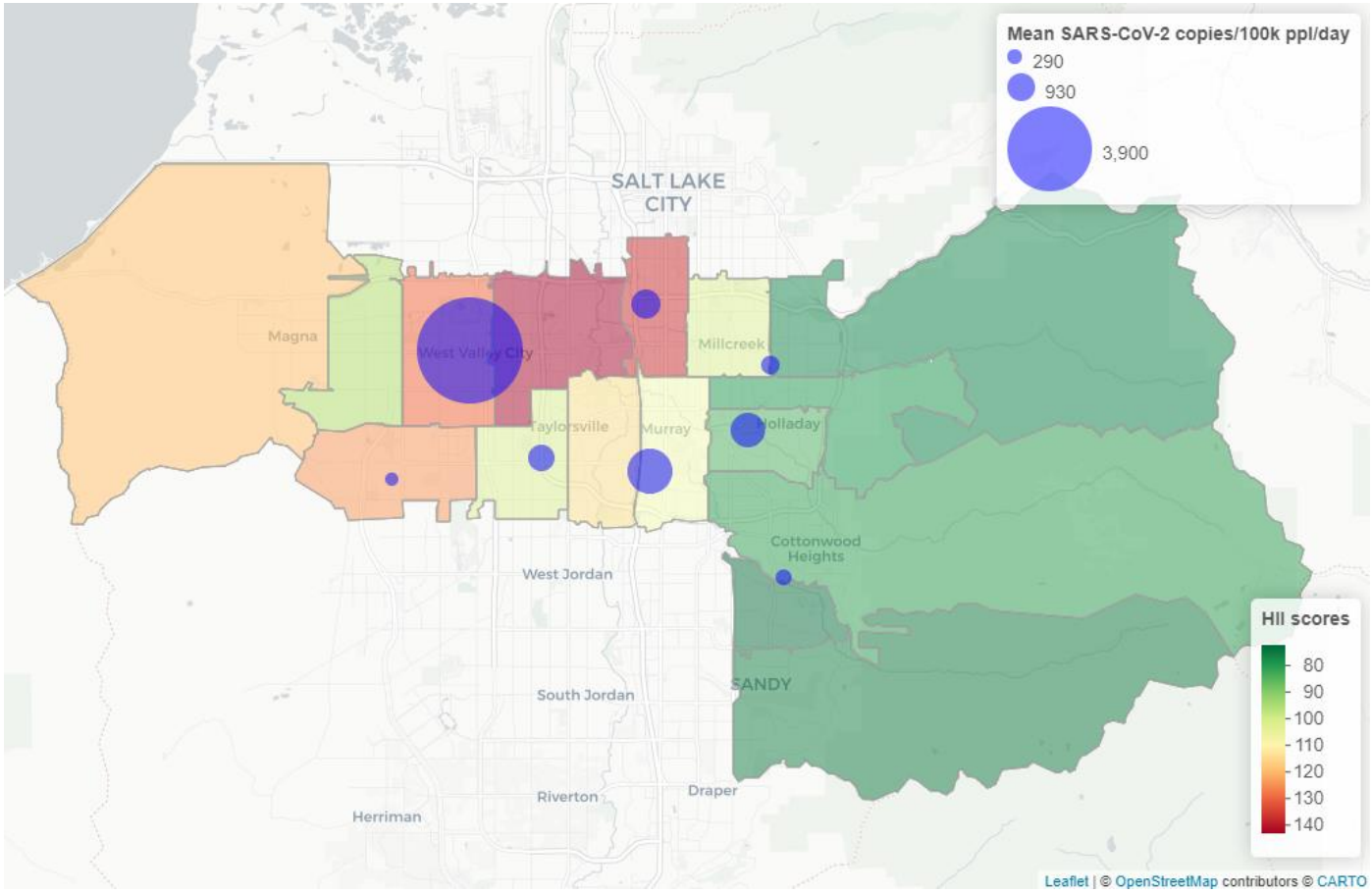
WATER QUALITY

UTAH DEPARTMENT OF HEALTH

University Campus Sampling

Sub-sewershed monitoring



Limitations & Interpretation

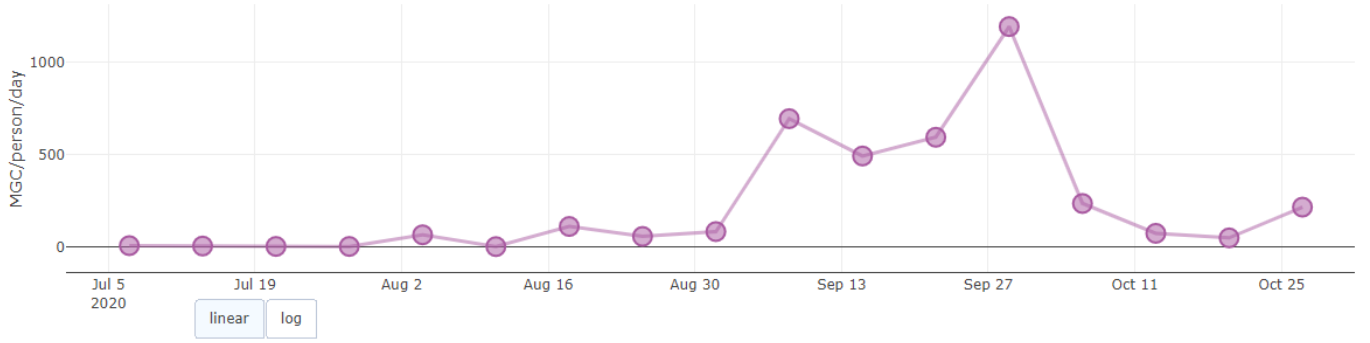
- Often variability in the data, from many potential sources:
  - Environmental: differences in sewer system infrastructure; infiltration of runoff and groundwater; wastewater transit time; temperature; other constituents of the wastewater stream; industrial sources
  - Biological: which people/populations tend to shed virus; how much virus is shed; how long virus is shed
- Data are not easily compared between facilities
  - More useful to look at data within a facility for changes over time
- As with most surveillance data, wastewater data is best interpreted in conjunction with other available information

Early detection of rising infection rates

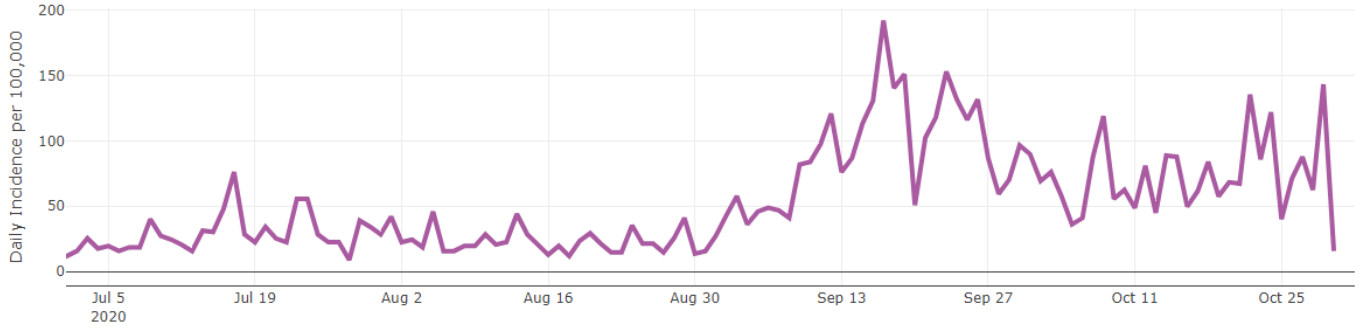
Provo City WWTP

Estimated population served: 102,624

Wastewater Surveillance *MGC = millions of gene copies. Note that the y-axis scale will vary based on the selected sewershed*



Daily Incidence per 100,000 *Note that the y-axis scale will vary based on the selected sewershed*

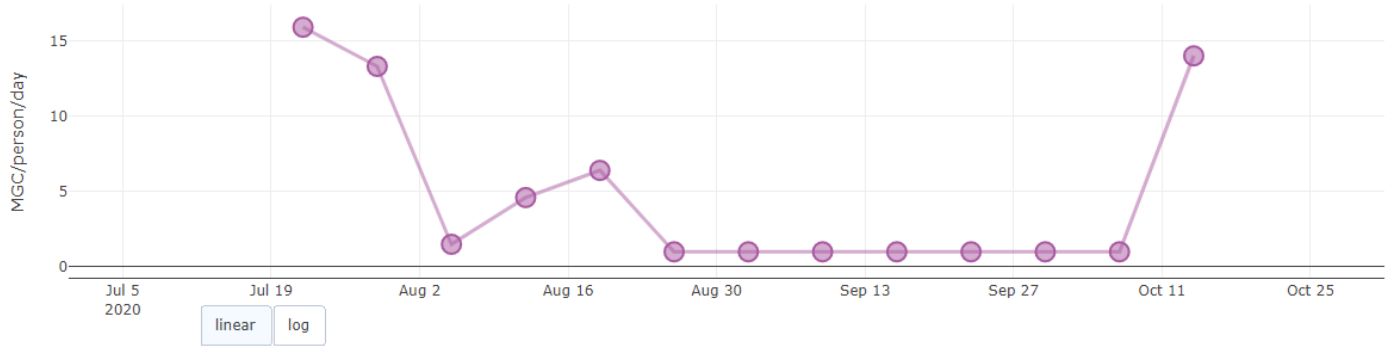


Monitoring of areas with lower testing

Blanding City WWD

Estimated population served: 3,530

Wastewater Surveillance *MGC = millions of gene copies. Note that the y-axis scale will vary based on the selected sewershed*



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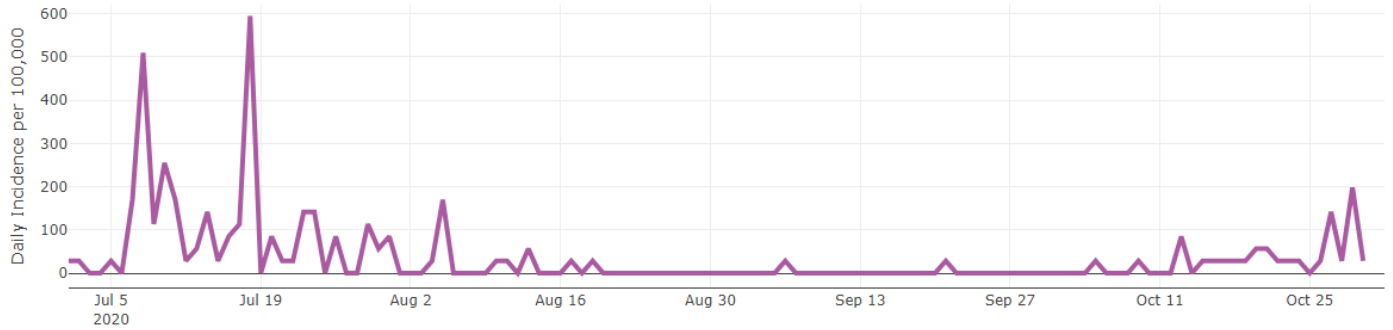
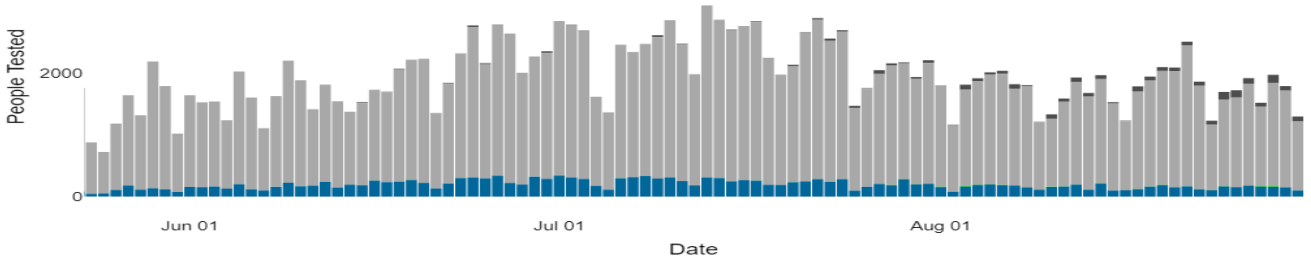


Confirmation of declining case rates

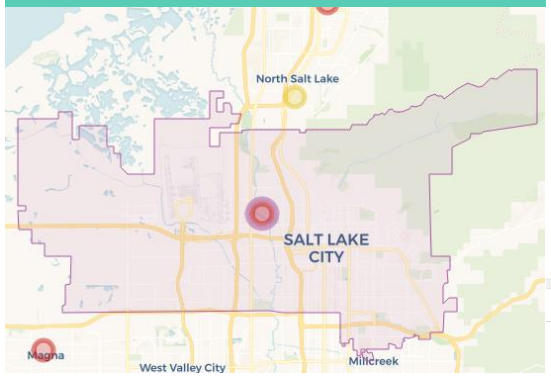
Number of People by Date | Total Tests by Date

Salt Lake County



Salt Lake City WRF

Estimated population served: 209,645



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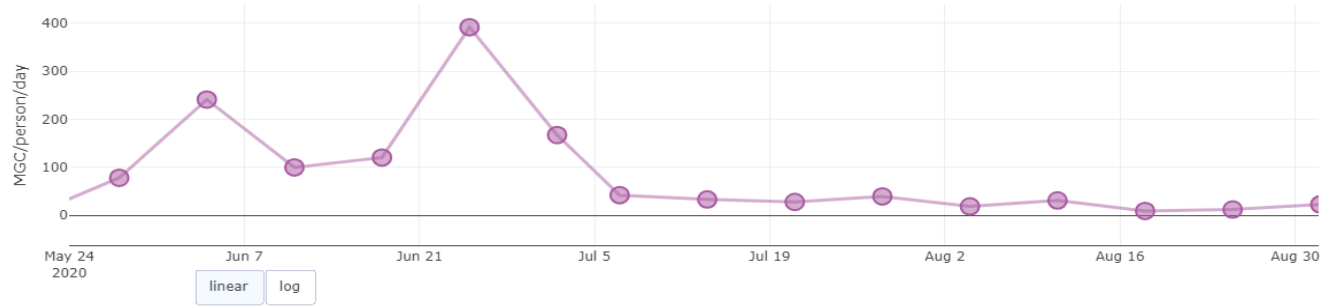

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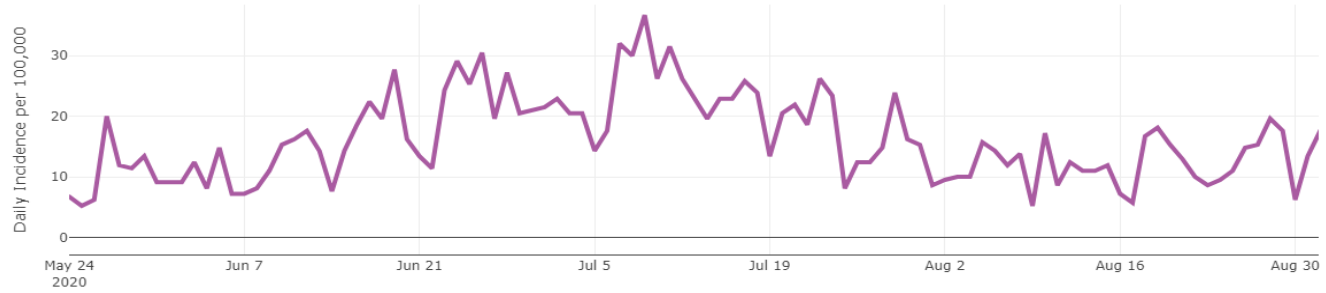
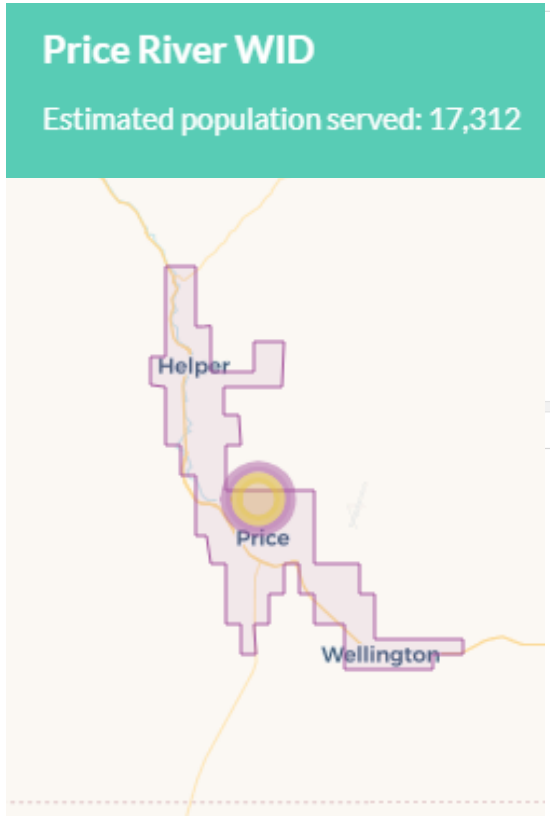
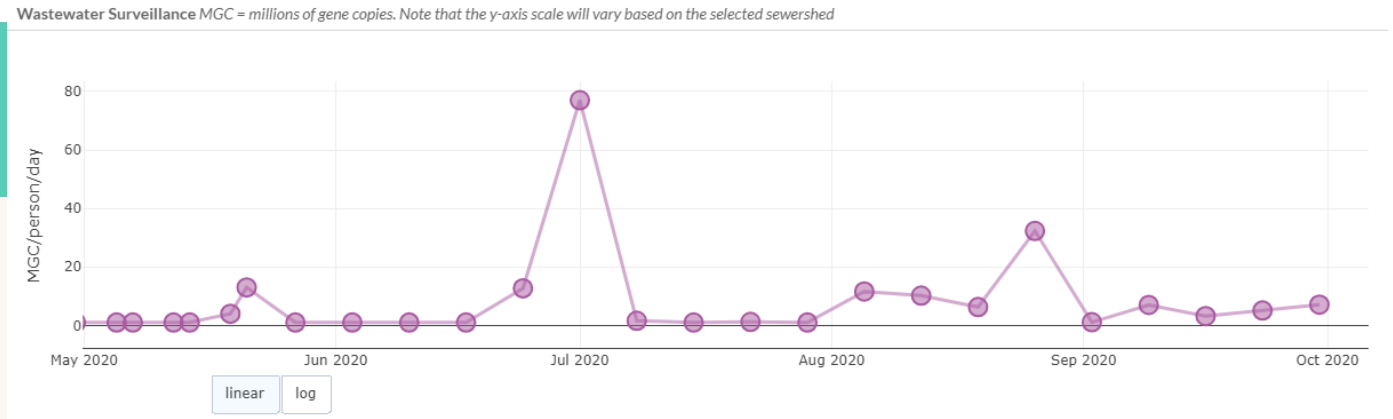
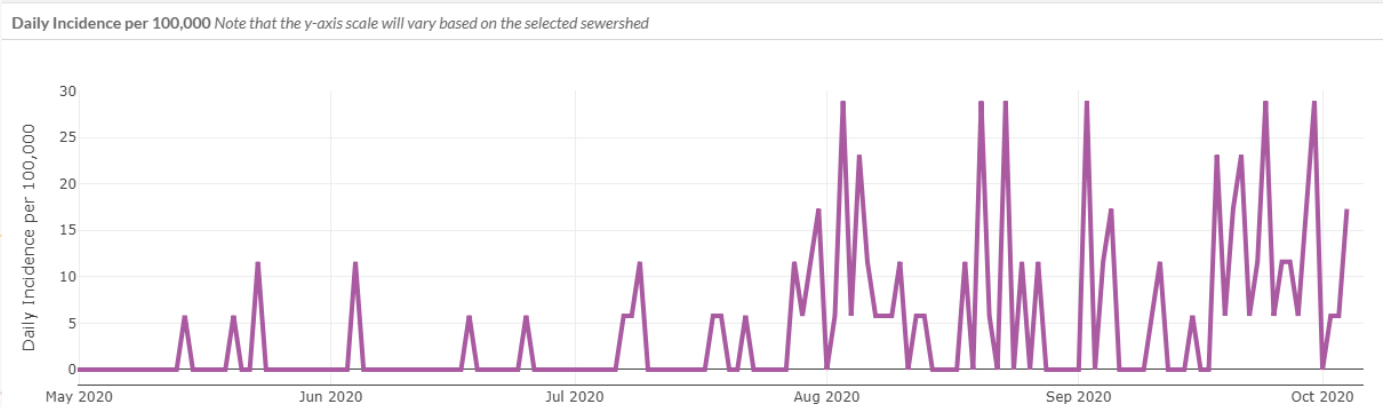


Capturing transient events

Travel & tourism, large gatherings, etc.

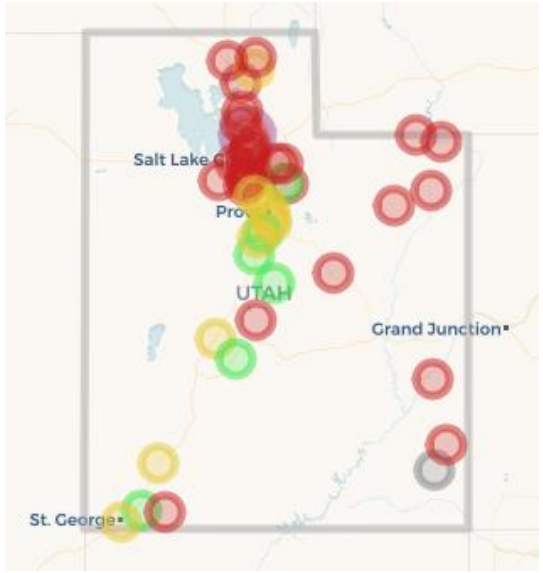






Other Uses

- Contact tracing prioritization
- Identification of high infection rate areas for intensive clinical sampling
- Targeting of outreach, education, and other interventions



Lessons

- A pilot study demonstrates utility of the tool and work out logistical and method issues at relatively low cost.
- Collaboration across many fields and agencies is critical. The value of effective communication, coordination, and logistical support cannot be overstated.
- We still have much to learn, but wastewater surveillance can already provide useful information for public health efforts.
- Sampling and analytical methods should be selected with public health uses in mind.
- Be adaptable and prepared for rapidly changing science and best practices.

Thank you!

Public dashboard: wastewatervirus.utah.gov

Questions?

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY WATER QUALITY

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UTAH DEPARTMENT OF HEALTH

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Questions for Speakers?

- Use the ‘Q&A’ or ‘Chat’ icons on the control panel at the bottom of your screen to submit your questions
- We suggest including your title and affiliation

November 4, 2020

Colorado's SARS-CoV-2 Wastewater Monitoring COllaborative

PRESENTERS

Nicole Rowan, Clean Water Program Manager, CDPHE

Brian Erly, Medical Epidemiologist, CDPHE

Resources

University Labs

Lab analysis

CDPHE and Gov. Office

Data analysis and financing

17 Wastewater Utilities

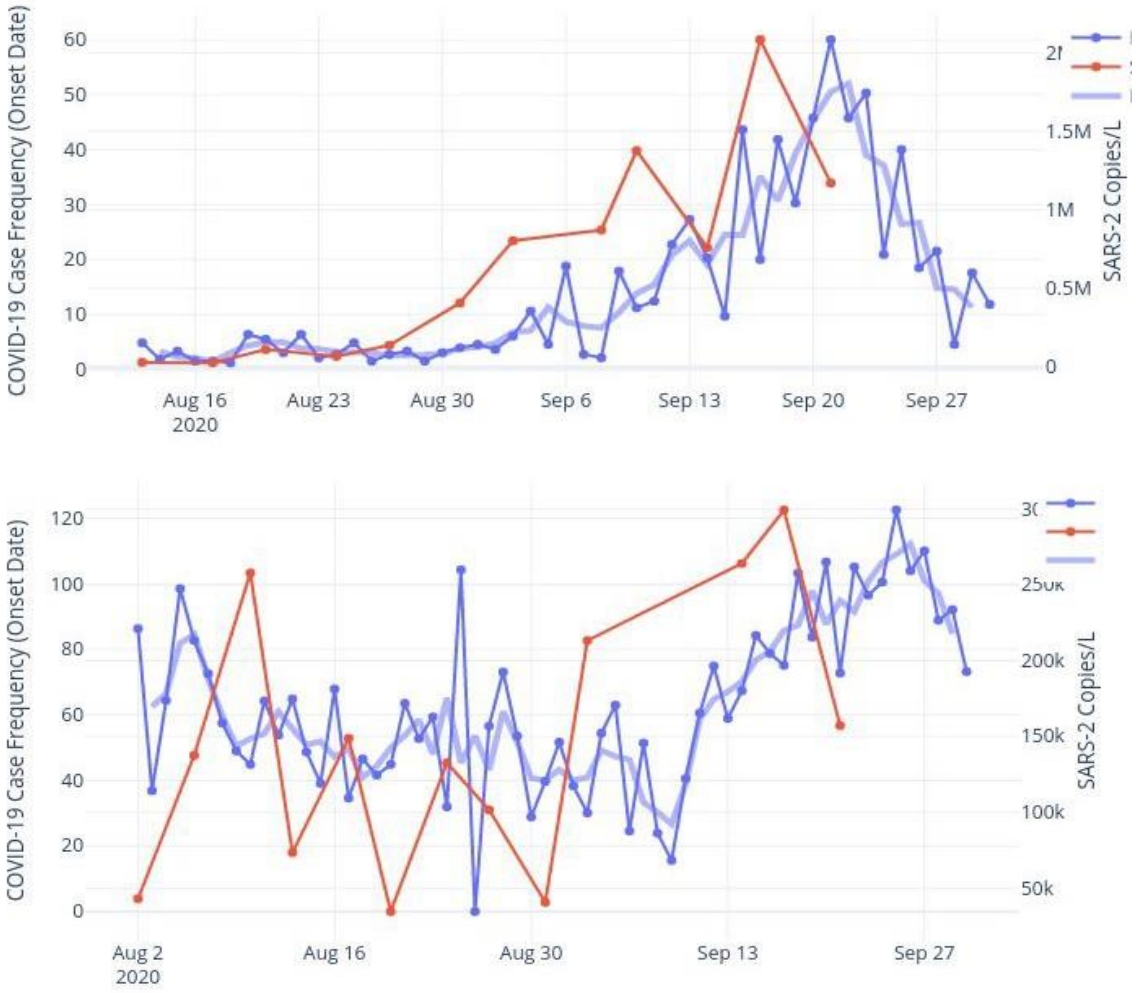
Sample Collection

60-65% of Colorado Population

WASTEWATER SAMPLING

- Samples collected at wastewater facility
- 2x per week at entry
- Part of routine sampling

Sewershed testing



- Everybody stools eventually
- Efficient pooled testing
- Quantitative signal
  - Interpretation more complex
- Far-reaching response
  - Pooled sample from many thousands of peop
  - Validates other surveillance data

Other wastewater sampling in CO

Institutions of Higher Education

- Residence-hall level sampling

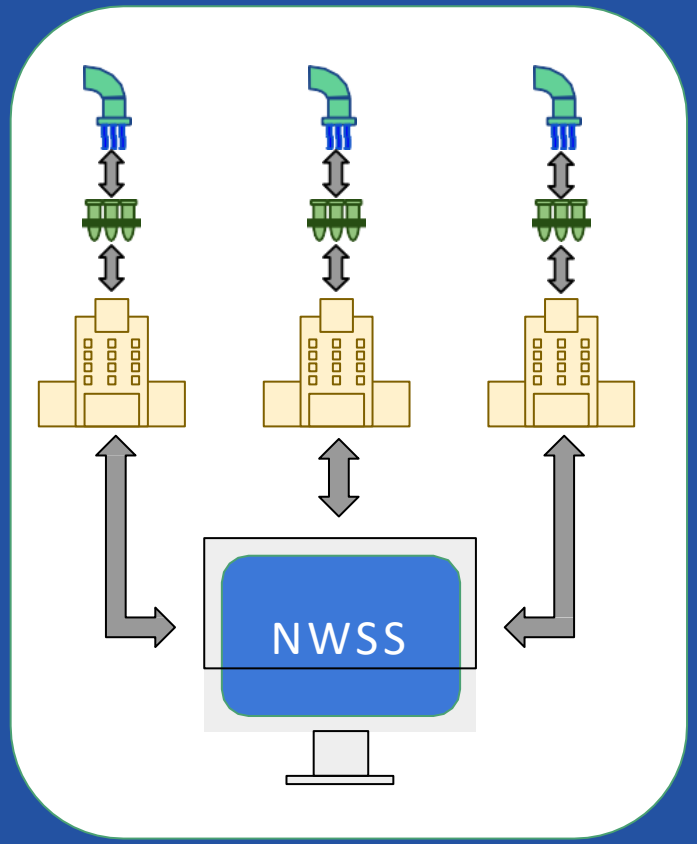
Individual Counties

- Sampling and rapid individual response

Department of Corrections

- Facility-level testing

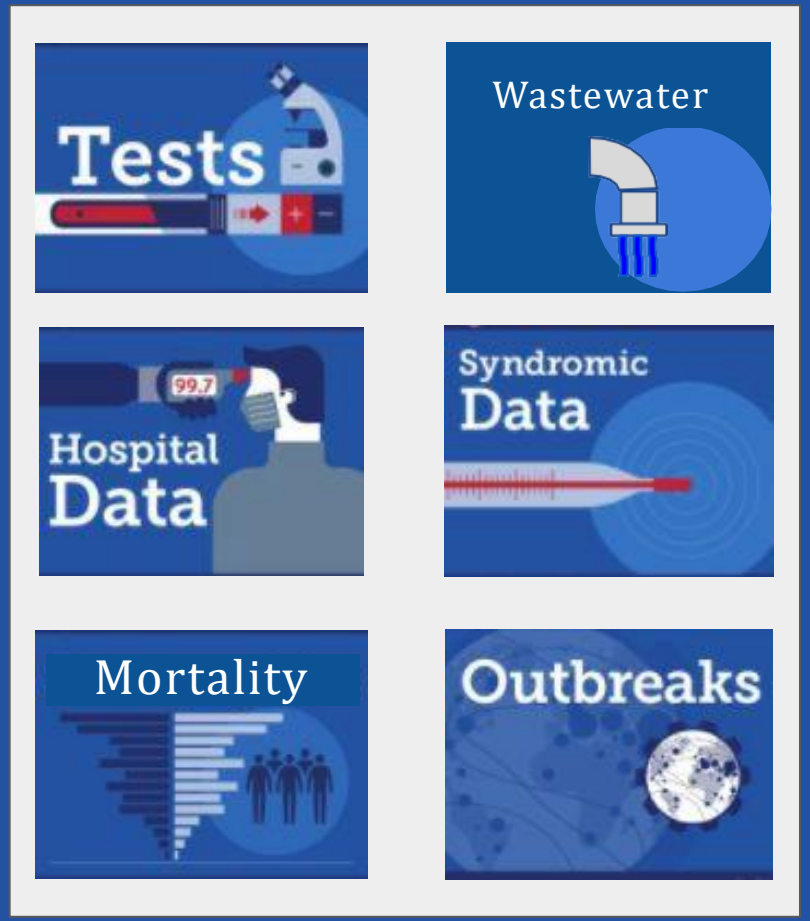
CDC NWSS



How is the state using the data?

- ALERT to regions of concern
- INFORM about limitations in other surveillance systems
- CONFIRM trends seen elsewhere

All data is interpreted in context of other indicators and what is going on in the state



Long-term vision

1	Expanding range	• Onboarding additional utilities • Targeted community sampling • Single facility sampling
2	Expanding access	• Publicly facing dashboard • Opening data for community researchers
3	Expanding scope	• Additional pathogens • Pharmacology • Human health indicators

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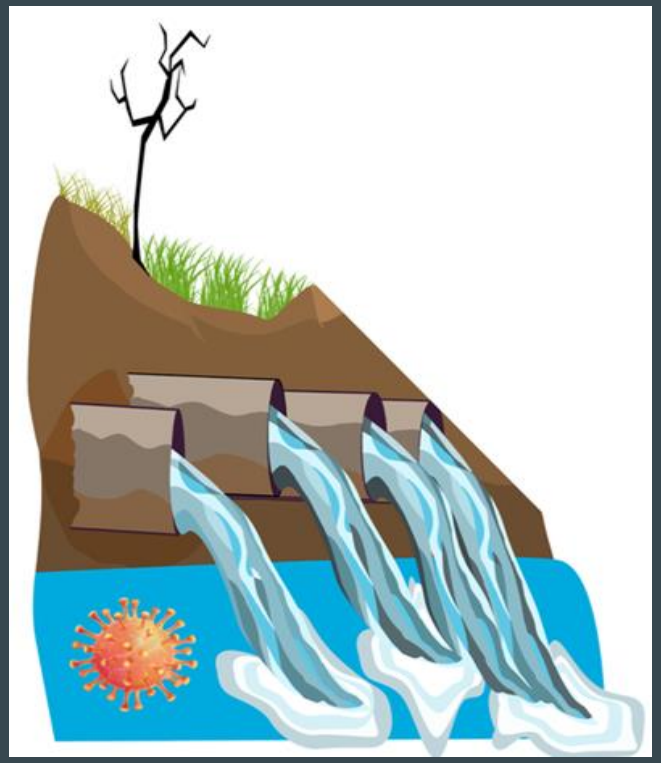
Sewer Sentinel Initiative

Measuring the quantity of SARS-COV-2 virus in wastewater to **monitor** infection levels in defined communities.

Use pooled data to measure virus load and rapidly **respond** to outbreaks



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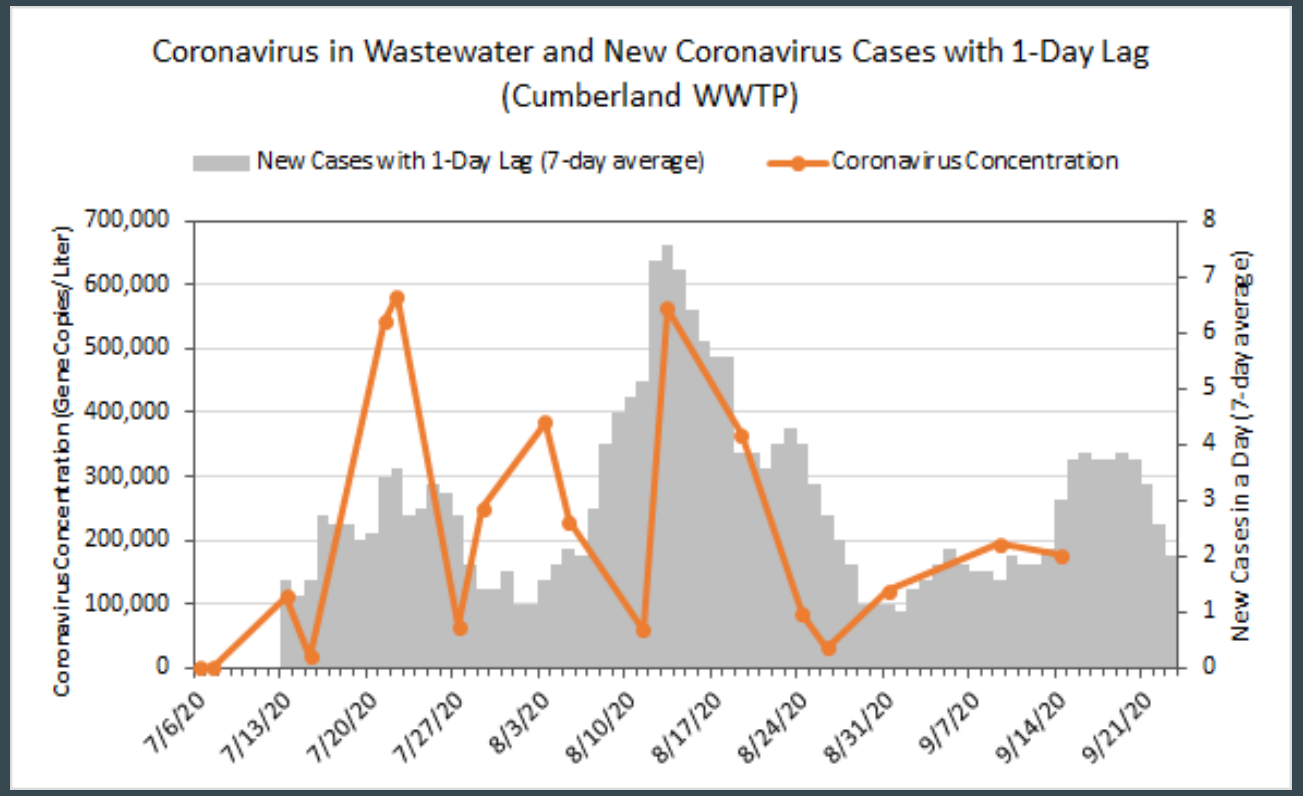
Phase I Lessons Learned

- Proof of concept
  - 5 locations
  - qPCR -- virus load
- Cannot determine # of infected individuals
- Best where clinical data aligns
- Pooled monitoring is cost-effective
- Provides actionable information

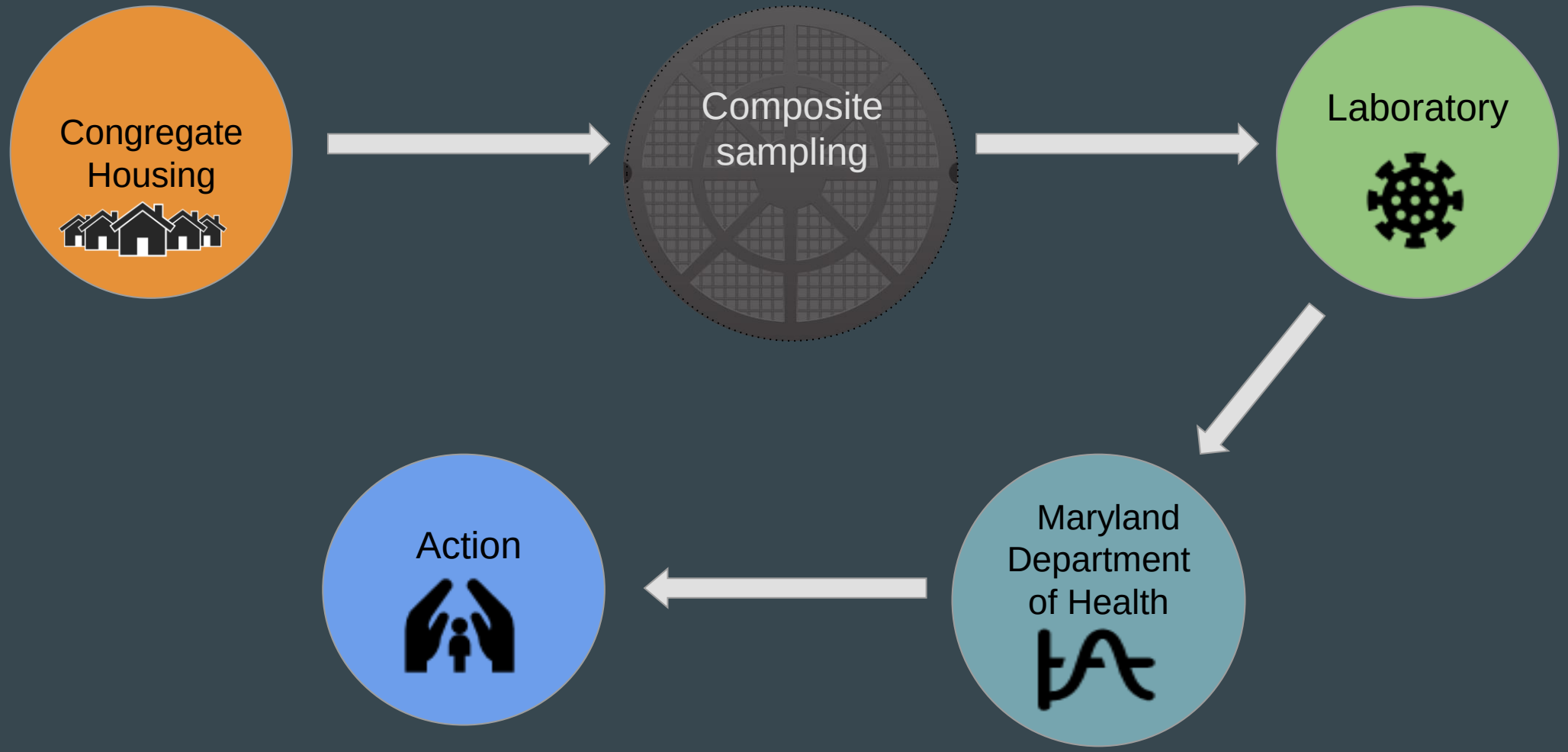


Data provided by MDH epidemiologists

Phase II

- **Find and Respond to Outbreaks**
- Downscale
- Congregate housing
- Vulnerable populations
- Weekly testing

Sewer Sentinel Initiative Phase II



Phase 2 Locations & Costs:

Non-transient residential:

- Incarceration facilities
- Juvenile and pre-release systems
- Baltimore Housing Authority locations
- Subsidized housing
    - Elderly

- **Costs: $1 million**
    - Weekly testing
    - 50 sites
- **Response**:
    - Testing/Tracing
    - Increased Cleaning
    - Behavior – Mask, Distance, Hand Washing

COVID Sewer Sentinel Initiative Phase 1 → 2

Monitoring

- Larger Scale: Community/neighborhood level
- Changes in virus load
- Response:
  - Testing
  - Shutdown
- Cost
  - $50,000 for 90 days
- Federal Funding
- Requires WWTP cooperation

Outbreak

- Smaller Scale: Buildings/Campus
  - Dorms
  - Subsidized Congregate Housing
    - Seniors
  - Incarceration facilities
- Response:
  - Clinical Testing
  - Contract Tracing
  - Behavior
  - Cleaning
- Cost:
  - $1 million for 6 months
- Require access and engagement from housing community

Conclusions

Wastewater sampling -- cost-effective tool to detect outbreaks in well defined communities.

Must have engagement and cooperation of health leaders to respond.

Measuring the quantity of SARS-COV-2 virus in wastewater to **monitor** infection levels in defined communities.

Use pooled data to measure virus load and rapidly **respond** to outbreaks

Questions

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Thank You!