MOBILE WASTEWATER ANALYSIS

DISEASE DETECTIVES

University of Kentucky

# WACKIEST

## **W**astewater **A**ssessment for **C**oronavirus in **K**entucky: **I**mplementing **E**nhanced **S**urveillance **T**echnology

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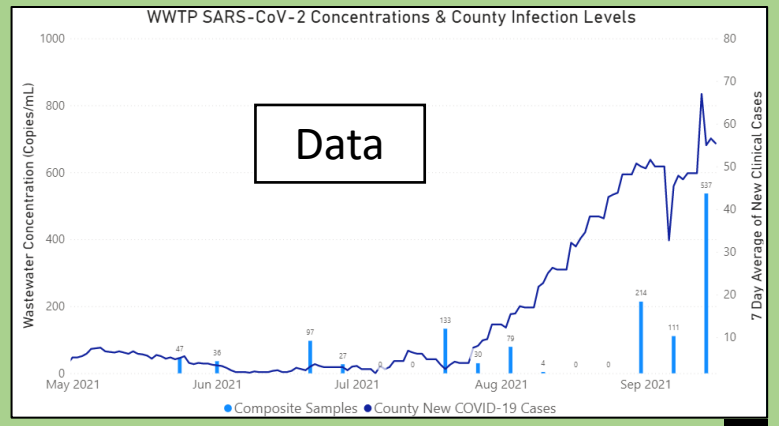
# Motivations for wastewater testing in rural KY

- Assess feasibility and acceptability of wastewater testing
- Develop technologies friendly to low infrastructure settings
- Understand usefulness of data for local decision makers

# Rural Wastewater Testing Partnership




Data

Academic Community

Wastewater Treatment Plants

Rural Health Departments

Rural School Curriculum

Wastewater samples from eight purposefully-chosen rural communities

Persons per square mile by census tract

- 10,000.0 or more
- 5,000.0 to 9,999.9
- 2,000.0 to 4,999.9
- 1,000.0 to 1,999.9
- 500.0 to 999.9
- 100.0 to 499.9
- 50.0 to 99.9
- Less than 50.0
- Water only

Kingsport

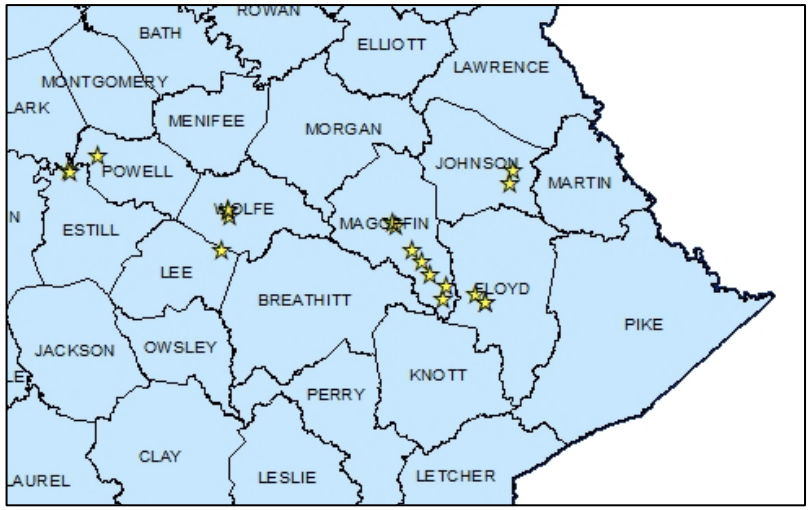
# Community Engaged Research

**Wastewater Treatment Plants**

- Leveraged existing professional relationships
- Goal: onsite testing

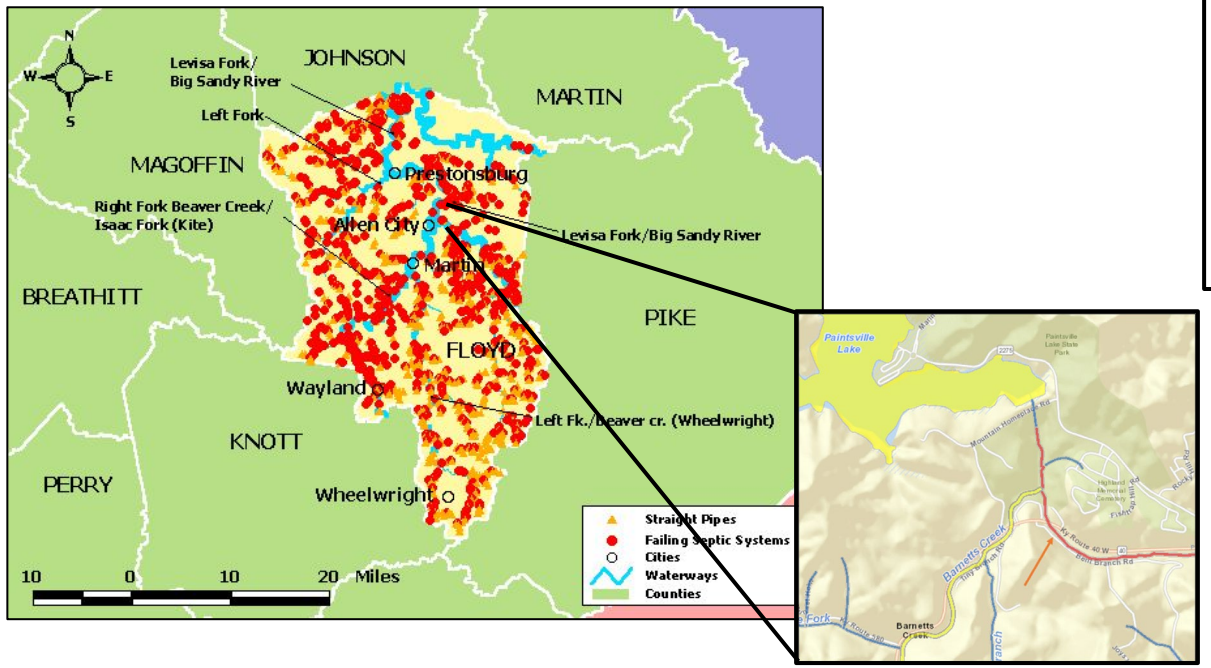
**Watershed Watch Citizen Scientists**

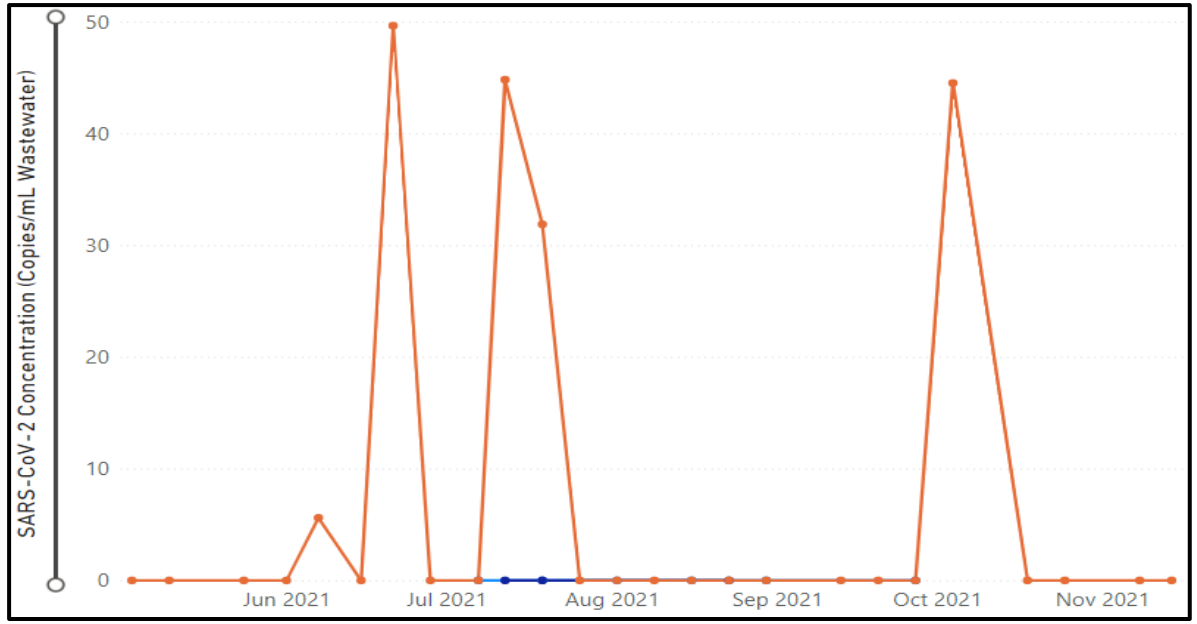
- Support stream sampling




# Environmental Sampling

| | County |
|---|---|
| Straight pipes | 1,447 |
| Failing septic systems | 1,196 |



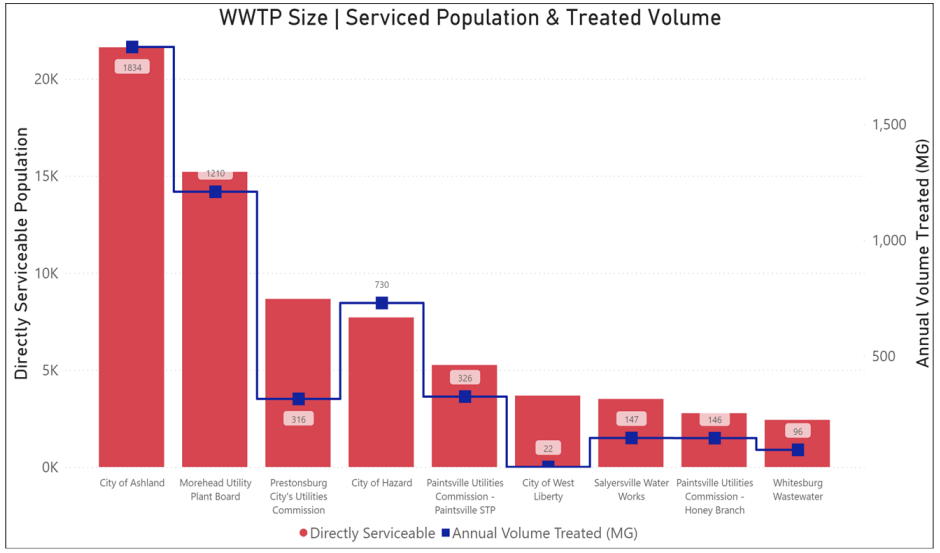




- 5/25 stream samples with SARS-CoV-2 RNA
- Anecdotal COVID-19 cases upstream

# Challenges

## Infrastructure and logistical

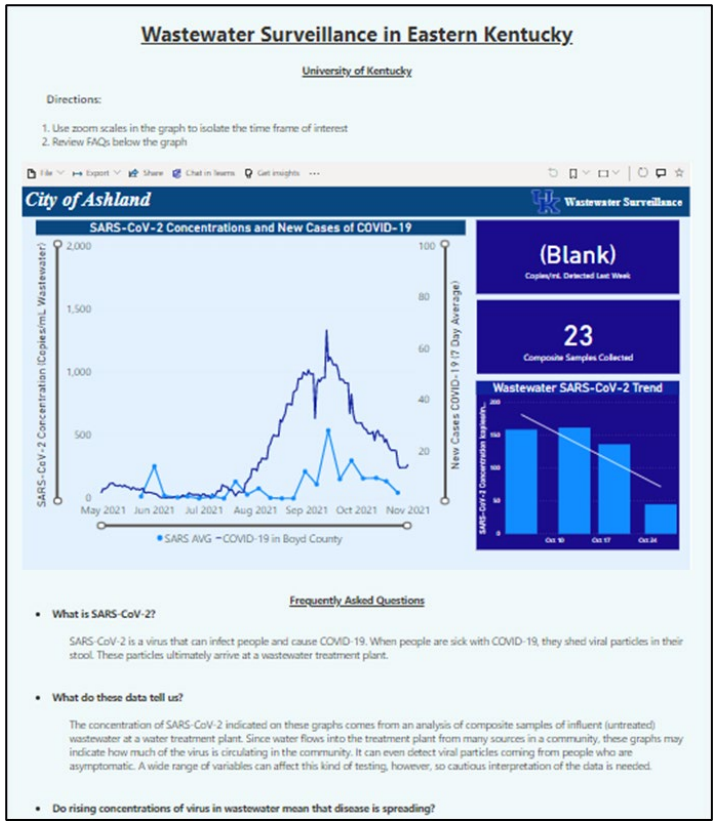
- WWTP location, communication, plant design




## Laboratory

- Dilute and labile biomarkers


## Data interpretation and use



# Community Engagement through Science Education

Sahar Alameh, PhD

An environmental health curriculum using the context of wastewater surveillance and the COVID-19 pandemic designed to:

- Improve students' science and socio-scientific literacy
- Build community environmental health literacy
- Promote students' interest in and improve attitudes toward STEM

# Middle and High School Biology Curriculum

## Aligned with Kentucky Academic Standards for Science (Next Generation Science Standards)

| | | |
|---|---|---|
| **1. What are Viruses?**<br>What defines life?<br>Are viruses alive?<br>Viral structure and function | **2. Coronaviruses & COVID-19**<br>Coronavirus attributes<br>How soap & water kill viruses<br>How viruses hijack host cells | **3. Viral Spread**<br>Use mathematical models (HS) and online simulations (MS) to investigate viral spread |
| **4. H-2-Poo!**<br>Wastewater management<br>Wastewater surveillance | **5. Become a COVID Detective!**<br>Hands-on wastewater testing (using safe water samples) with project's Mobile Lab | **6. Evidence-Informed Public Health**<br>Culminating project: Connect wastewater surveillance to public health decisions making |

# WACKIEST Curriculum Study

**Study Goals:**

- Improve views of science and socio-scientific literacy
- Build community environmental literacy
- Increase students' interests and attitudes towards STEM

**Study Participants and Design:**

- Pilot with 4 middle/high schools in Eastern Kentucky
- Teachers will attend professional development sessions
- Provide all instructional and lab materials (including mobile van!)

**Data collection:**

- Teachers: pre/post-surveys, exit interviews about curricular experience
  Students: pre/post-surveys, pre/post-lesson handouts, focus groups

# Our Transdisciplinary Team

**Scott Berry**
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Dalton Strike
Mechanical / Biomedical Engineers

**Anna Hoover**
Ted Smith
Malissa McAlister
Environmental Scientists

**Gail Brion**
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Public Health Physician

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