

Epidemiological Studies in Wastewater at the Laguna Treatment Plant

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Laguna Treatment Plant

- 100% CA Title 22 Reuse (Disinfected Tertiary)
- Produces average of 7 BG of Recycled Water
- Serves a Regional Population of ~230,000 from 5 Partner Agencies
- Goal is to beneficially reuse all treated effluent



Laguna Environmental Laboratory (LEL)

- LEL was established in 1968 with primary function of physical and chemical measurements of wastewater
- Expansion to add a broader scope of analytical testing in 2000
- Staffing includes sample receiving and preparation, laboratory analysts, information technology and management for a total of 13



SARS-CoV-2 Tracking

- Is SARS-CoV-2 (COVID 19) underreported?
- People shed virus in Stool 3-4 days after infection
- Virus does not survive in the sewer, but dead viruses leave Ribonucleic Acid (RNA) traces that can be detected and analyzed

City of Santa Rosa's Sampling Program

- Submitted data as part of three studies
 - Biobot
 - LuminUltra
 - WastewaterSCAN (Verily)
- One to three samples per week
- Samples are raw wastewater or primary solids providing data anonymization
- Staff responsible for the collection, preservation, and shipping samples



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Partners

Biobot and LuminUltra

- Private supported through the United States Centers for Disease Control

WastewaterSCAN

- National effort based at Stanford University
 - Scientific leads: Stanford and Emory Universities
 - National Scaling Partners: Verily and National League of Cities
 - Local Partners: Wastewater and Public Health Officials



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Analytical Details

Raw wastewater (Biobot and LuminUltra)

Primary Solids (WastewaterSCAN)

Units

- Copies of RNA per L of Water
- Copies of RNA per g of solids

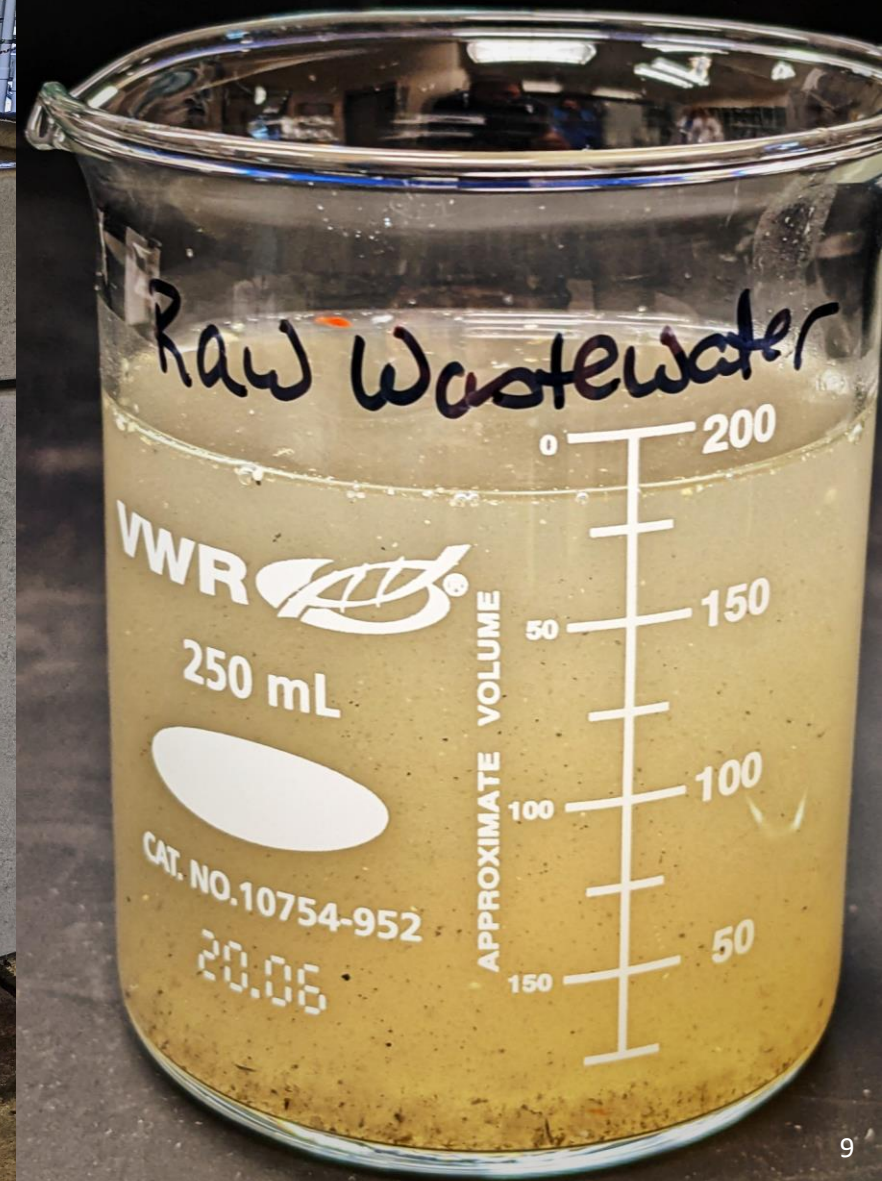
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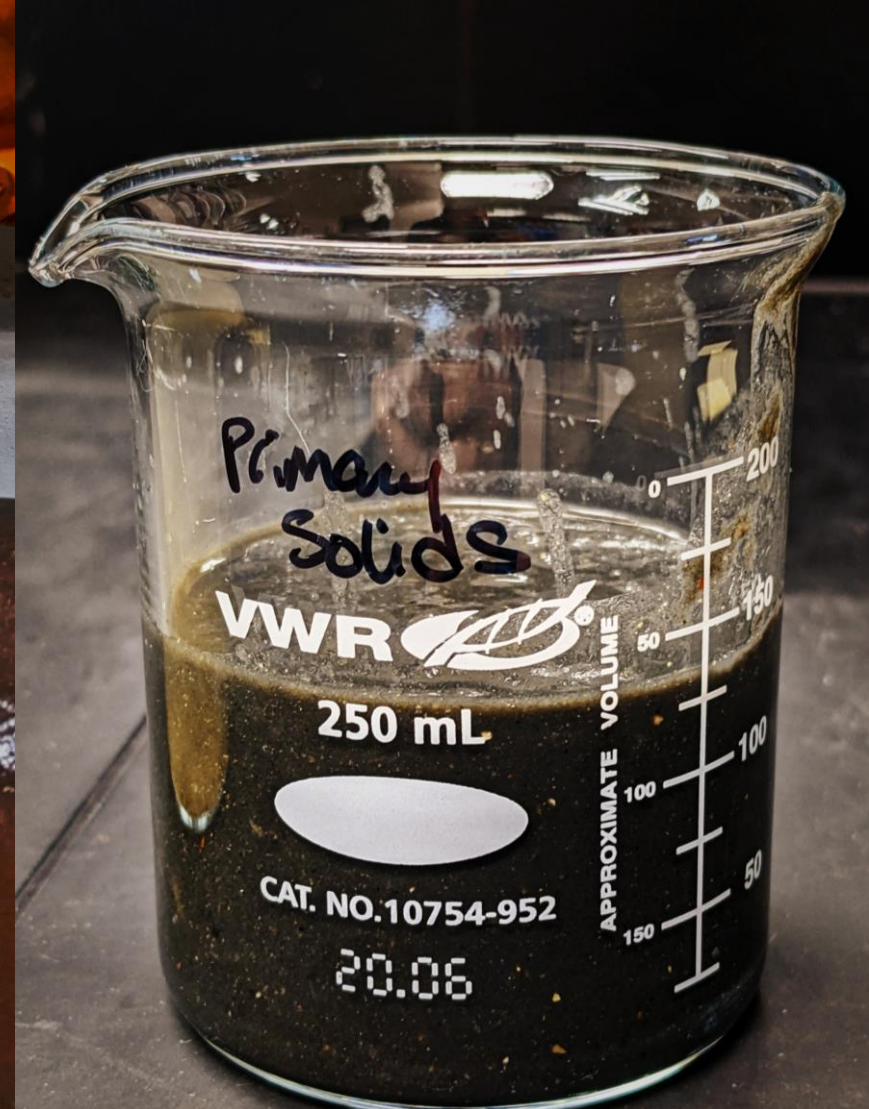
- PMMoV (pepper mild mottle virus)
- BCoV (bovine coronavirus)



Sample Locations

Raw Wastewater





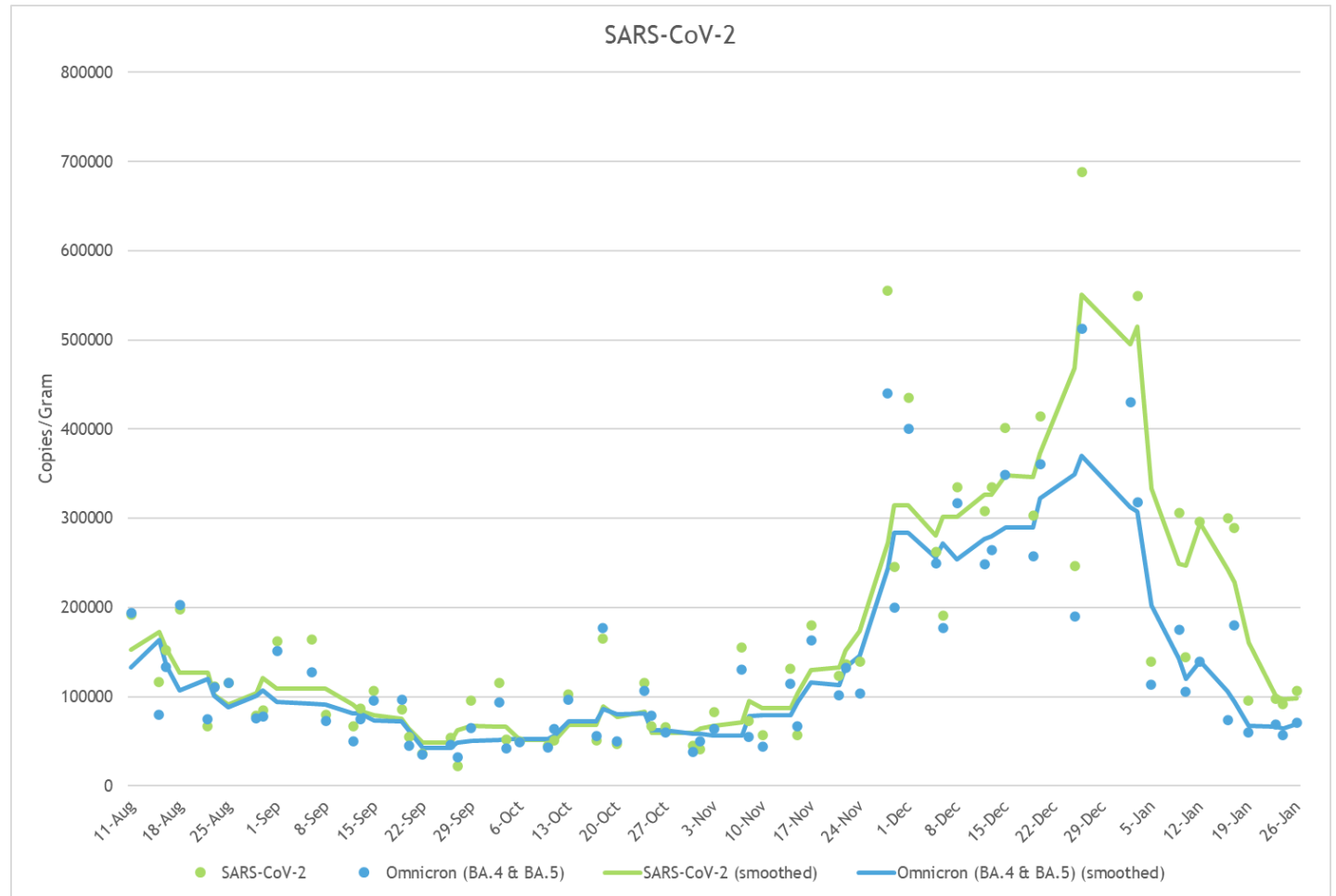
Primary Solids



Data Set and Normalization (WastewaterSCAN)

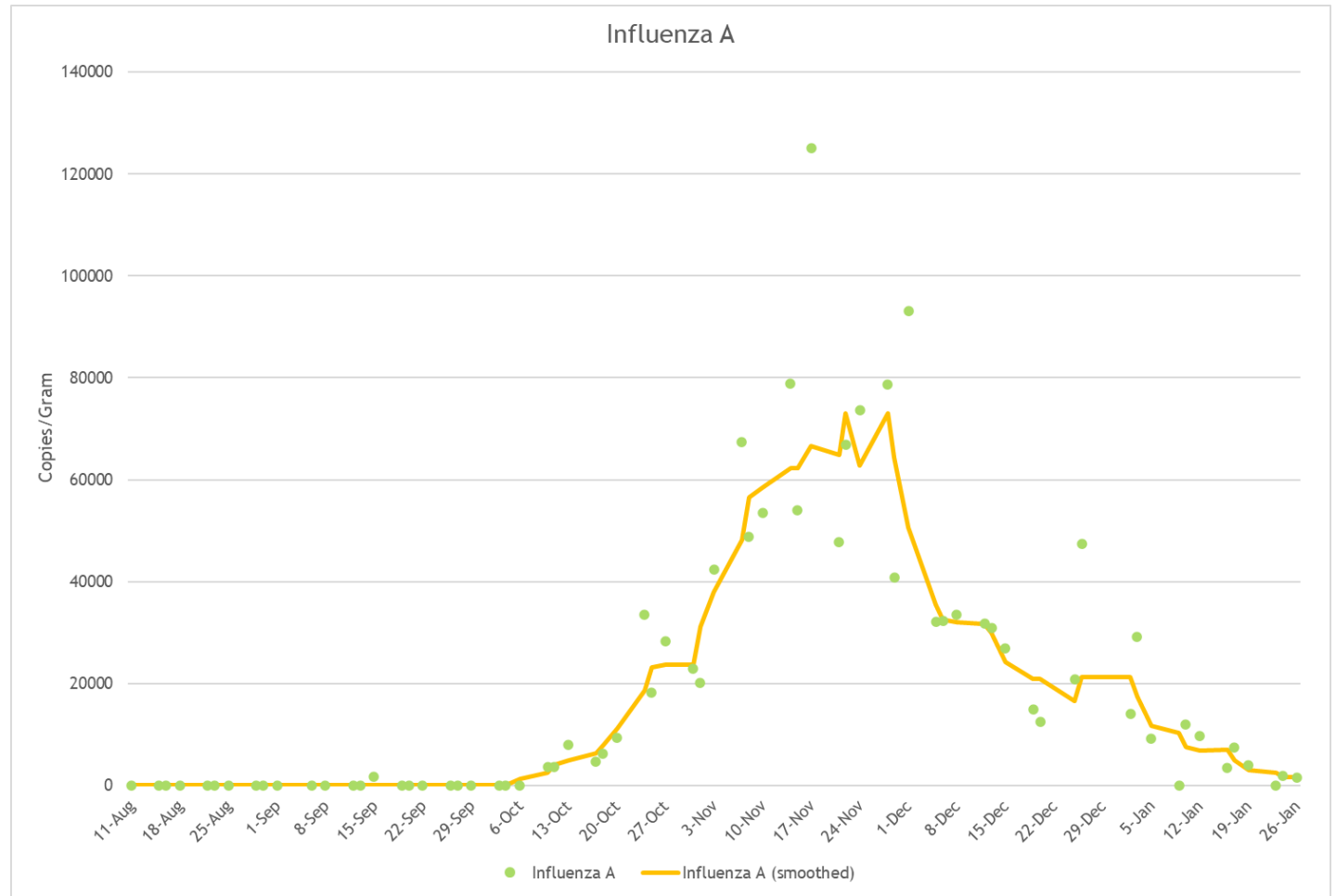
- Data collected is normalized to aid in the comparison of different agencies
- Eighty-five plants in national program representing 28.6 million people (8.7 % of US population)
- Sonoma County Public Health approached the City of Santa Rosa, City of Petaluma, and the Sonoma County Water Agency for participation in Study

Verily Data: SARS-CoV2



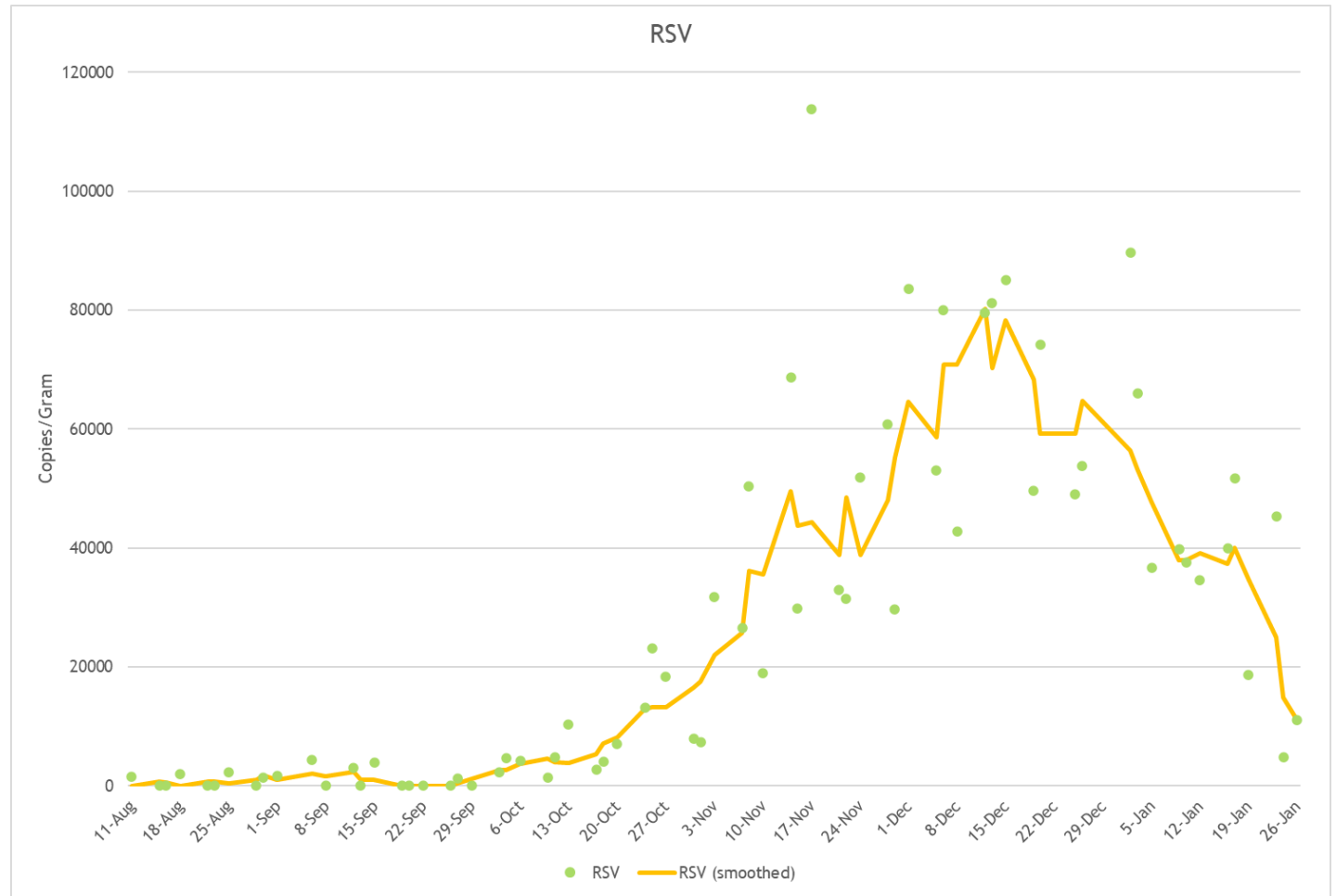
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Verily Data: Influenza A



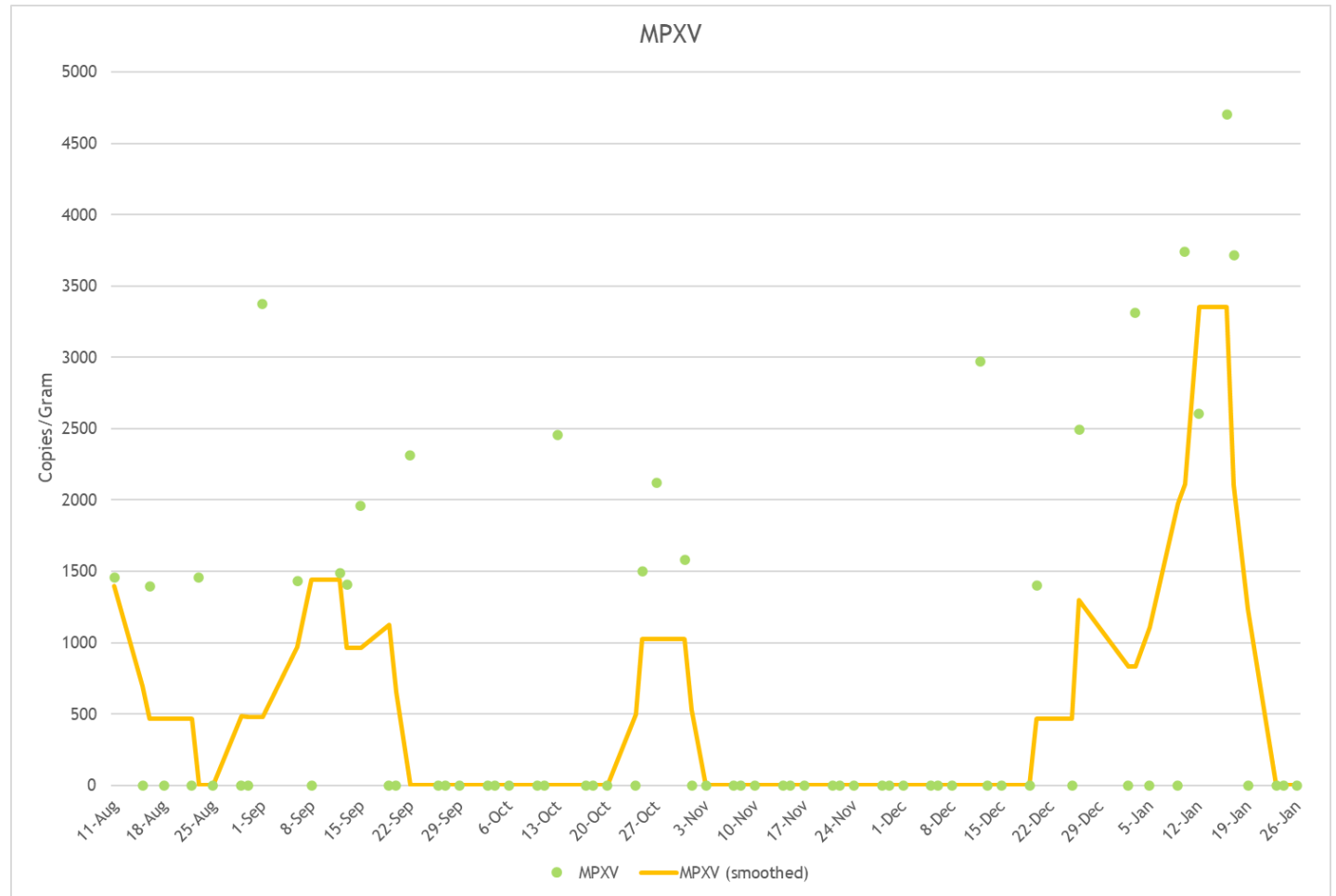
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Verily Data: Respiratory Syncytial Virus (RSV)



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Verily Data: MPXV



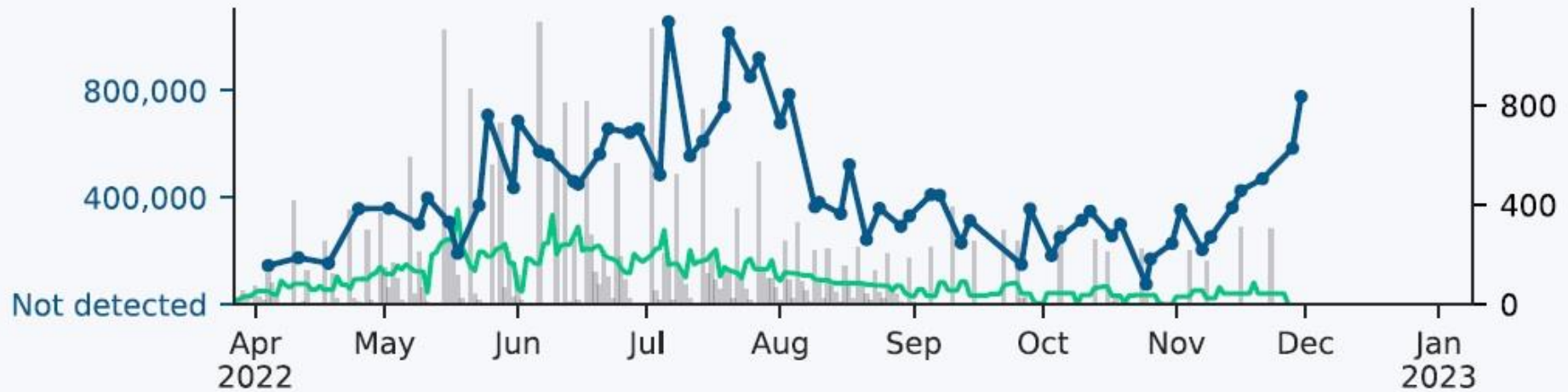
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Data: SARS-CoV-2 (Biobot)

Effective virus concentration over time

Effective SARS-CoV-2 virus concentration (copies / L of sewage)

New cases in county on sampling date



—●— Effective SARS-CoV-2 virus concentration

— 7-day rolling average of new cases in your county

■ New cases in your county



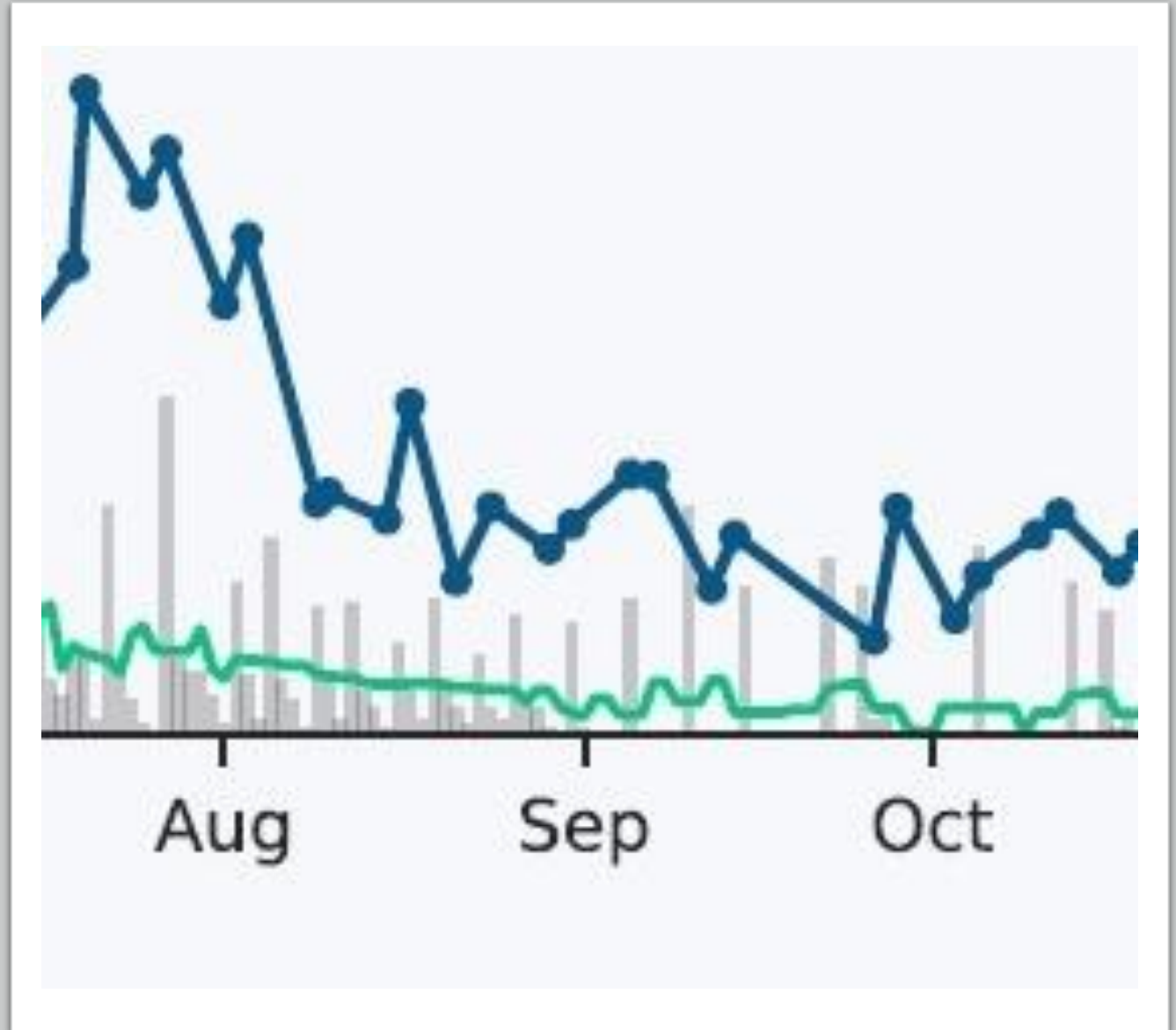
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Underreported Public Health Data

- Public Health Data is underreported but data collected in at Wastewater Treatment Plants are not reliant on self reporting
- Data from Verily is available publicly and Sonoma County Public Health uses the data to guide public health policy



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Conclusions

- Epidemiological studies in wastewater capture community viral infection levels when data from self reporting is limited or nonexistent
- At this time, the data indicate increases and decreases in infection rates in population connected to the sewershed and not percent infected population
- Wastewater viral studies are a method of determining effectiveness of public health mandates
- Epidemiological studies are an early indicator of emerging illness. This includes new WastewaterSCAN targets for Human metapneumovirus, Influenza B, Norovirus, and MPXV-WA (CDC preferred assay)



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Questions

Data available at:
publichealth.verily.com/



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