

# COVID-19 Surveillance Update

Presentation to SCCWRP Commission

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# Background

- COVID-19 pandemic has put wastewater based surveillance of viral pathogens at the forefront of public health
- California's wastewater community continues to be active in wastewater based surveillance for SARS-CoV-2
  - More than 40 facilities are monitoring and have at least six months of data
  - Several facilities (including SCCWRP member POTWs) have more than a year of data
  - Participation in national studies
- WQMC Wastewater Based Epidemiology continuing to provide guidance on effective data use and interpretation

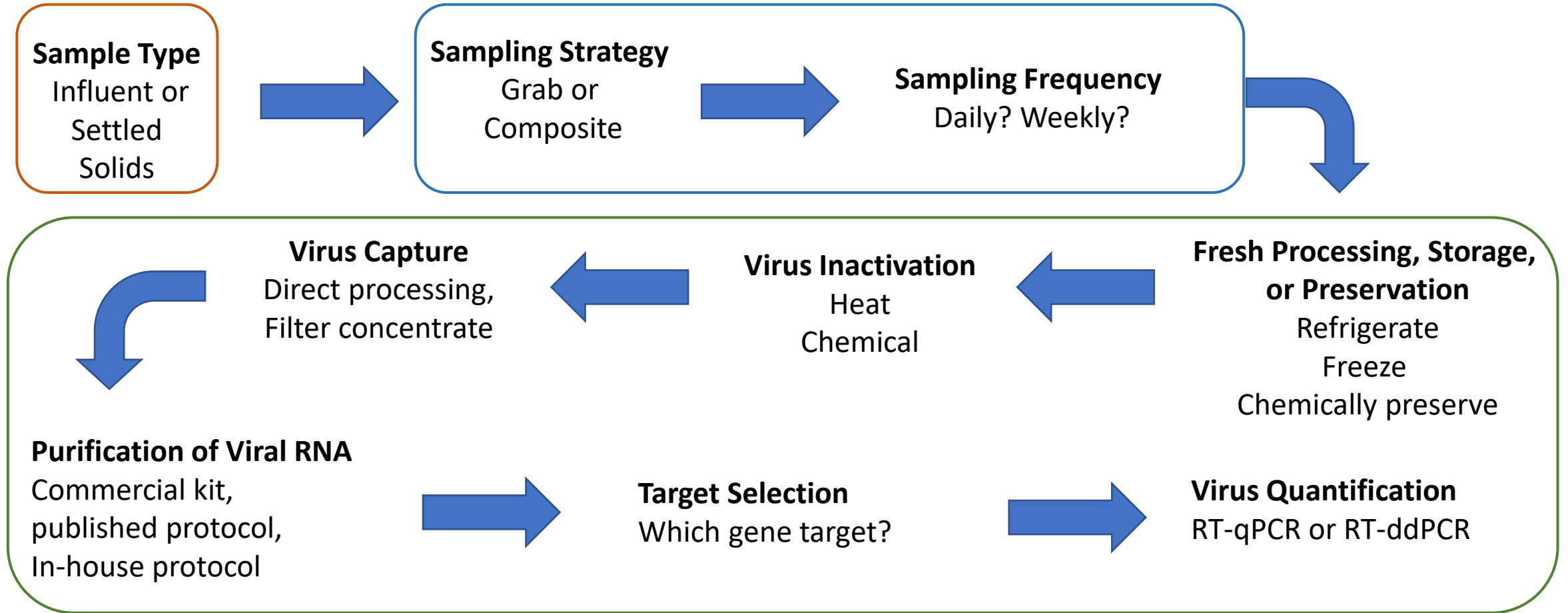
# From Method Comparison to Effective Data Use

- Laboratory measurement method variability
- Measurement methods sensitivity
  - Guidance document with WBE Subcommittee
- SARS-CoV-2 variants in wastewater

# Potential Sources of Variability

Stanford Collaboration

CSU Fullerton Collaboration



Manuscript in revision

# From Method Comparison to Effective Data Use

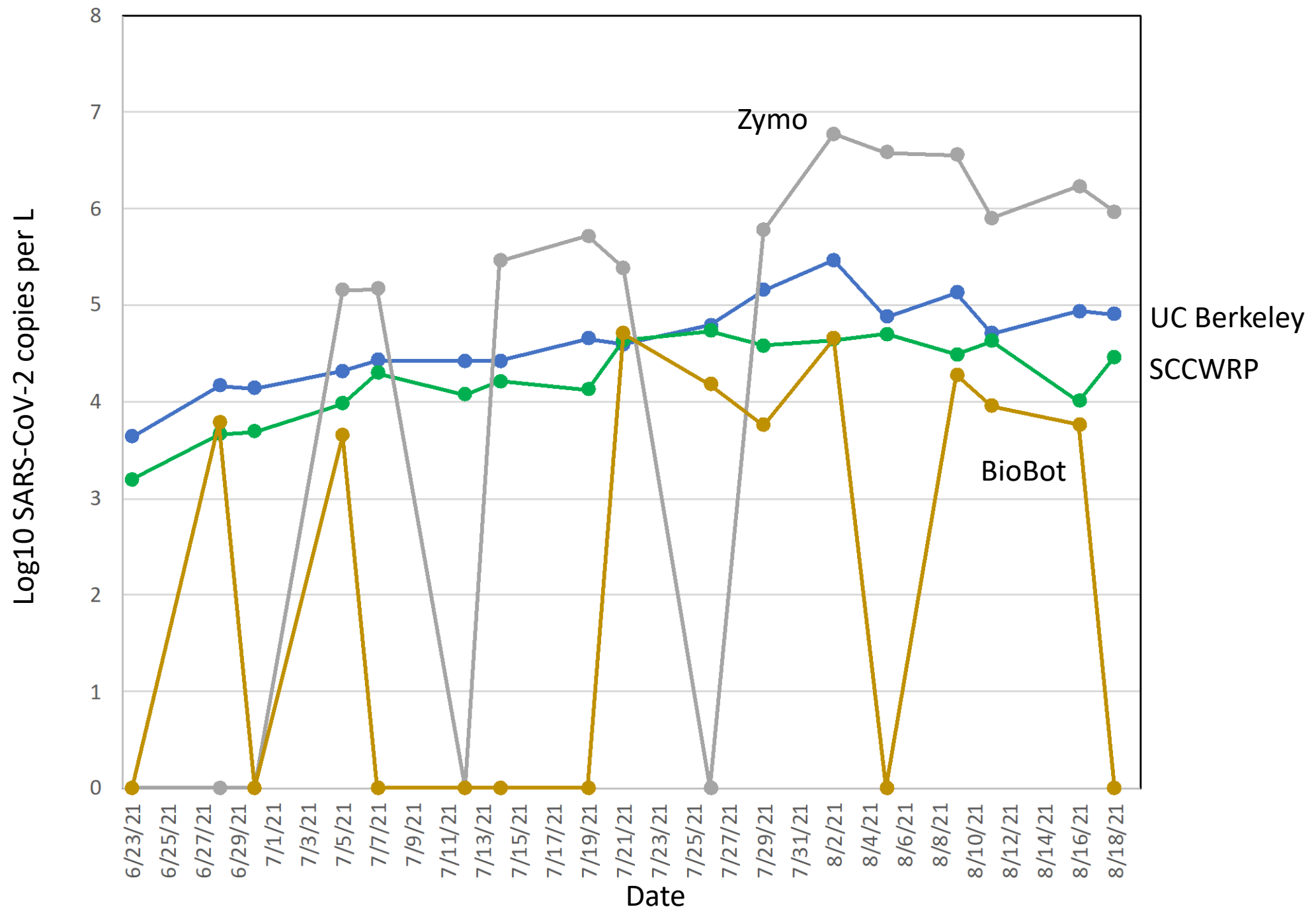
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# Recommendations to Improve Sensitivity

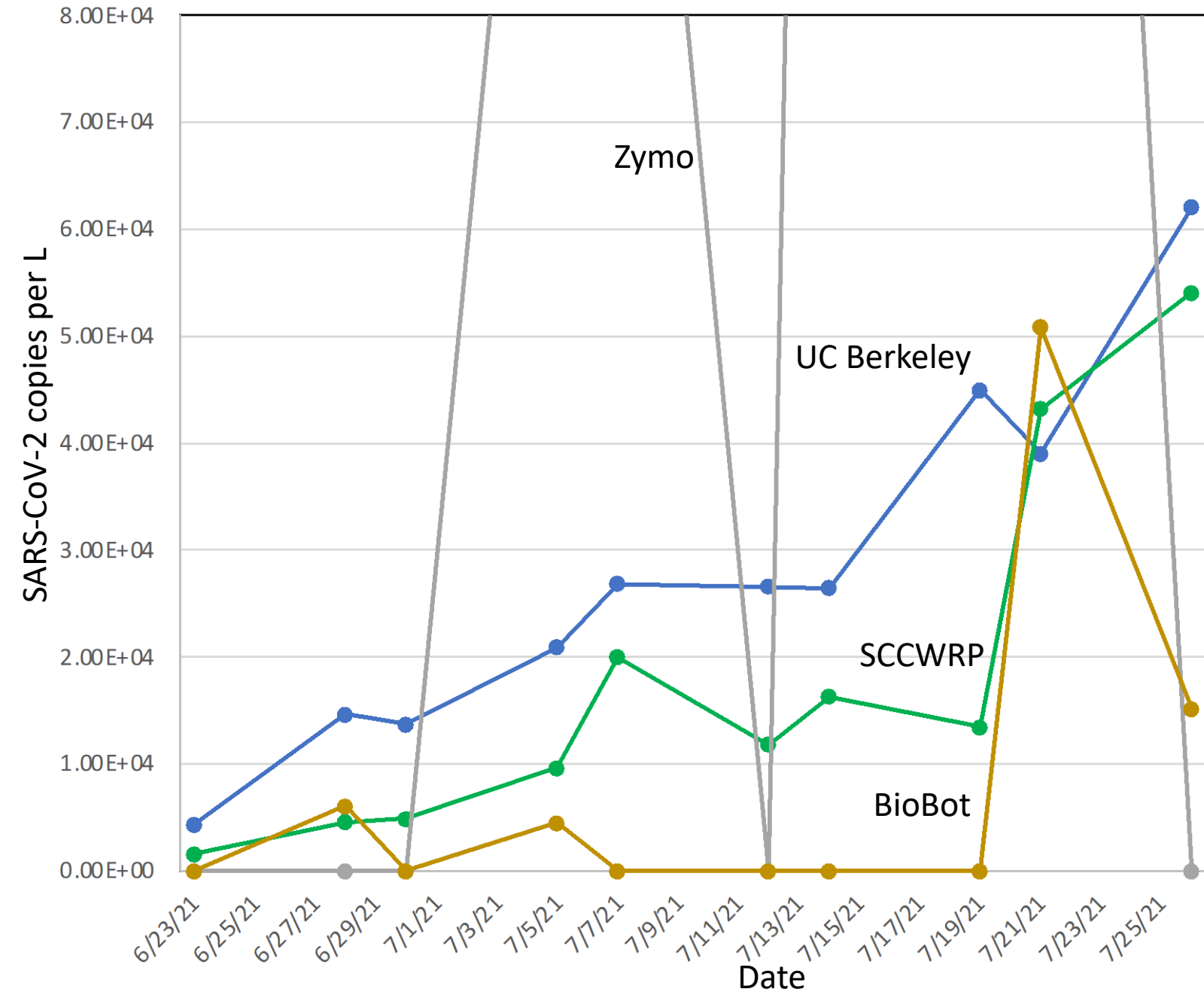
- Remove heat inactivation step
  - 50% of treatment plants using heat inactivation
- Concentrate or measure a larger volume
  - ~30% of labs are not concentrating
- Measure SARS-CoV-2 using digital RT-PCR
  - 60% of labs are using RT-QPCR
- Use sludge samples
  - 25% of labs are collecting sludge

# Sensitivity Case Study at JWPCP

- Opportunity to test sensitivity recommendations
- Split samples among four groups
  - Small volume qPCR (Zymo Research)
  - Small volume, concentrated qPCR (BioBot)
  - Large volume qPCR (UC Berkeley COVID-WEB)
  - Large volume digital PCR (SCCWRP)
- Preliminary results







- UC Berkeley and SCCWRP are highly correlated ( $r^2=0.7$ )
- 60% of BioBot samples below detection
- 50% of Zymo samples are below detection
- Zymo's concentrations are much higher compared to others

# Takeaways from the Sensitivity Comparison

- Larger volume concentration qPCR and digital PCR are sensitive enough at low concentrations
- Smaller volume qPCR methods too insensitive to be useful when prevalence is low
- WBE Subcommittee recommendations looking pretty good

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# Focus on SARS-CoV-2 Variant Analysis

- Variant analysis is the next on the horizon for SARS-COV-2 analysis
  - High public health impact
  - Not a part of current SARS-CoV-2 monitoring
- Should variant analysis become a part of routine wastewater based surveillance?
- WBE Subcommittee has determined that variant analysis is not ready to be included in routine monitoring
  - Guidance document sent to CASA and Public health departments.

# SARS-CoV-2 Variant Analysis in Sewage

- Wastewater is complex and multiple variants in sewage
  - Detection of a single mutation is not enough
- Approaches using both sequencing and targeted analysis are needed
  - Active area of research
- Interpretation of variant data in sewage will require collaboration across multiple agencies

# Ongoing Variant Research at SCCWRP

- Sequencing SARS-CoV-2 genomes in sewage samples
  - Sewage RNA Virus manuscript in revision
  - Identifying SARS-CoV-2 mutations in sewage
- Quantifying Variants using digital PCR
  - Targeting prevalent variants
  - Using multiple gene targets to identify specific variants
- Collaborating with universities, POTWs, and public health agencies within California and across the US