

Investigation of SARS-CoV-2 Prevalence and Variants through Wastewater Surveillance

Washoe County Board of County Commissions
May 24, 2022

Nevada Water Innovation Institute



University of Nevada, Reno





Presentation Outline

1. Monitoring Influent Wastewater at Water Reclamation Facilities (Lin Li)
2. Monitoring Wastewater in Sewer Network Locations (Laura Haak)
3. Tracking New and Evolving Variants of COVID-19 through Wastewater Surveillance (Subhash Verma)
4. Next Steps in Wastewater Surveillance



Current Research Group

Dr. Krishna Pagilla



**Principal Investigator,
Professor - Engrg**

Dr. Subhash Verma



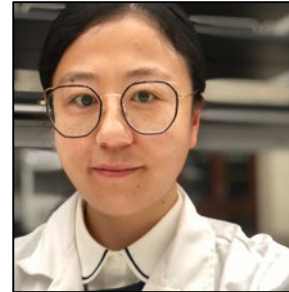
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**Director-Nevada
Genomic Center**

Dr. Lin Li



**Research
Scientist**

Dr. Laura Haak



**Research
Scientist**

Niloufar Gharoon



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Madeline Carine



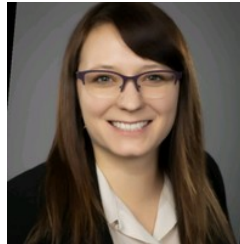
PhD Student

Kabita Adhikari



PhD Student

Shannon Harger



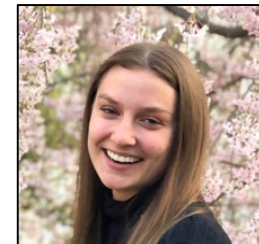
PhD Student

Olivia Tahti



Undergrad

Amelia Bryan



Undergrad

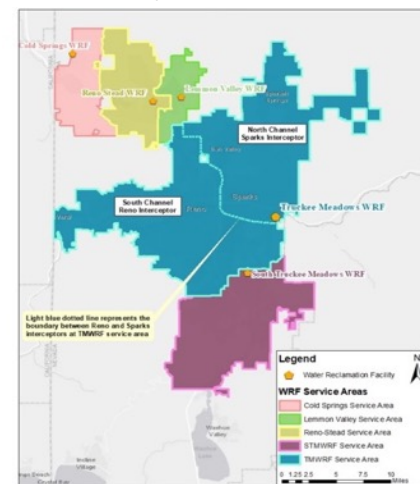
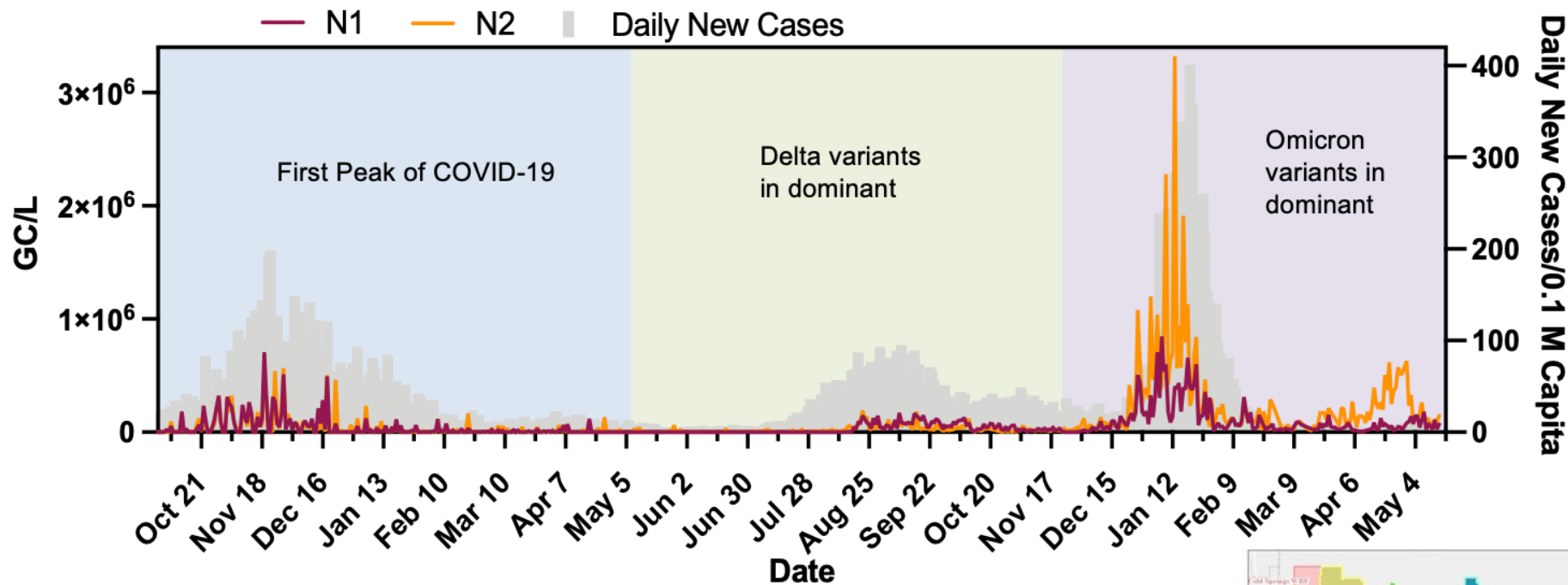
Heidi Miller



Undergrad

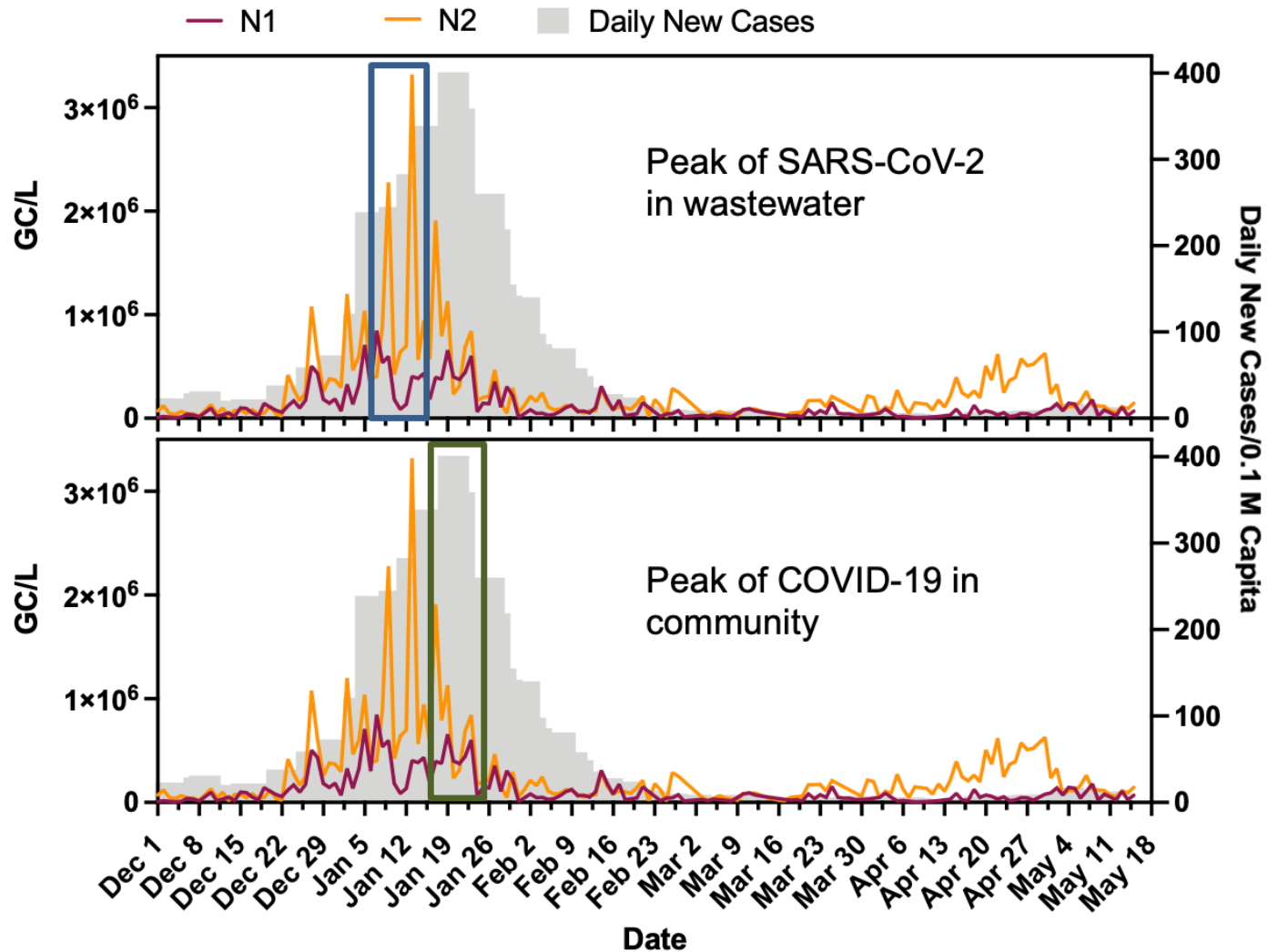


TMWRF Wastewater Monitoring





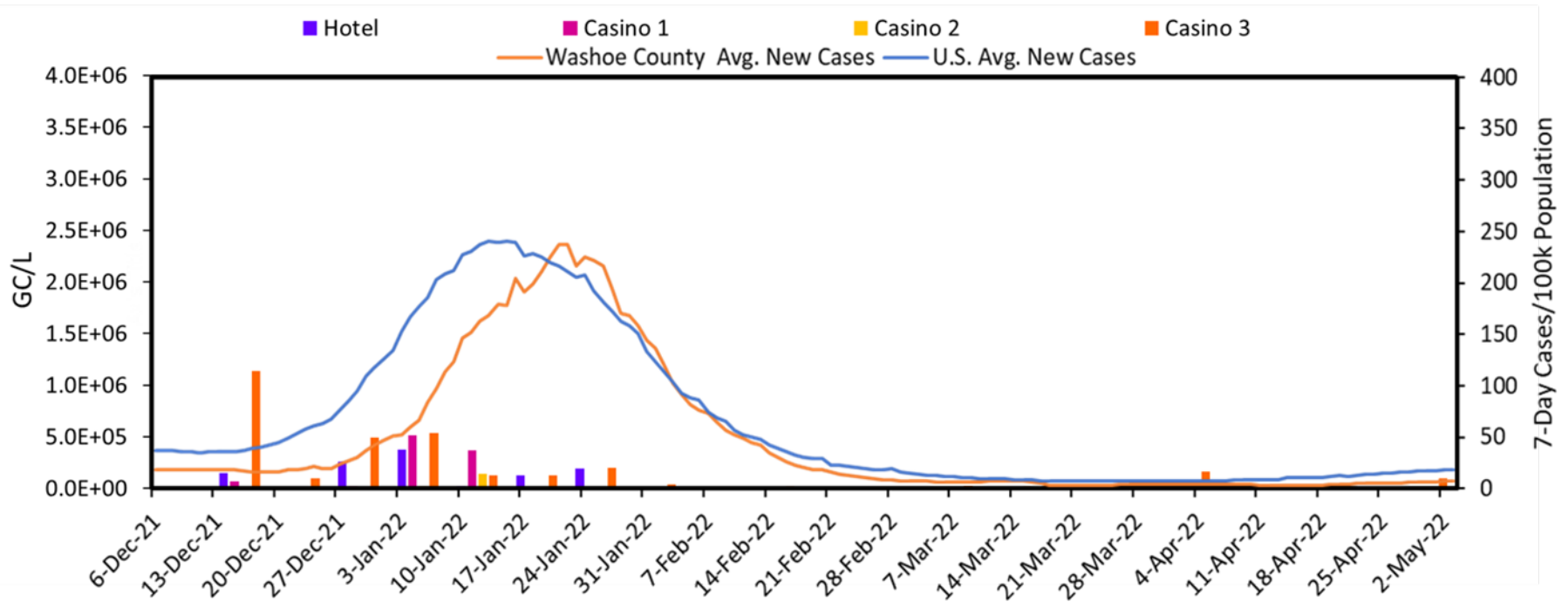
Trend Analysis





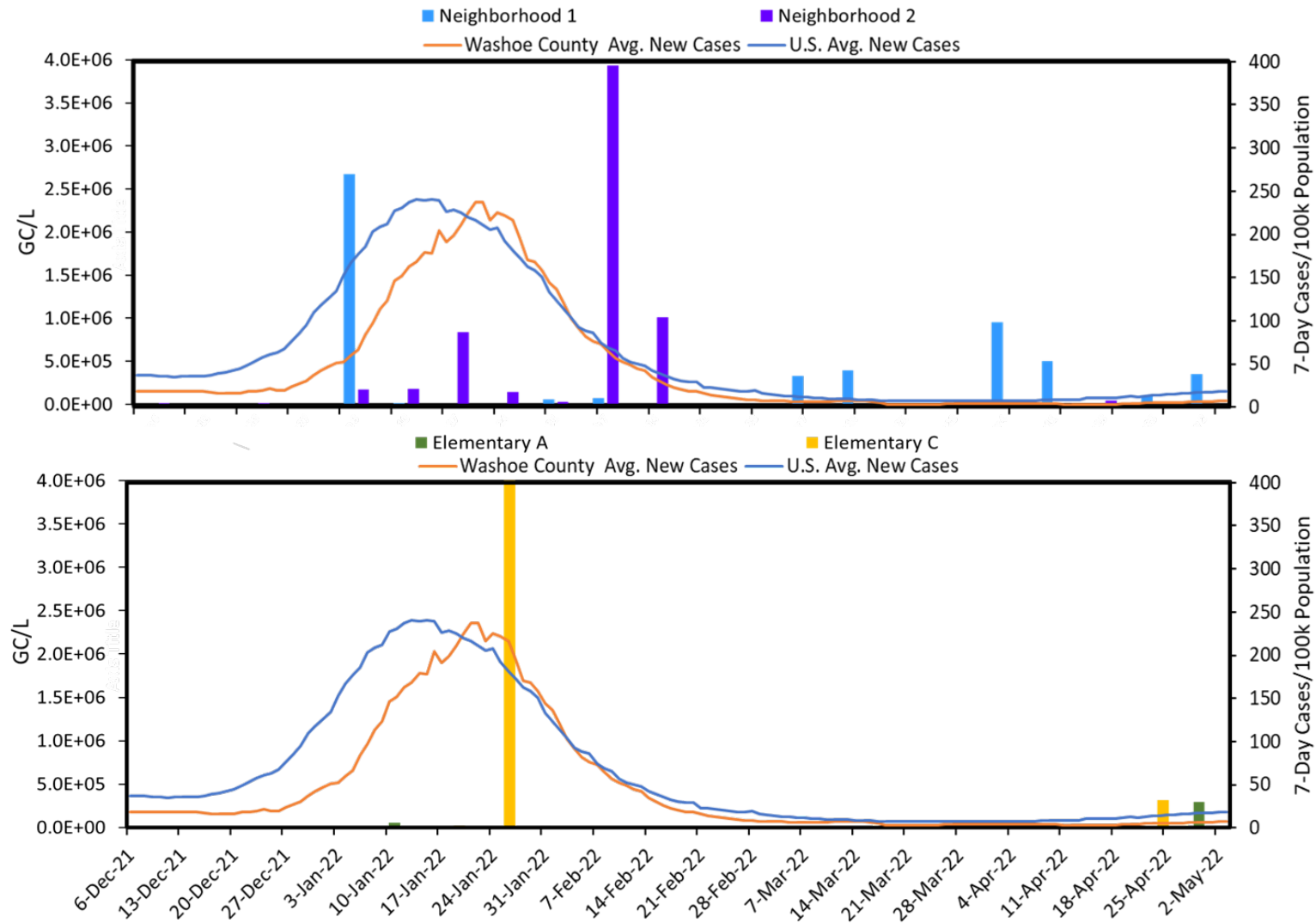
High Density Tourism Sites

Tourist sites act as leading indicators of national trends



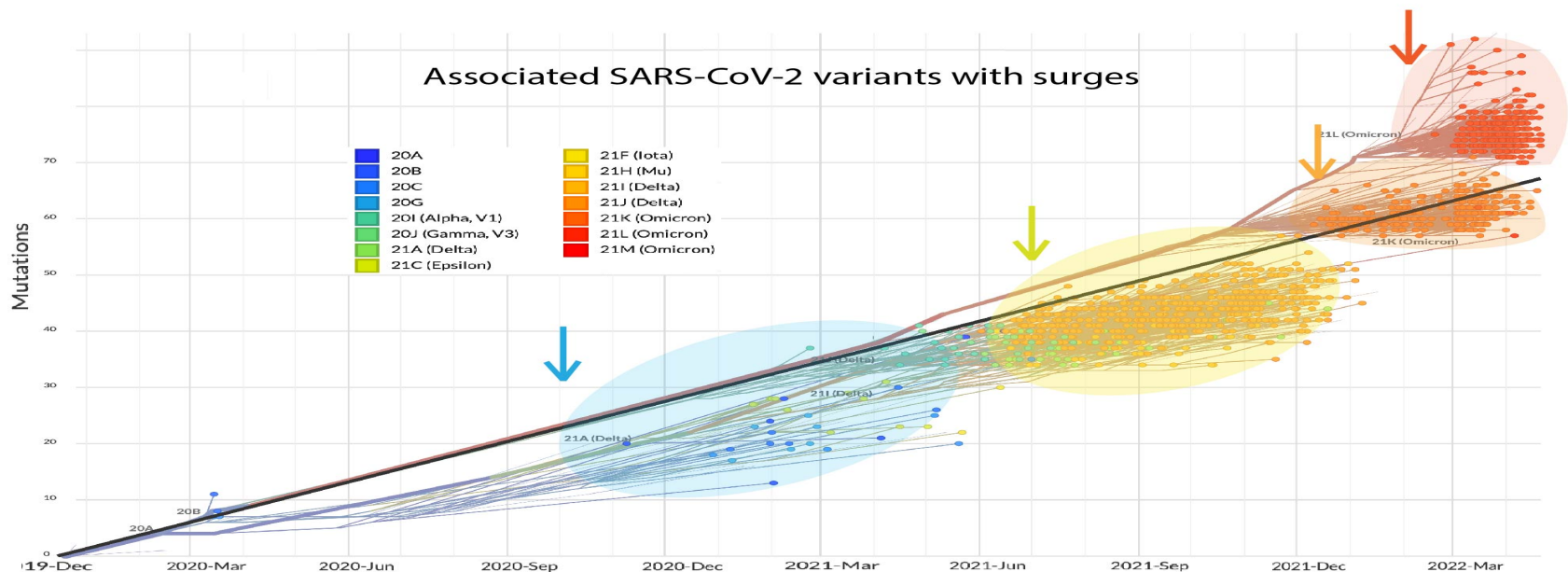
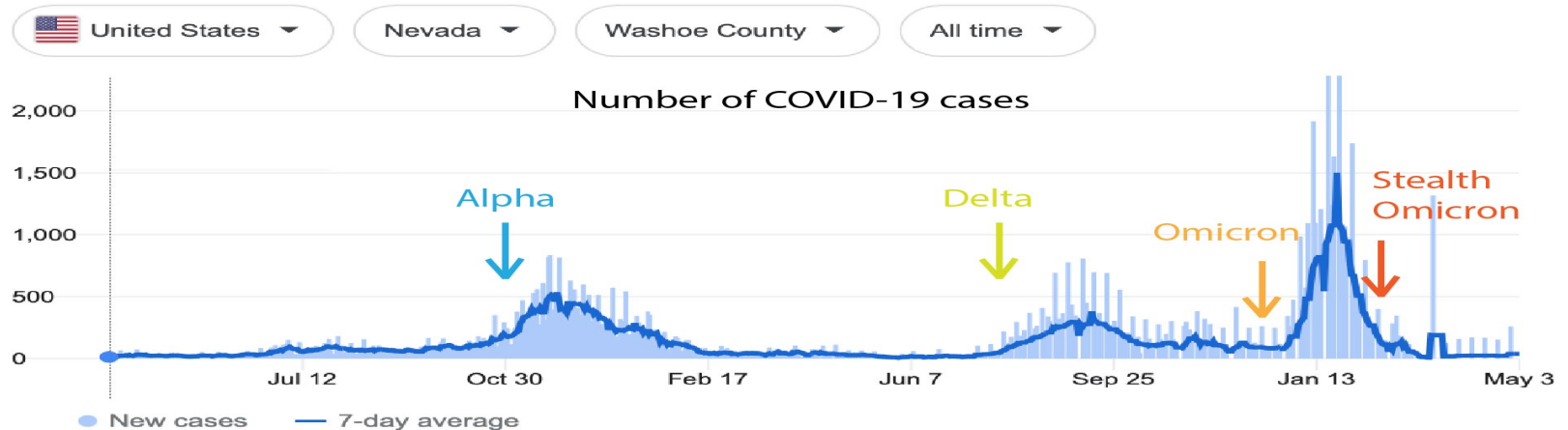


Neighborhood and School Sites



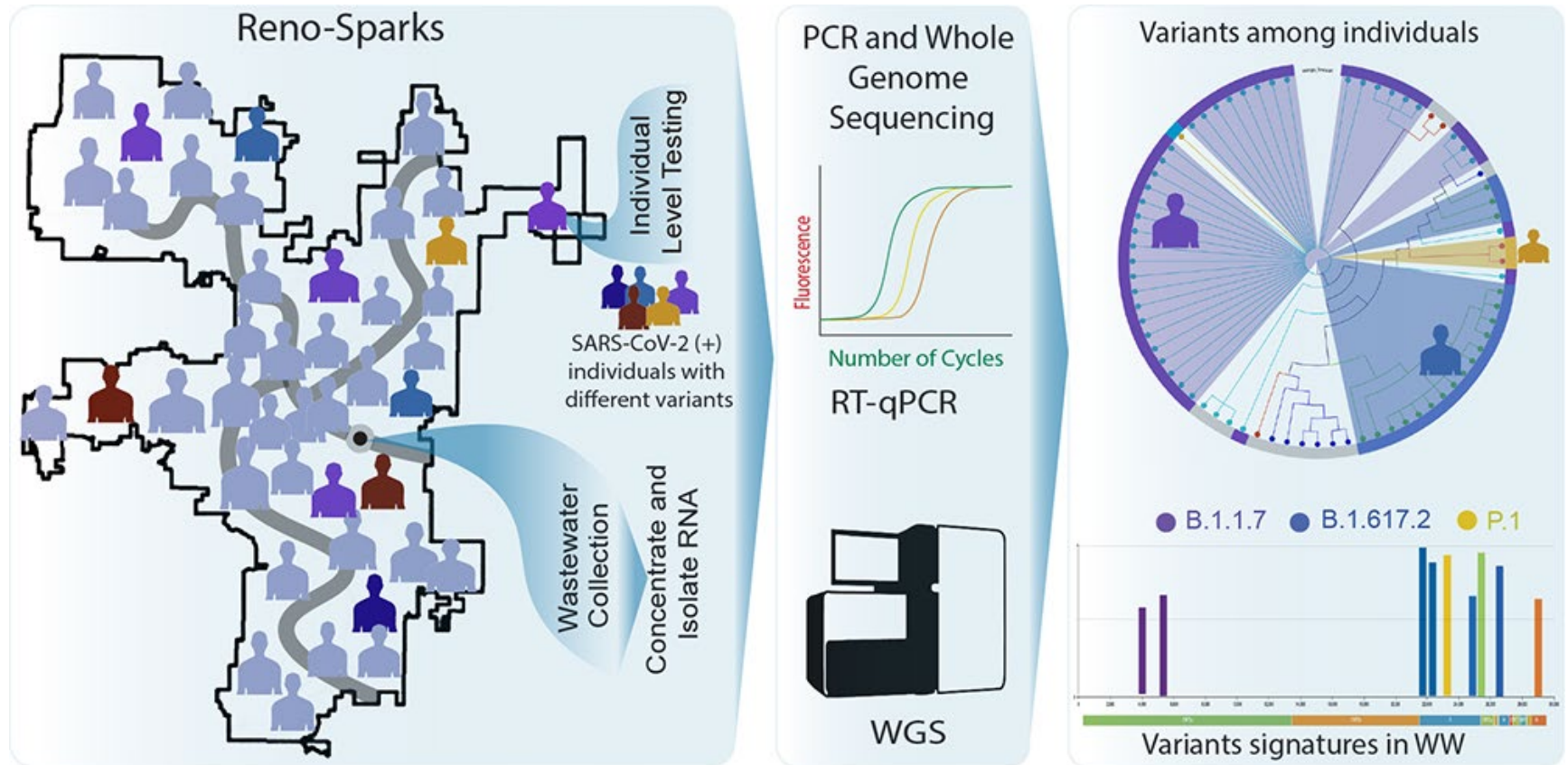


Monitoring variants (SARS-CoV-2) through wastewater





Wastewater detects all circulating variants in the community

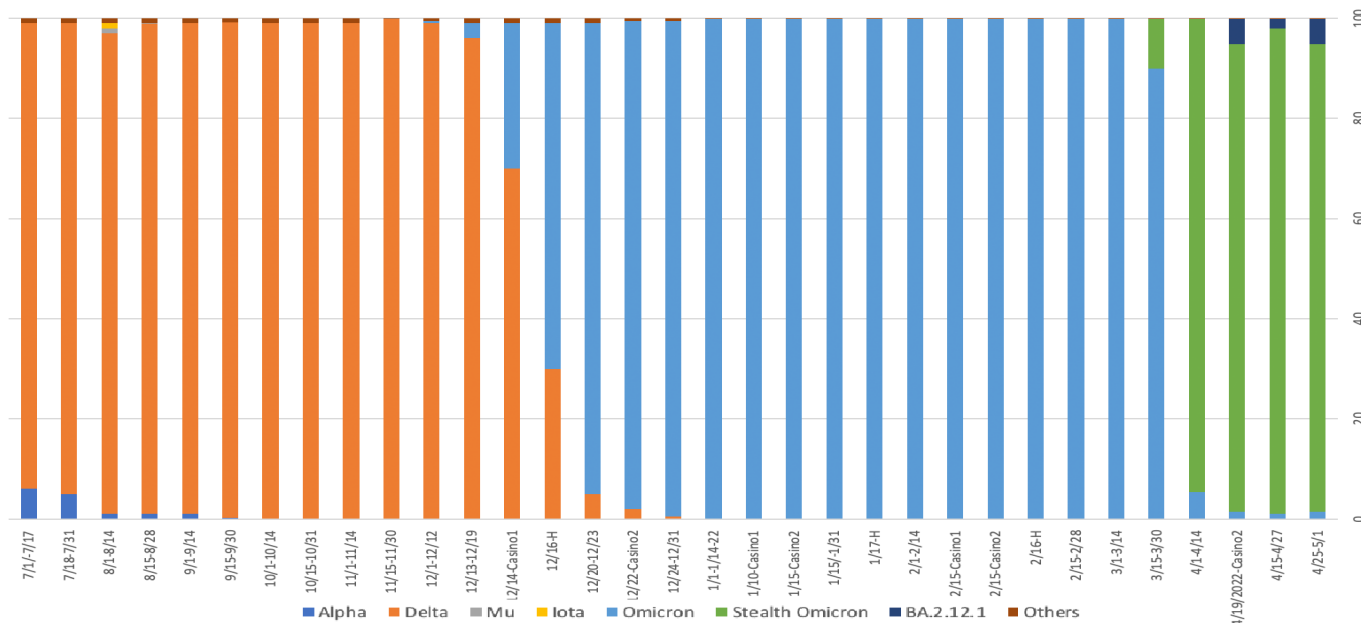


B.1.1.7- Alpha variant, B.1.617.2- Delta variants, P.1- Gamma variant



Omicron: detected in wastewater before the clinical cases

Relative prevalence of SARS-CoV-2 variants in Washoe county (July 1, 21-May 1, 22)



UNR researchers say wastewater can predict the course of Omicron variant



News Weather Sports KOL8 Cares Livestream

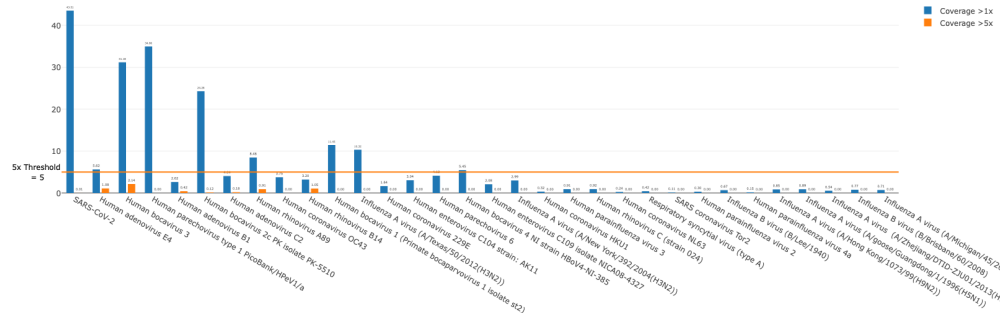
Omicron subvariant dominant in Washoe County, cases and hospitalizations down



RENO, Nev. (KOL8) - Omicron BA.2 subvariant is the dominant COVID-19 variant circulating in Washoe County right now.



Human bocaviruses, Influenza A, Respiratory Syncytial Virus: Cough, Wheezing, Fever, Rhinorrhea, and Vomiting





Current and Next Steps

- Continued monitoring of SARS-CoV2 and its variants prevalent in the community
- Wastewater Surveillance is more important than ever due to home or reduced testing of clinical cases
- Predictive intelligence of community health – chemicals and pathogens

Anti-Microbial Resistance (AMR) surveillance:

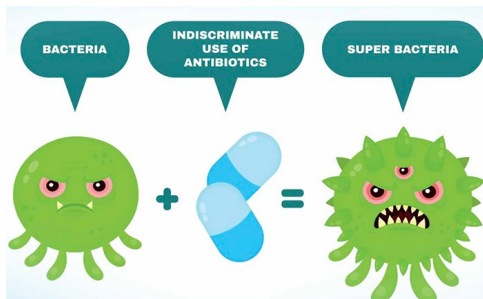


ACCESSION: WW4
REPORT DATE: 23 November 2021

RESULTS: **ONE OR MORE POTENTIAL PATHOGENS DETECTED**

BACTERIA	QUANTITY (PROPORTION OF DETECTED BACTERIA) ¹	ASSOCIATED AMR MARKER DETECTED ²	PHENOTYPIC GROUP ³
Escherichia coli Potential Carbapenemase	n/a (3.1%)	Yes	2
Burkholderia cepacia complex	n/a (1.0%)	n/a	2
Enterobacter cloacae complex Potential Carbapenemase	n/a (0.8%)	Yes	2
VIRUSES	QUANTITY (PROPORTION OF DETECTED VIRUSES) ¹	POTENTIAL AMR DETECTED ²	PHENOTYPIC GROUP ³
SARS-CoV-2 (2019-nCoV) B.1.617*	n/a (61.5%)	n/a	3

Antibiotic drug classes, representative antibiotics, and detected AMR markers



DRUG CLASS	POTENTIAL AMR MARKER DETECTED	REPRESENTATIVE ANTIBIOTIC ^a	AMR MARKER (BEST MATCH ALLELE / DETECTED VARIANT)
Aminoglycosides	Yes	Amikacin Gentamicin Neomycin Paromomycin Plazomicin Spectinomycin Streptomycin Tobramycin	APH(3') (APH(3')-IIIa), AAC(6') (AAC(6')-Ib-cr) <i>None Detected</i> APH(3') (APH(3')-IIIa), AAC(6') (AAC(6')-Ib-cr) APH(3') (APH(3')-IIIa) APH(3') (APH(3')-IIIa), AAC(6') (AAC(6')-Ib-cr) ANT(3') (aadA) ANT(3') (aadA), ANT(6) (aadS) AAC(6') (AAC(6')-Ib-cr)
Beta-Lactam + Beta-Lactamase Inhibitor	Yes	Amoxicillin+Clavulanic Acid Ampicillin+Sulbactam Piperacillin+Tazobactam	OXA(OXA-2), GES(GES-5) OXA(OXA-2), GES(GES-5) <i>None Detected</i>
Carbapenems	Yes	Ertapenem Imipenem Meropenem	OXA(OXA-2), GES(GES-5) OXA(OXA-2), GES(GES-5) OXA(OXA-2), GES(GES-5)
Cephalosporins (1st Generation)	Yes	Cefalexin Cefazolin	OXA(OXA-2), GES(GES-5) OXA(OXA-2), GES(GES-5)

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