

A Mixed-Methods Approach to Ensuring the Representativeness of Colorado's Wastewater Sentinel Surveillance Sites

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INTRODUCTION

We evaluated the data efficacy of Colorado's Sentinel Surveillance Site model using a mixed-methods approach to determine if additional sites should be added.

METHODS

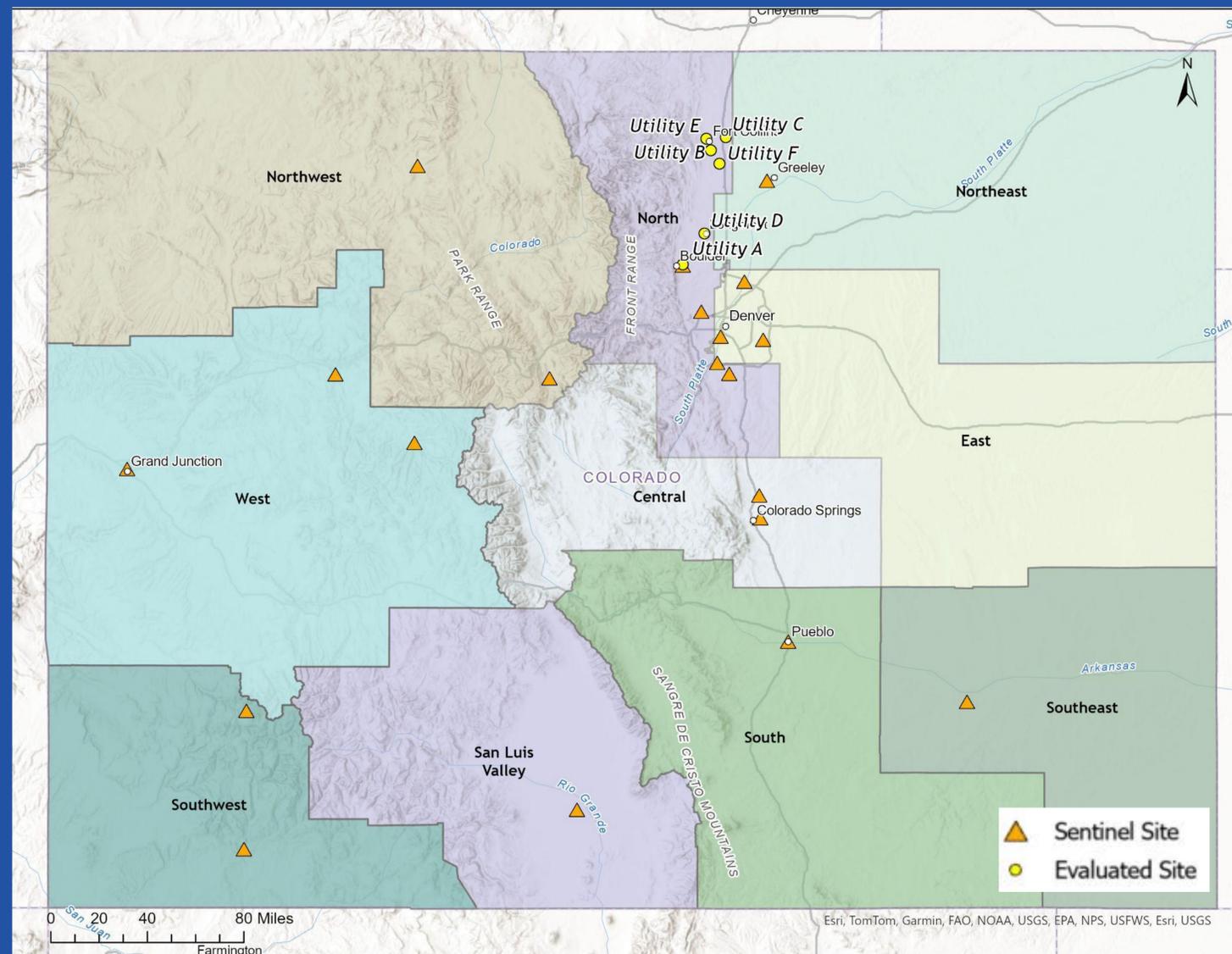
1. Conducted an ANOVA test to identify significant viral concentration relationships for SARS-CoV-2, Influenza, RSV, and EV-D68 data between sentinel and non-sentinel sites.
2. Utilized ArcGIS to assess population density, emerging pathogens, and healthcare facility locales within evaluated sites.
3. Compiled demographic variables and descriptive statistics to determine the representativeness of evaluated sites.
4. Evaluated responses from public feedback form.

RESULTS

- Utility B contains the largest sewershed population, adding over 100,000 Coloradans to the model.
- Utility B has high regional SARS-CoV-2 viral concentration Spearman's Rank correlations with the established sentinel site (0.859, p-value <0.01).

Evaluating wastewater sentinel surveillance models can help ensure data efficacy and support efforts to "right-size" wastewater programs.

Colorado Wastewater Surveillance System Sentinel and Evaluation Sites



The current sentinel model includes 20 utilities that are made up of the 10 largest utilities in the All Hazard and Emergency Management and Response Regions in Colorado, 3 additional Denver metro area utilities, and 4 utilities in high tourism areas. CDPHE is currently working with Utility B to determine interest in participating in our sentinel model.

RESULTS CONT'D

- Post-hoc ANOVA results for significant flu A concentrations show that some sites in the Northern region may serve as proxies for others, while providing distinct pathogen information from the established sentinel site.

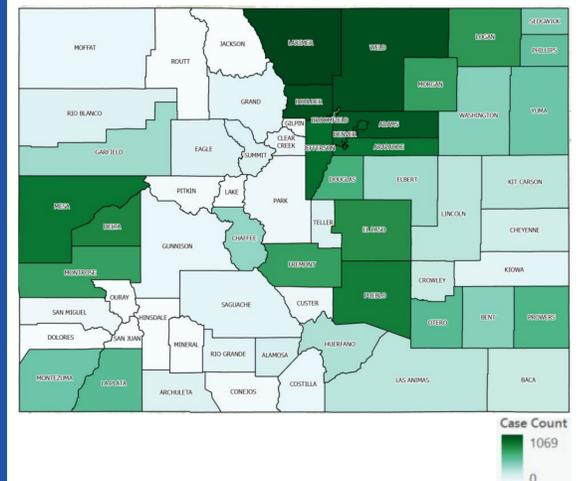
Tukey HSD Flu A Viral Concentration (gene copies/L)

	difference	lower	upper	p-value
Utility C-Utility A	-22250	-39214.66	-5285.344	0.0082698*
Utility D-Utility A	-21488	-38452.66	-4523.344	0.0108709*
Utility C-Utility D	762	-16601.88	18125.879	0.9935222

*significant

- Utility B is in the North region, which is an area of public interest according to individuals who responded to the public feedback form; 21.4% of Google feedback respondents reported residing in the North region.
- Utility B encapsulates the population of a large state university, and has the highest concentration of healthcare facilities compared to other evaluated sites.
- The North region also has the highest number of historical West Nile virus cases, a pathogen of concern, and a future target for the Colorado Wastewater Program.

West Nile Virus Case Counts by Colorado County 2003-2024



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