Raul Gonzalez, PhD

Environmental Scientist

Hampton Roads Sanitation District (Virginia Beach, VA)

Category: Wastewater Based Epidemiology

About Dr. Raul Gonzalez

Raul Gonzalez is an environmental scientist at Hampton Roads Sanitation District (HRSD). His group applies molecular methods to manmade infrastructure and their adjacent waters. During the COVID-19 pandemic, Dr. Gonzalez led the expansion of HRSD's research and laboratory capacity to identify the best methodological approaches to wastewater-based disease surveillance at the utility. Dr. Gonzalez earned his BS in Biology from the UCLA and his PhD in Environmental Science and Engineering at the UNC Chapel Hill.

Dr. Raul Gonzalez's Key Publications

- COVID-19 surveillance in Southeastern Virginia using wastewater-based epidemiology
- Assessing sensitivity and reproducibility of RT-ddPCR and RT-qPCR for the quantification of SARS-CoV-2 in wastewater
- Subsewershed SARS-CoV-2 wastewater surveillance and COVID-19 epidemiology using building-specific occupancy and case data

Impact of Droplet Digital PCR on Dr. Raul Gonzalez's Research

Hampton Roads Sanitation District started its in-house molecular laboratory in 2015 with the purchase of our first Droplet Digital PCR instrument. While our prior experience was with qPCR, we decided to start with the latest generation technology and saw promise in digital PCR's utility for environmental applications. Little did we know that our applications would go from finding broken sewer pipes using basic DNA markers, to detecting norovirus in oysters, to COVID/influenza/monkeypox wastewater surveillance. Certain applications, like wastewater surveillance, have garnered media attention but some of our lesser-known applications have produced the most actional data. We've screened upwards of a 1,000 L of water to confirm the performance efficiency of our advanced water reuse system, screened air samples for pathogens in aerosols adjacent to farm fields, and even done gene expression analysis to help optimize microbial degradation of chemicals. All of these applications have caused us to expand from tens of samples a month to over a thousand a month, on occasion. Within a few years we were forced to expand for capacity and ultimately purchased a second Droplet Digital PCR instrument.

Out of all the benefits we see with Droplet Digital PCR (e.g., no standard curve, better handling of inhibition in complex environmental samples, increased sensitivity, increased consistency, etc.) the confidence we have in the results has been the game changer. This confidence has made our data more actionable, and as a result has given collaborators and downstream data users confidence in us.