Sewer Signals Podcast
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Season 1 Episode 4: Bina Nayak with Pinellas County Utilities, Florida

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Transcript

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Anna Mehrotra: All right. Hello and welcome to sewer signals of podcast on utility experiences with wastewater surveillance. I'm Anna Mehrotra, Director of the Wastewater Surveillance Program at the Water Environment Federation. And I'm delighted to be talking to Bina Nayak today, who is joining us from Odessa, Florida. Hey, Bina. How are you doing today?

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Bina Nayak: Hi Anna. I'm doing well. Thank you. How are you?

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Anna: Great. It's great to be talking with you. So, Bina is the water research project manager at Pinellas County Utilities, where she manages research projects with government organizations, engineering firms and academia to expand the knowledge of water quality research that will benefit the utility and the water industry as a whole. She also assists the county water and wastewater treatment plants on internal projects such as corrosion control, disinfection by product management and process options for wastewater treatment. Active on project advisory committees for the Water Research Foundation and in the Florida section of the American Water Works Association, Bina has a PhD degree in microbiology from the University of South Florida. And a little bit about Bina's utility: so, Pinellas County Utilities provides wastewater collection and treatment services through two water resource recovery facilities with a combined average daily flow of 31 million gallons per day to approximately 300,000 people on the West Coast of Florida. Their wastewater collection system includes 1500 miles of sewer and 289 pump stations. Thanks to the county's extensive reclaimed water infrastructure, Pinellas County Utilities customers reuse approximately 18 million gallons of wastewater per day for irrigation and other uses. And that's really one thing that Pinellas County very well known for. I mean, that's a high rate of water reuse18 million gallons out of that 31 million gallons average treated. So that's that's so great. And that's a whole other topic. But today we're talking about wastewater surveillance. So let's dive in. So, Bina, tell me when and how did Pinellas County utilities get started with its wastewater surveillance program for COVID?

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Bina: The WHO declared COVID as a pandemic in March 2020, and that's when all these articles started coming out from around the world. The the reports that academics and other, you know, researchers were using WWE to track COVID in the systems and being a microbiologist myself. I realized that this was a good opportunity for our utility to participate and we play a very important role in public Health Protection and participating in WWE efforts is a kind of service to our customers, to our community. It's more our responsibility to public health. We started our program in late April 2020 when Tulane University reached out to us and asked if we could send them samples from both our facilities once every other week. It was not very often so that was like kind of our toe in the water kind of thing where we're like, OK, we're sending samples from each of our facilities once every other week and we were sending the influent pre and post disinfection samples because they were also looking to see if it gets

treated. This was early enough that there was not enough information and we would like to know if it was actually getting disinfected through our treatment process and there is no signal in the effluent, so this was an interesting study and we decided to participate in it and we sent them samples for about three to four months. But by the end of May, within the month of starting to send samples, we also realized that there needs to be a more frequent influx of data. You know we we need more data out of this. Sending them once every other week is not enough. So we looked into getting a commercial lab to help us with processing the samples. We do have a utilities lab. But our lab does only compliance samples and I am the only molecular biologist in my lab. I have a little lab set up with qPCR and a DNA extraction hood and all that. But I cannot process that many samples by myself and so we decided it was better to go with a commercial lab which had already figured out how to do the, you know, the lab analysis for SARS-CoV-2 RNA. And that's when we we started in sending them samples in June 2020. And we continued with them till May 2021. So for a whole year, we were sending samples to a commercial lab.

Then we got on to the NWSS National Wastewater Surveillance System, and we've continued with NWSS since then for whenever. So there's there's been gaps in between NWSS. And so it's not been a continuous program, but for the last two years, in 24 months, we've been sampling for 20 months at least.

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Anna: Wow. Such an interesting evolution of your program and also kind of an evolution of the partners you been working with. So I heard Tulane, I heard the commercial lab. Who are your partners now?

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Bina: This phase three has been the funding has been given to Biobot Analytics. So we have started sending samples to Biobot for this phase. For the previous phase from January to the end of April or mid-April, we sent samples to LuminUltra. And before that, I guess in mid 20/21 it was Biobot again. So yes, our partners have been changing.

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Anna: They have been, yeah, changing over time. And now, to what extent are you working with county or state level health departments in terms of sharing the data and interpreting the data?

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Bina: So that's a long story. Initially, when we started doing our own data collection in June 2020 by sending samples to the commercial lab and paying for it ourselves, we realized we needed at least three to four months of data to actually try to do some modeling efforts of estimated disease prevalence and such. So after four months collecting this data and starting to build the model we presented to our local Pinellas County Department of Health and we started sending data biweekly to them. Unfortunately, the interpretation part was not as clear. Like they, I guess they weren't sure what to do with the data. Plus being slammed with the pandemic response staffing you know, all the other challenges that they were facing themselves, I mean you have to understand, Pinellas County has 25% of their population over the age of 65 years.

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Anna: Oh my.

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So our Department of Health at that time I'm sure was really busy securing nursing homes, making sure that the pandemic doesn't spread among our older population and such. So it is not

surprising that they were, you know, getting too much information and didn't know what to do with it. So engaging the Department of Health was a challenge for us. We were hoping to include academia in this effort because I had seen how in other places throughout the country, the university labs were processing these samples and helping with the data, helping utilities with the data interpretation and bridging that gap between the utility and the Department of Health, but we could not get that kind of effort started in spite of I have reached out to the local universities where we could not get that kind of, you know, response started. So unfortunately that part of our plan didn't work out so well.

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Anna: OK. Yeah. I mean as you point out, it's, you know, wastewater surveillance is a relatively new, not brand new, but relatively new sort of tool in the public health surveillance toolbox. Health departments are not used to seeing wastewater data. So as you point out, you know, how do you know what you're looking at? Right, and how do you know how to extract information when you're in the middle of fighting, you know, a pandemic.

So OK, but now fast forward to now and you're participating in the phase three commercial testing contract with Biobot. You're sending samples twice a week to Biobot. Both samples are being analyzed for SARS-CoV-2 and one sample week is being sequenced. Where are you sampling? Are you sampling the influent to both of your water resource recovery facilities? Other places? Talk to me a little bit about that.

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Bina: That's right, we're collecting 24-hour flow proportional composite samples from both our treatment plants. Initially, for that first year, we did collect flow proportional composite samples from a pump station that serves retirement communities and nursing homes. But we stopped that after our first phase of the study. And right now we are only sending from the two facilities that we have.

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Anna: OK. And again, those two facilities capture the 300,000 people in Pinellas County? And just getting into the weeds in terms of logistics, who actually collects the samples? I'm. I'm assuming the flow proportional samples are already being collected for permit compliance or other process optimization purposes. So talk me through the mechanics of actually getting that sample in the mail to Biobot.

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Bina: That's correct. We have an amazing team of operators who are making sure pandemic or not, there's always work going on, right? Yeah, they are unsung heroes and they collect samples for compliance either way, but this was an additional sample that they're collecting and they're still doing it. And you know the kits are already sent to them. So they have the huge 24 hour composite jug that they pulled out of and a representative sample is packed into the shipping kit and you know they call UPS or FedEx or whichever courier is required to come and pick it up from the facility twice a week.

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Anna: I know. We're, we're all so grateful for all of those operators and technicians out there who are willing to pour off samples, collect samples, get them in the mail and make this all work, right? All right, so the samples are then sent off to Biobot where they are analyzed. Then I know there's a couple of options for utilities in terms of getting data back from Biobot or they can post the data on their website and then you can download your data from their website or you could

opt for a PDF emails report of the data. Which one do you use? How does Pinellas County Utilities get the data back from Biobot.

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Bina: So last year went by about did the first phase of the funding they were sending us a PDF of the report. This year we have just started collecting samples since last week, so I haven't received a report yet or figured out about should I get it from the website or should I ask them to e-mail me the report. But I am the point of contact reports come to me and I do the job of dissemination of the information.

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Anna: OK. And we talked a little bit about how you know your your goal was to share this information early on with the County Health Department. So who what's your plan in terms of disseminating the information this time?

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Bina: So I do get invited internally to present to our own staff so that they understand what's going on with the pandemic. I have people from our utility who have both retired and those who are still working sometimes reach out to me and ask me what's going on, you know with the with the wastewater numbers at the high at the low. Well, I'm, you know, I don't know if I should go to a restaurant or whatever, you know, so people internally, I have people asking me about it. We are feeding this data into the NWSS system. So, you know, people can see it publicly and I'm happy to report also that I am now connected with the Florida Department of Health State Epidemiologist. She reached out to me about our participation with NWSS. We discussed the Florida state college laboratories. I'm trying to pick up the sampling and you know she she lets me know where they're at with with their progress. You know, starting to launch this program and I I I'm really happy about that. I'm really happy that they're they're getting involved, they are trying to get the data interpretation, then they're also she mentioned members of the public health community of practice.

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Anna: It's fantastic news because, you know, I know you've been thinking about wastewater surveillance a lot for the last two years. I think we can agree that this, this whole approach is not really going to go away with COVID. And I know that COVID is taking a little bit longer to go away than we were hoping. But if you can look into your crystal ball and tell me where do you see this technology going in the next year or two?

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Bina: So full disclosure, antimicrobial resistance is my personal favorite. That was, that was my doctoral and postdoctoral research, and I have kind of continued to do it in our utility as well. We've participated in several projects funded by external organizations that have looked in our drinking water wastewater and reclaimed water for ARBs and ARGs. So I started looking into it as well in my like I said, I have my own little lab with my personal little PCR machine and I started looking into antimicrobial resistance in our plant, particularly focusing on tetracycline, vancomycin, sulfonamides and carbapenems. And looking at what's coming into the influent and what's going out as the effluent, so AMR is my personal favorite and I hope that we do continue because it is a big issue I think it's larger than what we can see. I'm hoping that's how it will go and we will continue as a utility to participate in these kind of projects, even though there is no regulation on the horizon, I have to explain why we are getting into this. If there is no regulation on the horizon, you know we don't have a huge research team. I am the research team and thankfully though I have a very supportive management who understands the importance of

being a utility participant in these research projects, I don't have to explain away the funding because most of these are funded externally by the Water Research Foundation or other organizations. It's just important for us to be part of that. So we've we've been participating and I hope we'll continue to participate. And then we recently also participated in a pilot study testing opioids in wastewater. So I think that's another action that we haven't utilized, it's it's an underutilized tool. Right now we I presented to our our county opioid task force and they were amazed at what kind of data we can get out of this. So they're they're actually mulling it over you know considering if we should just start sampling and set up a baseline or if we should launch this program. So I'm waiting on on their response on that. So any WBC efforts we can get enrolled in, we would and I know at the Wastewater Disease Surveillance summit, Dr. Amy Kirby of the CDC mentioned expanding the testing in the future to either localized or, you know, statewide or nationwide, depending on what's going on. And I'm really excited to see this future direction and implementation of wastewater surveillance.

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Anna: Yeah. Wow. You know, there's a lot of great information in there. So certainly AMR or antimicrobial resistance is one that's, you know, on CDC's list for expanding NWSS. And just so a few definitions. So, ARB antibiotic resistant bacteria and ARGs antibiotic resistant genes. Did I get that right?

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Bina: That is correct. Yeah. And the genes would be the the specific targets for, you know, a PCR assay you'd be looking for specific genes. If you see the genes, it doesn't mean those bacteria are still alive. So there's a question of is there a threat or not? Do they really pose a threat if you find their gene, but the actual bacterium is dead? Yeah. And that's where QMRA, quantitative microbial risk assessment, comes in. And especially now that so many places in the country have moved on to portable reuse, that's a gray area where we're looking for all these organisms as part of compliance, but we do not know what risk these ARBs and ARGs pose in the world of portable reuse.

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Anna: Right. Yeah. And how they interact with the environment and all that. So many unknowns. And then it was just interesting to hear that you know you're committed to participating in this however it evolves and you know what the needs of your county health department are. I hear that a lot. You know, wastewater utilities are public health entities, and many of them have baked into their mission statements, you know, protection of public health and the environment. So that's just something, it's just a comment that you know. I hear that a lot going forward.

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Bina: I'd just like to point out though that. Consider our size. We are not as big as HRSD, Cincinnati or some of the bigger utility participating in these programs, they do have a research team. They have microbiologists and staff and all that. Our utility is like small, really small compared to them. And I I just want to focus attention to the smaller utilities that are even smaller than us and do not have microbiologist staff to to help the management understand the importance of WBE and participation on these kind of projects and you you don't want your data skewed towards the larger utilities. You would prefer to have small, medium and large utilities, but it's a a bigger challenge for the smaller utilities to get involved in these things. They do not have molecular biologists. I'm I'm interpreting qPCR data for our organization. Not everyone has the luxury to do that. I mean, even in our Tampa Bay area, not many utilities are participating in this effort. Mostly because they have, they are a little wary of what this this is where this is going. What is required of them. You know, how do they participate in this? So it it has to you

have to consider the smaller utilities and the challenge that they face with trying to get involved in this.

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Anna: Yeah, really well said, Bina. And as as you point out, you know the vast majority of facilities in this country are small. So there are a lot of small utilities out. There you know you've you've touched a little bit on on this question that I'm about to ask and it's related to challenges in program implementation and and especially because you've had these different phases of your program where you're working where you different partners, you know, different sampling cadences, different sampling locations. You talked early on how with Tulane, you were actually looking pre and post disinfection, but you know, maybe home in on one or two of the biggest challenges you feel like you faced as a small utility as a smaller utility so that, you know, other smaller utilities could could learn from from what you've faced.

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Bina: Yes. So like I mentioned before, data interpretation was our biggest challenge. How to get our Department of Health involved also funding for the for the first year, we paid for it by ourselves. It's $300.00 per sample from three different locations to water resource recovery facilities at the pump station. And we collected samples once a month. So that was a lot of money that we put into the program. We we don't have a huge research budget, but we realized this was important enough for us to to participate in and again, because of the, you know, we couldn't just continue with funding this program, so NWSS came at a very opportune moment and I just kept my eyes open, waiting for, you know, them to say who's got the funding. And in December 2020, on the Water Reuse Association community page they posted saying that Aquavitas is doing the the pilot phase and they had an e-mail on there and I reached out and I said hey, we want to participate you know so try to keep up and make sure that we were included in these in this program because we knew that we couldn't fund it continuously, that that really was something I had to stay on top of trying to get us into the program for sure.

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Anna: Yes, it does take somebody like you. Like I I would call you a a wastewater surveillance champion. You know somebody you have kept at it over the past two years to find your find your niche, you know, and and your funding. So that that's really great. So, you know, data from your two facilities will be available on the COVID Data Tracker because, you know, as you pointed out the data from Biobot are being shared with CDC, so the public will be able to see your data there. Is there anywhere else people want to find more out more information about your program? Who should they talk to or where should they go?

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Bina: You know, when the reporters reach out, they my communications team points them to me so, but we don't have a dashboard, we don't have an outward facing dashboard. I've seen all these cool dashboards from these, from Ohio, from Michigan, Bozeman, Mt has such a cool dashboard. And I was like, I wish we could do something like this, but unfortunately you know we couldn't do that. But yes, I mean anybody could reach out to me for more information on our program and all our interviews and articles. I can send the links to you so they have information on our program. I co-authored an article on, well, optimistically last year we thought that COVID would be over. So Sandhya Parshionikar from the EPA and myself we co-authored an article that was published in the journal AWWA. It's it's titled “Beware of superbugs in a post COVID world”. Again pointing towards my favorite subject, AMR. And so these are all the resources I can provide to you so you can link them with the podcast.

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Anna: Yeah, absolutely. We will provide links to all those things in the in the show notes. Well, I had one more question for you, Bina, and it's not related to wastewater, but I've never visited Pinellas County, which makes me realize there's so many places I need to get to in this world, but my understanding is that there are many different types of animals that live in Pinellas County, bobcats, gopher tortoises, which I'm not sure what that is, otters, alligators, of course, because it's Florida sea turtles, dolphins, sharks, manatees, not to mention a lot of bird and fish species. So do you have a favorite animal species or two? And if so, why?

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Bina: Some sea turtle species are on the endangered list and I try to participate in beach cleanups before nesting season. So because sea turtles is top of my list, OK, also manatees. I think they are such like gentle giants, you know?

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Anna: Seem like it.

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Bina: Huge. And so, so quiet and gentle and they they're very sensitive to environmental changes, so they were on the endangered list until 2017, when the population increased enough that they went on the threatened list. But unfortunately, I've seen articles that say that in 2021, the number of manatee deaths have increased. So I'm I'm hoping we do more towards protecting them. So yes, sea turtles and manatees. Top of the list, but OK, all the rest do anything we can do to preserve the environment. You forgot to mention snakes. We have some pretty cool snakes, like the cottonmouth. I'm sure I have some cool snakes in my backyard too. Yeah, they have environmental you know requirements and we are encroaching on their land.

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Anna: Yeah. No, I didn't forget it. That was intentional. Good point. Very good point.

Well, wonderful there you have it. Wildlife and wastewater on the western coast of Florida. As Bina mentioned, she's going to share a whole bunch of resources with me. And I'll post those in the show notes. And I just want to say thank you so much, Bina, for talking with me today. I really appreciate you taking the time.

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Bina: Thank you for having me, Anna.