

Fecal Contamination Source Tracking in the Rondout-Wallkill Watershed



Outline



- 1. Initial & evolving goals
- 2. Rondout-WallkillMicrobial SourceTracking (MST)Project
- 3. What to do with the data

1. Initial & Evolving Goals



We started with the community of river users



Our initial Entero monitoring project goals

- 1. Fill a data gap
- 2. Get the public interested in water quality (broadly) through recreational interest
- 3. Reduce sewage contamination



We quickly learned that tributaries have more fecal contamination than the main Hudson



Our monitoring program expanded into tributaries & we gained partners



Today's Community Science Program goals reflect our experience

Community science data collection is the foundation on which we build and support active data-based communities that are empowered to highlight issues of public concern, advocate for local solutions and lobby effectively in order to engage governments to improve water quality.





2. Rondout-Wallkill Microbial Source Tracking Project

Microbial Source Tracking Project Partners

Cornell University Dr. Ruth Richardson Post-docs: Dr. Yolanda Brooks, Dr. Catherine Spirito Students: Anna Hong, Desiree Sausele



There are multiple potential sources of *Enterococcus*



Combined sewer overflows Separate sewer overflows Septic system failures Street runoff Illicit connections Agricultural runoff Livestock Wildlife Contaminated sediment

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To remove the contamination, you need to know the source

"Toolbox Approach" helps identify fecal contamination sources



Some of the tools in the toolbox:

- Enterococcus (& E. coli)
- Nutrients
- Detergents
- Macroinvertebrate communities
- Infrastructure data
- Land use
- Microbial source tracking



Enterococcus Monitoring Results: Hudson River Watershed Snapshot

Enterococcus is an indicator of fecal contamination. Bars show the geometric mean, a weighted average, of all non-tidal samples. Results are from 14-937 samples collected May-October, 2010-2018. Date ranges vary by watershed. Samples were collected and processed by a network of community scientists and labs.





Rondout Creek





























Enterococcus

















Enterococcus





























Enterococcus





Microbial Source Tracking Study Site Selection



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Microbial Source Tracking Study Sites

Rondout: 8 sites in 2 clusters Wallkill: 16 sites in 3 clusters

Our broad conclusions about watersheds are based on these clusters of sites

The clusters were chosen based on high-Entero sites, but not every site sampled in the MST study was a high-**Entero site**

Skytop

(191)

Stroudsburg

Tannersville

380

Tobyhanna

80

(209)

Mt Pocono

(206)

(209)

Delaware

Water Gap

National

Recreation...



Microbial Source Tracking Study Results: Wallkill



Percentage of Samples With Marker Detected

Microbial Source Tracking Study Results: Rondout





1. Wild birds were the most commonly observed source in both waterways



2. Human fecal contamination was also common, and showed different distributions in the two waterways



3. Both human and avian contamination were more common in the Wallkill than the Rondout



- 4. Cows were a source of fecal contamination, but much less common than human or bird
- 5. We never detected horse fecal marker in the Wallkill, but it was a source in the Rondout



Percentage of Samples With Marker Detected

6. In some samples, and more frequently in the Rondout than the Wallkill, we detected none of the source types we looked for



In both streams:

- average Entero count of samples with 1+ marker detected was greater than average Entero count with 0 markers detected
- average Entero counts without markers detected were order of magnitude above EPA threshold



Microbial Source Tracking Study: Key Takeaways

- Human sewage is a problem.
- Wildlife (birds) is also a significant source.
- Neither cows nor horses are significant sources in the areas studied.
- Other significant sources, if any, remain unknown.

3. What To Do With the Data





Rondout Wallkill MST Project

8 years of water quality monitoring:

- Sparked creation / revitalization of 2 watershed groups
- Built community prepared to respond effectively to Harmful Algal Bloom
- Drove state action by demonstrating importance of water to local community
- Mobilized / coalesced watershed groups around septic policy gaps
- Opened conversation about sustainable wastewater systems
- Contributed to peer-reviewed journal article



Sparkill Creek Watershed Alliance

9 years of water quality monitoring:

- Attracted multiple academic research projects, deepening global understanding of wastewater impacts
- Attracted funding and support for water studies from state and federal agencies
- Provided factual basis for SCWA to request sewer system investigation and infrastructure investments from town



Trib 13 / Mill Brook Community Group

8 years of water quality monitoring:

- Brought town & village governments and environmental boards, Preserve stewards and water quality stewards together around common interest
- Led to self-design, selffunding & implementation of additional Entero sampling
- Mobilized community around septic policy gaps



Riverkeeper Water Quality Program

53 water quality monitoring partners:

- Demonstrate the value of water
- Motivate elected & agency officials to act on water quality
- Provide factual basis for our lobbying
- Educate us about policy needs
- Act as "eyes on the water" to identify broad range of issues – chronic and acute

