

Bacteria Source Tracking To Improve TMDL Development in Bacteria-Impaired Streams

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Problem Statement

Surface-water impairment by fecal coliform bacteria is a water-quality issue of national scope and significance. In Virginia alone, more than 175 stream segments are on the Commonwealth's 303d list of impaired waters because of fecal coliform bacteria. One of the major obstacles to improving stream-water quality is that the potential sources of fecal coliform bacteria are numerous and the dominant sources are generally unknown. This study demonstrates the emerging technology of bacteria source tracking (BST) and is a cooperative effort between the USGS, the Department of Environmental Quality, the Department of Conservation and Recreation, and Fairfax County Bacteria source tracking data provide critical support and calibration points for producing more defendable and scientifically rigorous watershed models. Incorporation of these bacteria-source data into watershed management strategies will also result in the selection of more efficient source-reduction scenarios for improving water quality.



Site Descriptions

Three watersheds with diverse land-use characteristics and notential bacteria sources were studied



otink Creek is dominated by urban land uses.

Christians Creek is primarily influenced by agricultural land uses. urban and agricultural land uses



2) Poultry:

Wildlife:

5) Humans:



Seasonal patterns in the distribution of The distribution of bacteria sources between periods bacteria sources were observed. of low flow and storm flow remained similar.

Extend waste composting period 3) Dogs and Cats: Clean up after your dog and properly dispose of litter box contents

Avoid overpopulation

Locate source contributions









Future Directions

Indi

The USGS is developing a human wastewater study in Accotink Creek, the system most heavily impacted by bacteria of human origin. To identify the distribution and physical sources of the human waste in Accotink Creek, we will initiate a comprehensive, multiple-tracer investigation of the stream, tributaries, and flowing storm drains in the watershed.



cator tracers:		
	surfactants	chloride
	conductivity	bromide
	turbidity	boron
	dissolved oxygen	optical brightener

Confir organic compounds (caffeine, cotinine)





Methods



The field samples were collected during both low-flow and storm-flow periods, processed in the field (membrane filtration), incubated for 24 hours, and enumerated for fecal coliform concentrations



E. coli were isolated from the fecal coliform bacteria and analyzed by genetic fingerprinting (ribotyping). The ribotyping analysis characterizes the E. coli gene for ribosomal RNA production by generating a specific banding pattern for each *E. coli* strain. This banding pattern is then compared to banding patterns of *E. coli* from known animal sources to achieve positive idenification.