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NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
GROUND WATER AND ECOSYSTEMS RESTORATION RESEARCH

Microbiological Impact of Agricultural and CAFO Activities on Surface and Ground Water Quality

Research Type and Organization

The research type is in-house. The organization is EPA's Ground Water and Ecosystem Restoration Division.

Project Period

April 1, 2002 through December 30, 2007

Project Summary

Previous evidence of microbial contamination of natural waters by agriculture and concentrated animal feeding operations (CAFOs) has created the necessity to further evaluate the situation. Pathogenic bacteria and pathogenic viruses are often present in the intestinal microflora of humans, as well as animals associated with CAFOs. This creates the potential for pathogen transfer into nearby watersheds, which poses a public health threat.

The objective of this research is to provide a microbiological evaluation of the Turkey Creek Watershed, located in northwest-central Oklahoma. This is a priority watershed listed under Section 303D of the Clean Water Act and is currently the focus of a U.S. Geological Survey study on sources of impairment. Nitrogen-isotope ratios of nitrate and detection of organic compounds typical of human wastewater previously indicated that animal or human wastes were the major sources of nitrate in Turkey Creek.

Therefore, it is important to identify the species source of fecal contamination, as well as specific pathogens that may be present in the watershed.

This research project consists of bacterial source tracking using the bacterium *E. coli* as the indicator organism. The methodology is based on antibiotic resistance analysis in combination with a statistical discriminant analysis. The application of the results will aid in the development of Total Maximum Daily Loads and risk management strategies for optimizing land use practices in the animal industry.



Products

Olivas, Y. and B. Faulkner. (2008). "Fecal Source Tracking by Antibiotic Resistance Analysis on a Watershed Exhibiting Low Resistance." *Environ. Monit. Assess.*, 139: 15–25. DOI 10.1007/s10661-007-9805-0.

Contact

[Bart Faulkner](#)

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