



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003NY21B

Title: Validity Assessment of Methods to Distinguish Between Ruminant and Human Sources of Fecal Contamination in Watersheds

Project Type: Research

Focus Categories: Non Point Pollution, Water Quality, Waste Water

Keywords: non-point source pollution, fecal contamination, water quality, pathogens

Start Date: 03/01/2003

End Date: 02/28/2004

Federal Funds: \$24920.00

Matching Funds: \$41659.00

Congressional District: 21

Principal Investigators: Braun-Howland, Ellen

Abstract: Problem:

Nonpoint source (NPS) pollution, including runoff from agricultural operations and failing or improperly sited septic systems, can have a substantial detrimental impact on source water quality. In addition to environmental concerns, significant public health effects have been attributed to NPS fecal contamination of both drinking and recreational waters. Pathogens of concern include *Giardia* and *Cryptosporidium*, pathogenic strains of *E. coli*, *Salmonella* sp., and *Listeria monocytogenes*.

Methods:

The project will use bovine fecal suspensions within diffusion chambers to examine seasonal and temporal effects on the survival of indicator bacteria. Diffusion chambers containing 40 mls of fecal suspensions at two concentrations will be incubated, in duplicate, in an upstream "pristine" stream environment and in a downstream environment in Albany County that has been identified previously as being fecally-impacted by local confined animal feedlot operations (CAFO). Diffusion chambers will be sampled three times a week until indicator bacteria are no longer detectable using conventional culturing methods. If viable *Bacteroides* organisms are still detected at this time, sampling will continue on a

weekly basis until they are no longer detectable. Incubations will be initiated in the spring, summer, and fall to measure the effect of seasonal changes on the relative survivability of the target organisms. Water quality parameters including water temperature, pH, dissolved oxygen, and conductivity will be measured in both stream locations at the time of sampling.

Objectives:

The overall goal of this project is to determine the validity of the molecular-based detection method for *Bacteroides* sp. to accurately identify sources of fecal pollution within watersheds.

The specific objectives of the project are:

- 1) To measure the die-off kinetics of fecally-derived indicator bacteria including: *Bacteroides*, fecal coliforms, fecal streptococci, *E.coli*, total coliforms, and enterococci in situ under varying environmental conditions;
- 2) To determine the effects of fecally-impacted and non-impacted stream conditions on the in situ survival of the various indicator organisms; and
- 3) To confirm that the molecular-based method for the identification of *Bacteroides* results in the detection of DNA from viable organisms, rather than dead cells, using whole cell in situ hybridizations.

[U.S. Department of the Interior, U.S. Geological Survey](#)

Maintain: Schefter@usgs.gov

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