Report for 2004CA94B: Development of a Quantitative Detection Method for Enumerating Host-Specific Fecal Bacteria Based on Real-Time, Quantitative Polymerase Chain Reaction

There are no reported publications resulting from this project.

Report Follows

RESEARCH PROGRAM: Updated project information. The process for submitting each research project consists of the following progressive steps:

1. Include Problem and Research Objectives, Methodology and Principal Findings and Significance for your project.

   Problem and Research Objectives: The goal of the proposed research is to develop and evaluate a quantitative method for calculating the fractional contribution of fecal pollution from human and animal sources by measuring host-specific fecal indicator bacteria using the real-time, quantitative polymerase chain reaction (QPCR).

   Methodology: The experimental methods include both laboratory and field research. In the laboratory, we are developing QPCR methods for total *E. coli* as well as several host-specific target sequences in fecal indicator bacteria (other than *E. coli*). In the field, we are characterizing the sources of fecal pollution in a watershed by combining our QPCR methods with traditional water quality measurements, such as culturable *E. coli*, nutrients, and BOD.

   Principal Findings: The first activity was focused on developing a QPCR method for total *E. coli*. The main challenge was to eliminate trace levels of contamination in commercial preparations of the polymerase enzyme, which interfere with detection of low levels of *E. coli*. A novel DNase treatment step was developed that may have widespread relevance for many QPCR applications. This phase is near completion and a manuscript is in preparation for submission to a peer-reviewed journal. The next activity is to develop QPCR methods for several host-specific targets that we have identified from the literature and discussions with colleagues.

   Significance: Fecal pollution continues to be among the leading contaminants of our nation's waters. This research will result in improved tools to manage fecal pollution, ultimately increasing our ability to identify and target the dominant sources of pollution, to monitor changes in the concentration of fecal pollution and its sources over time, to assess the effectiveness of specific mitigation strategies, and to provide more information for evaluating the true public health risks.

2. Provide publication citations associated with the research project.

   none to date

3. You have the option of providing introductory text regarding your overall research program.

   Kara Nelson received her PhD in Environmental Engineering from the University of California, Davis in 2001. Since 2001, she has been an assistant professor in the Dept. of Civil and Environmental Engineering at the University of California, Berkeley. Prof. Nelson teaches classes in environmental science, physical-chemical treatment processes and the control of waterborne pathogens. Her research areas include natural systems for water and wastewater treatment, the detection and inactivation of pathogens in water and sludge, and appropriate technologies for improving water quality in developing countries.

INFORMATION TRANSFER PROGRAM: Provide a brief description of information transfer activities supported with section 104 and required matching funds during the reporting period.

Not applicable.

STUDENT SUPPORT: A summary of the number of students supported resulting from work supported by your project funding and by supplemental grants during the reporting period.

None of the federal project funds were spent on student support during the reporting period; however, the funds will be spent on student support during the next reporting period.

	Total Project Funding		Supplemental Awards	Total
	Federal Funding	State Funding		
Undergrad.				
Masters				
PhD.		20,009.85		20,009.85
Post-Doc.				
Total				20,009.85

NOTABLE ACHIEVEMENTS AND AWARDS: Provide a brief description of any especially notable achievements and awards resulting from work supported by your project funding and by supplemental grants during the reporting period.

None to date.

PUBLICATIONS FROM PRIOR PROJECTS. Please provide citations to publications attributable to projects completed in prior years and not included in this year's annual report.
None to date.

PUBLICATIONS & CITATION FORMAT: List all reports, in the following format, published during the reporting period resulting from work supported by your project funding and by supplemental grants during the reporting period.

1. Articles in Refereed Scientific Journals
none to date (in preparation)
2. Book Chapter
3. Dissertations
none to date (in preparation)
4. Water Resources Research Institute Reports
5. Conference Proceedings
6. Other Publications