

## **Watershed Scale Assessment of a Karst Drainage Basin Using Microbial, Geospatial, and Geochemical Approaches**

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### **Justification:**

The Brushy Creek watershed lies in a karst region where the level of groundwater-surface water interaction is suspected to be high, but is largely unknown. Cattle grazing is the primary land use and economic activity, although there is also significant hay and tobacco production in the watershed. One tributary of Brushy Creek, Buck Creek, was a designated USDA EQIP priority area in 2001 and 2002; and subsequently, well over \$4 million has been spent to reduce nonpoint nutrient pollution from cattle operations through installation of BMPs and stream restoration. A recent study determined that these BMPs have had little effect on water quality at the larger watershed scale (Albright 2007), and suggested that a major hindrance to BMP effectiveness was the absence of karst as a consideration in the BMP prescriptions for individual cattle operations. The current study combines knowledge of the karst environment through dye traces, implementation and effects of best management practices, and use of real-time PCR to discern between potential pathogenic and nutrient sources and GIS-based hydrologic transport models will provide a more detailed description of how and where pathogens move through a karst system, which will improve the planning and management plan of such watersheds.

### **Objectives:**

Our two major research questions are:

- 1. Can we detect watershed scale effects of site-scale management based on general watershed characteristics in a karst region?*
- 2. Because failing septic systems and straight pipes are a suspected source of nutrient and pathogenic pollution, can we determine the nutrient and pathogenic pollution attributable to cattle versus other host sources?*

### **Progress to date:**

During the Fall of 2008, the emphasis has been on acquisition of laboratory and field research equipment. Sampling will begin in February 2009.

### **Impacts:**

The project is in its initial phases, and there are no impacts to report.

### **References:**

Albright, Michael. 2007. *Assessment of agricultural practices in the Brushy Creek Watershed*. Masters thesis. Department of Geography. Eastern Kentucky University.