



2009 CSREES National Water Conference; St. Louis, MO

**Impact of indigenous microbial community on the survival of fecal indicators  
in Hawaiian beach sand**

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Abstract:

**Rationale:** Fecal contamination of recreational water poses direct health threats to beach users and cause economic losses due to frequent beach advisories and closures. Although the regulatory and research efforts have been traditionally focused on the water itself, recent studies have started to reveal the importance of beach sand to water biological quality. It is now widely observed that beach sand often harbors fecal indicators at concentration levels several orders of magnitude higher than the beach water. The objective of our study is to understand the relative importance of the environmental factors affecting the survival of fecal indicators in Hawaiian beach sand.

**Experiments:** Stationary-stage cells of two common fecal indicators (i.e. *E. coli* and *E. faecalis*) were spiked into sand microcosms to examine their die-off rates under different environmental conditions. Our results showed that *E. coli* lost cultivability at a significantly faster rate in live beach sand than in autoclaved sterile sand, indicating that biotic factors played more important roles than abiotic factors. Subsequent experiments were conducted to understand the relative contributions from the three constituent microbial groups, including bacteria, protozoa, and viruses. The indigenous bacteria were shown to be the most important contributor to the die-off of *E. coli* in beach sand from the Sand Island and Kailua Beaches. Similar study is ongoing to examine how *E. faecalis* responds to the same stresses posed by the three microbial groups.

**Future works.** Experiments will be conducted to identify the indigenous microbial antagonists and to enhance their antagonistic effects against fecal indicators in beach sand. Outcomes may enable beach managements to develop and implement active remediation technologies against beach fecal contaminations.

Impact Statement:

This study in beach sand may provide useful information with regard to the survival of fecal indicators in agricultural watersheds.

Category: Other Water Resource Topics  
Type of Presentation: Poster Presentation