USDA-CSREES 2006 National Water Quality Conference

Source tracking studies: developing specific, quantitative markers for watershed studies

Estuarine and coastal waters of North Carolina are adversely impacted by poor water quality, causing thousands of acres of shellfish beds and beach areas to be closed annually due to elevated levels of routinely monitored indicator bacteria such as fecal coliforms, *E. coli*, and/or enterococci. It is know that these indicators, while useful as proxies for the presence of dangerous pathogens found in human fecal contamination, can also come from sources such as dogs, livestock, wild animals, and birds. Some of these indicators can also grow and persist for long periods of time in certain environments, and specific species can be found naturally in soils and on plant silage. The first step toward effective management of high priority shellfish harvesting and recreational waters is to understand the temporal and spatial patterns of fecal contamination loading to receiving waters, an increasingly complex aim. This presentation will focus on work being conducted in a watershed area called Jumping Run Creek (JRC), in coastal eastern North Carolina. The projects features an intensively collaborative effort involving UNC Coastal Studies Institute, North Carolina State University, the NC Division of Water Quality, and Duke University. Our component of the project is to identify and quantify not only bacterial indicators, but to also use bacterial markers (*Bacteroides* sp.) and specific pathogens (enterovirus, canine parvovirus) as tracers of specific sources of fecal contamination. To do this, we are using Quantitative PCR (Q-PCR), resulting in the development of new rapid source tracking technologies and management strategies that will promote protection of estuarine waters from biological contamination originating various land uses. Using a combination of techniques we are partitioning the sources of fecal contamination, and assessing loads of fecal contamination to receiving waters, in an effort to identify strategies to mitigate the numerous sources. The resulting information will be used for the development of hydrological models as tools for future implementation of TMDLs.

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