Autonomous Real-Time Testing of Escherichia coli in Oak Creek Watershed

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Escherichia coli (E. coli) is a coliform bacteria that indicates the presence of fecal matter. In Oak Creek Watershed in Sedona Arizona, E. coli exceeds the water quality standards set by the Environmental Protection Agency (EPA) 8% of the year. At E. coli levels above EPA standards, Slide Rock State Park is required to close because of the possible health risk. The current method of testing E. coli at Oak Creek Watershed requires 18 hours of incubation to yield results. After 18 hours the tested sample will not be indicative of current conditions in the watershed. This project is a development of a faster autonomous alert system for E. coli exceedances. This system would serve to inform people when E. coli levels in Oak Creek water exceed U.S. EPA criteria by posting results on a publicly-accessible website. The system functions by submerging a paper-based litmus E. coli test strip into a enclosed container of water pumped from the creek. A roller mechanism holds the test strip into the sample water for the required 90 minute period. After the test strip reaction, the color sensor reads the color value to determine the E. coli concentration. This data can then be transmitted to a website to inform park staff and the general public of the E. coli levels. While testing our prototype, the E. Coli test strip was substituted with a pH strip. No E. coli was used in the development of the system.