Title: Evaluation of Indicator *E. coli*, fecal coliforms, *E coli* O157 and *Salmonella* ssp. in Surface Waters of the Southwest Regional Canal Network

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Abstract:

Introduction: Irrigation canal systems are an important water delivery system for the sustained health of the Southwest desert farming region. Industry guidance and proposed produce safety regulations have recommended that stakeholders use fecal indicator bacteria as a proxy for deleterious water quality. It is unclear whether larger volumes or targeted sampling would improve monitoring strategies for canal irrigation systems.

Purpose: The purpose this study is to determine the relationship between fecal indicator bacteria and pathogens in irrigation water supplies and whether large volume sampling for pathogens is more informative for microbial water quality.

Methods: Seven sites were sampled monthly at overpasses along canal networks in the Southwest U.S. Using ultrafiltration, (20L) samples were analyzed for indicator bacteria *E. coli* and fecal coliforms, *Salmonella* and *E. coli* O157:H7. Environmental and biological characterization and water quality parameters were collected at each site. Sampling for 2013 was conducted from June to November; sampling for 2014 will be performed from January to April.

Results: 76 water samples were collected over 6 sampling events. To date, *Salmonella* was found in X (60%) of screened samples while no samples tested positive for *E. coli* O157:H7. The presence of *Salmonella* was not associated statistically with an increase in indicator bacteria (*E. coli* and fecal coliforms). Average indicator *E. coli* counts (cfu/100mL) were well below the standard of 235 cfu/100mL (μ =46.1, σ =82.4) and did not vary significantly (p>0.05) across the sampling period. Fecal coliforms varied across time and space (event and site).

Significance: The water quality standard adopted by the produce industry and slated for inclusion in the Food Safety Modernization Act for the safe application of irrigation water is 235 cfu/100mL for *E. coli*. Our data indicate that the presence of pathogens in irrigation water supplies is not predicted by an exceedance in the current water quality standard in a major southwestern desert produce production region.