

Title: Presence and transport of *Escherichia coli* and *Salmonella* spp. in soils of a municipal park irrigated with reclaimed wastewater

Author: Jean E.T. McLain

Co-author: Channah M. Rock, Clinton F. Williams

Meeting: Southwest Hydrology/Arizona Hydrological Society Symposium
Tucson, Arizona
Aug 29 – Sep 1, 2007

Increasing demands on limited water resources have made wastewater reclamation for municipal irrigation an attractive option for extending available water supplies. However, there remain public health concerns about the potential risks to humans coming into contact with irrigated turf areas. We are monitoring soil and water quality in a municipal city park in Maricopa, Arizona, where turf has been irrigated with reclaimed water since the opening of the park in September 2006. The presence of viable *E. coli* and *Salmonella* in the irrigation system, and in an adjacent pond where reclaimed irrigation waters are held prior to application, are being monitored using standard plating methods. Bacterial transport and survival from the soil surface to a depth of 15 cm is being determined through plating of subsamples obtained from soil cores. Through the first nine months of the study, *E. coli* and *Salmonella* levels in the reclaimed water leaving the treatment plant remained within regulatory guidelines (< 0.02 CFU mL⁻¹). *Salmonella* levels were higher in the pond and in the irrigation system, averaging 1.3×10^2 CFU mL⁻¹, while *E. coli* levels averaged < 0.3 CFU mL⁻¹. However, the pond is stocked for recreational fishing and also serves as a haven for waterfowl, and while *Salmonella* tend to be associated with warm-blooded animals, they are commonly detected in fish guts, while both fish and birds can harbor *E. coli*. We are using quantitative real-time PCR and *Bacteroides*-specific primers to both quantify and differentiate the sources of bacteria (human vs. other) in the pond and irrigation water. Our early results also indicate that *E. coli* and *Salmonella* are surviving in the soil after application but as of yet, we have found no bacterial transport downward in the soils (and potential pollution of groundwater). By identifying the sources of bacteria and the transport and survival of *E. coli* and *Salmonella* within the parkland, this work will reveal potential impacts, including ecological benefits, of using reclaimed water for municipal irrigation.