

## Do Tourists Bug Bacteria? Effects of Human Presence and Fecal Contamination on Bacterial Distribution in Streams of Glacier National Park

Kelsie Delaney, Department of Microbiology, University of Wyoming

The bacterial biodiversity of a stream is vital to its ecological stability and functionality. Bacteria play an essential role in nutrient cycling, serving as the main source of nitrogen and carbon for higher order organisms, the removal of halogens and metals from pristine waters, detoxification of urine, primary production, and provide the base of stream food webs.



The project's aim was to examine the effects of human presence on bacterial populations in the streams of Glacier National Park. A particular focus was placed on known point sources, such as pit toilets and campgrounds.

Sediment samples were taken approximately every 700m along the stream, with biofilm samples taken when present. Three streams were chosen, two with high human contact and one with none. Each sample underwent genetic analysis to identify bacterial abundance of normal flora versus levels of *Escherichia coli*, which is used as an indicator of fecal contamination.



There was found to be a strong connection between the levels of *E. coli* present in the stream a few kilometers past pit toilets and campgrounds. This spike in *E. coli* corresponds to a significant decrease in biofilm-forming bacteria and a slight increase in nitrogen-fixing bacteria. In areas of high *E. coli* concentration, the biofilms were very thick, discolored and unhealthy in their appearance and bacterial composition. The numbers for the biofilm-forming bacteria recovered with the decrease in *E. coli* after 1.5km, but the nitrogen fixers remained in high numbers down the entire stream continuum. Other bacterial species exhibited indifference to the increase in *E. coli* levels. These results support the hypothesis that the biodiversity of the stream bacteria can be affected by human pollution.