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Nutrient and Fecal Microbe Assessment of the Water Quality of Tates Creek, Madison County, Kentucky

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Nutrient and fecal microbe assessment of the water quality of Tates Creek, Madison County, Kentucky. KRISTOPHER H. CARROLL* and WALTER S. BOROWSKI, Department of Geography and Geology, Eastern Kentucky University, Richmond, KY 40475.

Tates Creek is a significant tributary to the Kentucky River that has shown high levels of microbial and nutrient pollution. We sampled the waters of Tates Creek comprehensively by occupying 25 stations along its 13-mile length, collecting stream water at the confluence of major tributaries from its headwaters to the Kentucky River. Samples were collected four times between May and August 2011 during dry periods as well as immediately after rainfall events.

We measured ammonium (NH_4^+), nitrate (NO_3^-) and phosphate (PO_4^-) concentrations using colorimetry. Microbial samples were measured for total coliform and *Escherichia coli* using IDEXX Colilert-18 media. Background levels of NH_4^+ , NO_3^- and PO_4^- are typically ~0.2 ppm, 13 ppm, and 1.0 ppm, respectively. Nutrient concentrations generally increase during rainfall events, presumably because nutrients are flushed into the stream. Background counts of *E. coli* are typically ~100 cfu/mL but microbe counts reached 1,000 – 2,419 cfu/mL immediately following rain events. A sewage treatment plant exists approximately two miles from the headwaters and noticeably affects water quality. Nutrient concentration, especially NH_4^+ and PO_4^- , are markedly increased at the plant's outflow. These nutrients then decrease steadily in concentration downstream to background levels. In contrast, fecal microbe counts are high upstream from the plant, but fall to near-zero levels at its outflow, and then increase anew downstream. The treatment plant went offline on 19 July 2011, so we will be able to assess any changes in water quality and stream health in the future.

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