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Hunter R. Evans
Eastern Kentucky University

Reid E. Buskirk
Eastern Kentucky University

Walter S. Borowski
Eastern Kentucky University

Jonathan M. Malzone
Eastern Kentucky University

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**Nutrient contamination from non-point sources: Dissolved phosphate in surface and subsurface waters at
EKU Meadowbrook Farm, Madison County, Kentucky**

Hunter R. Evans, Reid E. Buskirk, Walter S. Borowski, Jonathan M. Malzone
Department of Geosciences, Eastern Kentucky University, Richmond KY 40475

Farms are non-point sources for nutrient contaminants that drain into watersheds and contribute to eutrophication and other environmental problems. Eastern Kentucky University's Meadowbrook Farm raises both crops and livestock, causing dissolved phosphorus in the form of orthophosphate (PO_4^{3-}) from fertilizer and animal manure to enter surface and subsurface waters, eventually flowing into Muddy Creek, a tributary of the Kentucky River.

We sampled surface water, springs, and water from French drains that emanate from the farm, and also sampled Muddy Creek waters from May through August 2016. Typically, 1 to 2 days after sampling, we colorimetrically measured dissolved orthophosphate concentration using the established ascorbic acid method and a UV-VIS spectrophotometer with general accuracy and precision of ~ 0.1 mg/L, or ppm.

Phosphate values measured from the farm are less than those measured nationally from agricultural lands. The median value of orthophosphate from Farm waters was 0.02 mg/L P- PO_4 , but nationally the level is ~ 0.1 mg/L P- PO_4 ; pristine water display 0.010 mg/L P- PO_4 . Phosphate concentrations are also low when compared to nitrate usually ranging from 0 to 0.2 mg/L P- PO_4 with higher concentrations of 0.5 to 2.7 mg/L P- PO_4 occurring sporadically. With minor exceptions, we saw little difference in phosphate concentration between different sample sources whether spring water, water from subsurface drains, surface waters flowing over the Farm, or Muddy Creek waters. However, one sub-watershed draining the Farm had increased levels of phosphate on 24 May (2.7 mg/L P- PO_4). Overall patterns of phosphate concentration were similar whether sampling during periods with little or no rainfall, or periods following rain events. An exception occurred on 24 June, when overland waters of the same sub-watershed mentioned above had a value of 0.5 mg/L, immediately following a significant rain event.

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