11-2017

Patterns of Nutrient Export for a Typical Non-point Source, Meadowbrook Farm, Madison County, Kentucky

James Scott Winter
Eastern Kentucky University

Walter S. Borowski
Eastern Kentucky University, w.borowski@eku.edu

Jonathan M. Malzone
Eastern Kentucky University

Recommended Citation

Winter, J.S., J.M. Malzone, and W.S. Borowski. 2017. Patterns of nutrient export for a typical non-point source, Meadowbrook Farm, Madison County, Kentucky. Kentucky Academy of Science, Annual Meeting, Murray State University, November 3-43 2017, pg. 30.

Patterns of nutrient export for a typical non-point source, Meadowbrook Farm, Madison County, Kentucky.

JAMES SCOTT WINTER, JONATHAN M. MALZONE, and WALTER S. BOROWSKI,
Department of Geosciences, Eastern Kentucky University, 521 Lancaster Avenue, Richmond, KY, 40475.

Excess nutrients are found in watersheds originating from active farmland often causing poor water quality and eutrophication in natural waters. Use of fertilizer and animal husbandry can contaminate both surface water and groundwater. Eastern Kentucky University's Meadowbrook Farm raises crops and livestock and is typical of farms that contribute excess nutrient contaminants to watersheds as non-point sources. An instrumented weir is positioned within a key sub-watershed of the Farm that empties into Muddy Creek, a tributary of the Kentucky River. This drainage is the largest outlet from the Farm that is representative of the Farm's collective activities.

We measured flow and nutrient concentration (orthophosphate, PO_4^{3-}; nitrate, NO_3^-; and ammonium, NH_4^+) over the weir to ascertain flow rates, nutrient export rates, and overall nutrient export. We concentrate on patterns of nutrient export during a single rainy period from 22 to 25 June 2017, which encompasses the passage of the remnants of tropical storm Cindy. In addition, baseline samples were obtained during drier periods throughout that summer.

Various nutrients respond differently to storm flow. Dissolved phosphate mirrors the flow hydrograph showing peak concentrations of 0.5, 0.8, 1.2, and 1.0 mg/L correlative with 4 distinct instances of peak flow. Nitrate concentration spikes sharply to ~3.0 mg/L during initial runoff but then quickly decreases and maintains constant values between 1.0 and 1.5 mg/L. Ammonium values are highest, just under 2 mg/L, before initial flow over the weir and then decrease to show sporadic values between 0.1 and 0.6 mg/L, apparently independent of discharge.

Program, Annual Conference, Kentucky Academy of Sciences, November 3-4, 2017, pp. 59.