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**Groundwater and surface water in a landscape with shallow bedrock:
Implications for agricultural nutrient export**

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Controls on nutrient export from agricultural landscapes include regional hydrological and geological conditions. In many central Kentucky basins shallow fractured bedrock produces focused groundwater discharge and flashy runoff events. Eastern Kentucky University's Meadowbrook Farm is currently experimenting with nutrient sequestration techniques; however the effectiveness of these techniques given the local hydrogeology needs to be quantified. Our objective was to determine the potential pathways for nutrient export by mapping key hydrologic features and using a watershed approach. The key features mapped were springs, tile drains, runoff channels, land use and the underlying geology. We chose a 0.46 km² watershed to study closely because it contained a good representation of farm activities and hydrology. Within the watershed we constructed a V-notch weir at the outlet to determine the flow from surface runoff and groundwater outputs and conducted a water budget. Next, we installed gaging stations along a main fourth order stream that the farm drains into. Finally, we selected sites within the stream to conduct differential stream gaging to quantify the input and outputs of groundwater to the stream. Mapping indicated that the Boyle Dolomite contained 100% of the springs. This means that the Boyle Dolomite is controlling groundwater export off of the farm. Hydrographs indicated flashy runoff events consisting of ~15% of precipitation volume. Tributaries dried approximately 5 days after a precipitation event. Nutrient export must be confined within these flashy events. Differential stream gaging indicated both gaining and losing stream reaches.

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