

REGIONAL AND GEOMORPHIC INFLUENCE ON SOIL GENESIS AND OAK ECOSYSTEMS IN THE
CHARITON RIVER HILLS OF MISSOURI

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ABSTRACT

Little is known about soil, geomorphic, and vegetation relationships in the moderately-dissected glaciated forests of the Chariton River Hills Ecological Subsection (CRHES). To gain a better understanding of these relationships for endeavors such as ecosystem classification and improved land management, sampling was done on two slope positions (upper and lower positions of backslopes with >15% slopes) of two slope aspects [north to northeast-facing (protected) and south to southwest-facing (exposed)] for a total of 48 plots along a gradient from central Missouri to the Missouri-Iowa border. Forty-eight soil pits were excavated at each plot to a depth of 205 cm, described, sampled, and analyzed. Soil physical properties such as particle size, bulk density, estimated available water capacity, and depths to diagnostic horizons were determined. To assess soil chemical property variation, samples were analyzed for extractable base cations, base saturation, cation exchange capacity, pH, and total organic carbon. Woody vegetation plots at each soil pit were established and inventoried, and site productivity data were collected. Vegetation data were used to determine site index, basal area, trees per hectare, percent stocking, and species richness. To assess the geomorphic effects of slope aspect and hillslope position, statistical analyses were performed on soil and vegetation parameters in a nested sampling design; and regional influences were determined using confidence intervals and regression analyses. Results indicated that influences from local geomorphic effects were more important than regional variation across the CRHES. Analyses demonstrated that clay in the argillic horizon was greater on upper hillslope positions, therefore decreasing the available water capacity. Upper exposed slopes had the least overall site productivity, but a greater abundance of white oak. On protected aspects, depth to the argillic horizon was greater, overall site productivity was greater, and there was an increase in abundance of red oak species.