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Amblyomma americanum (L.) (Acari: Ixodidae) is a common tick species in the midwestern United States that is emerging as an important human disease vector. While some recent studies have modeled broad-scale (regional or county-level) distribution patterns of *A. americanum*, less is known about how fine-scale habitat characteristics drive *A. americanum* abundance. Such fine-scale information is vital to identify targets for tick population control measures within land management units. We investigated how fine-scale habitat features predict host-seeking *A. americanum* adult and nymph abundance within a 12-ha section of oak-hickory forest in Missouri. We trapped ticks using CO_2-baited traps at 40 evenly-spaced locations for three 24-hour periods during the summer of 2015, and we measured biotic and abiotic variables surrounding each location. A total of 2,008 *A. americanum* were captured, of which 1,009 were nymphs and 999 were adults. We observed large fine-scale variation in local abundance (min=0 ticks, max=112 ticks, mean=16.7 ticks/trap night), which we visualized using interpolation techniques. Using generalized linear mixed models, we identified variables that best predicted nymph and adult abundance. The best models determined by AIC for both nymphs and adults used aspect to predict abundance and had negative relationships with slope. Nymph abundance was negatively related to temperature variance, while adult abundance had a negative relationship with elevation. These results demonstrate that managers can predict local tick abundance through simple physiognomic factors and use these parameters for targeted management action.