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ABSTRACT

In semiarid portions of the northern bobwhite (*Colinus virginianus*; hereafter, bobwhite) geographic distribution, weather is a strong driver of interannual abundance. However, the strength of this relationship may depend on habitat amount. Given this habitat–weather dependence, there is likely to be a threshold value for habitat that determines how strongly a bobwhite population responds to weather. Our objective was to evaluate the relationship between habitat amount and the relative influence of weather on bobwhite abundance in Texas and Oklahoma, USA and determine a potential land-cover threshold value. We collected bobwhite abundance and land-cover data from the Breeding Bird Survey and National Land Cover Database, respectively, for 2 time periods which corresponded to historical lows (2012–2013) and highs (2015–2016) of bobwhite abundance within this region. We reclassified land cover into grassland, shrubland, pastureland, cropland, forest, and urban cover, and combined grassland and shrubland categories to represent bobwhite habitat. We used weighted linear regression to model the difference between mean bobwhite abundance between each time period as a function of habitat amount, hypothesizing a positive, linear relationship given the theorized greater influence of weather on populations within higher habitat amounts. To evaluate a potential habitat threshold, we modeled mean bobwhite abundance, for each time period, and all individual land-cover variables using a generalized additive model with a negative binomial distribution. We detected a positive, linear relationship between habitat amount and the difference between high and low bobwhite populations (r^2 = 0.30), per our hypothesis. Models of land-cover variables differed between low- and high-abundance time periods. The time period of lower abundance (2012–2013) model included all land-cover variables except cropland and showed significant positive, linear relationships with grass and hay cover, and negative, linear relationships with forest and urban cover. Shrubland cover was the only nonlinear term, increasing to approximately 50–60% cover, then decreasing sharply with increasing cover. Deviance explained for this model was 41.2%. For the period of high abundance (2015–2016) the model explained approximately 25% of the deviance and was reduced to only negative, linear relationships with forest and urban cover. Our results provide some evidence toward the habitat–weather threshold hypothesis. Additionally, while no land-cover values showed a threshold-like relationship with bobwhite abundance, we did document differences in variable selection for each time period. Stressors on bobwhite habitat seem to have a more dramatic impact on bobwhite populations than available habitat, especially in periods of higher abundance, whereas periods of lower abundance also included habitat variables.

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