**Title:** **Multi-Level Modeling of Factors Influencing Wild Turkey Reproductive Success in Pennsylvania**

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**Abstract** Organisms interact with the environment at multiple spatial and temporal levels in a hierarchical manner. Variation in recruitment is considered a key factor in population growth of wild turkeys (*Meleagris gallopavo silvestris*) prompting biologists to investigate the factors that influence nesting success. We developed a multi-level framework to link the sequential processes affecting wild turkey recruitment during breeding and nesting periods: an individual movement model, a nest-site selection model, and a nest success model. The individual movement model (with hens as the study unit) and the nest-site selection model (with nests as the study unit) used conditional logistic regression to examine how both nest-level factors (e.g., visual obstruction) and landscape-level classifications (e.g., agricultural land use) influenced decision-making during the pre-nesting and nest-initiation periods. To enhance our understanding of nesting behavior, we also fit a known-fate model to quantify daily nest survival probabilities in relation to various predictors, including weather variables, individual hen characteristics, and landscape and nest-level habitat characteristics. These models were applied to a dataset of female wild turkeys, in Pennsylvania, USA. Hens exhibited differing patterns in habitat selection between nest and landscape-level predictors when selecting nest sites. At the nest-level, hens preferred locations with denser understory vegetation and a higher proportion of woody stem plants but avoided areas with invasive woody stem plant species. At the landscape-level, hens favored sites in an agricultural landscape at greater distances from primary roads. Our findings suggest that mowing and haying fields during peak turkey nesting periods could adversely affect nest success rates. Managing early successional vegetation along wooded field edges, fencerows, and forest clearings combined with invasive species control could be effective in enhancing the quality of turkey nesting habitat.