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APPLYING MULTISTATE MARK-RECAPTURE MODELS WITH STATE UNCERTAINTY TO ESTIMATE SURVIVAL AND REPRODUCTION OF QUAIL

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ABSTRACT

Obtaining unbiased estimates of vital rates and understanding how vital rates change in response to environmental stimuli are a continual pursuit of ecologists. Multistate mark-recapture (MSMR) models provide a flexible framework for evaluating dependent vital rates in a comprehensive analysis. For example, a bird must remain alive during breeding season to initiate a nest (i.e., transition from a nonbreeding to a breeding state); thus, the probability that a bird initiates a nest is dependent on the probability that it is still alive. Traditional MSMR models allow only for the estimation of survival, detection, and state transition parameters and depend on the assumption that observers can correctly classify the true state of the animal without error. If the potential for state misclassification exists, incorporating parameters to estimate state uncertainty will reduce biases in the biological parameters of interest. I applied an MSMR model with state uncertainty (MSMR-SU) to estimate short-term survival, dispersal, and reproduction in translocated scaled quail (*Callipepla squamata*) reintroduced to a large landscape in West Texas, USA. I tested for the effects of release treatment, source population, age, release location, and year on demographic parameters (e.g., survival, dispersal, nest initiation, renesting rate, and nest success). I demonstrated a novel method of estimating nest initiation and renesting rate for avian species using a MSMR-SU model. MSMR-SU models provide a flexible and rigorous approach for evaluating effects of variables on demographic parameters for quail and other species.

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