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ESTIMATES OF NORTHERN BOBWHITE NEONATE SURVIVAL

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ABSTRACT

Neonate survival is an important but poorly understood component of northern bobwhite (*Colinus virginianus*) population dynamics. We used a combination of thermal imagery (forward-looking infrared [FLIR]) and radio-telemetry to estimate survival from time of hatch to fall recruitment. During 2013–2015, we tracked bobwhites and captured broods at ~11 days of age using the corral technique. In addition to patagial tagging each neonate captured, we sutured radio-tags (0.76 g) on a subset of neonates ($n = 56$), and located them 3–4 times daily using radio-telemetry to determine fate and cause of mortality. We modified the Dail-Madsen model in a Bayesian framework to estimate survival, while accounting for brood amalgamation, from data collected with FLIR and the known-fates to estimate survival of radio-tagged birds. We observed a curvilinear relationship ($\beta = 0.047$, $SE = 0.014$) between age and survival such that daily survival rates gradually increased up to 10 weeks of age at which time survival reached an asymptote. The average daily survival rate for bobwhite neonates during the first 2 weeks of age was 0.9278 (95% CrI = 0.5908–0.9987), 0.9814 ($SE = 0.0049$) for weeks 3 to 10, and 0.9979 ($SE = 0.0017$) after 10 weeks of age. Linking daily survival estimates from FLIR (0–11 days) with radio-tagged (≥ 12 -days) survival, we surmise that only small portion (~18.5%) of chicks hatching during the peak nesting period (June–July) survive to fall recruitment. Despite the lack of information on neonate survival, to date, numerous population models incorporate estimates of chick survival at 45–50% to fall recruitment. However, our results suggest that those estimates are high and may report spurious results. We further suspect that hatch timing (June vs Sep) and weather likely influence daily survival rates of neonates and may substantially impact overall fall recruitment.

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Key words: *Colinus virginianus*, chick, FLIR neonate, northern bobwhite, survival, suture, thermal imagery

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