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# CASCADING EFFECTS OF HUNTING DISTURBANCE ON NORTHERN BOBWHITE BEHAVIOR, PHYSIOLOGY, AND SURVIVAL

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## ABSTRACT

The northern bobwhite (*Colinus virginianus*; hereafter, bobwhite) is an important gamebird across the United States and has been in decline for several decades. As a commonly hunted prey species, the bobwhite provides an ideal study species to investigate the use of proactive and reactive antipredator behaviors in response to hunting pressure. We designed an experiment to understand how late-season hunting affects bobwhite demographics using fecal glucocorticoid (fGCM) concentrations, foraging and movement behaviors, survival, and breeding season metrics. Our results show that bobwhite responded to increased interactions with a shotgun through proactive responses. After one encounter with a discharged shotgun, bobwhite began foraging farther from supplemental feed where the risk of encountering a hunting party was the greatest ( $\beta = 0.21$ , 95% Bayesian credible interval [CrI]: 0.06–0.36). Bobwhite responded to increased hunting pressure, particularly late-season hunting pressure, via reactive responses through increased fecal glucocorticoid metabolite (fGCM) concentrations ( $\beta = 2.18$ , 95% CrI: 0.21–4.15), resulting in decreased survivorship in non-harvested individuals ( $\beta = -0.42$ , 95% CrI: -0.77 to -0.07) and decreased fecundity ( $\beta = -0.17$ , 95% CI: -0.31–0.09). These results can help inform hunting season regulations and management decisions aiding in bobwhite recovery.

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**Key words:** antipredator behavior, *Colinus virginianus*, ecology of fear, fecal corticosterone, fecundity, glucocorticoid, hunting pressure, nonconsumptive effects, northern bobwhite, stress

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