Behavioral "bycatch" from camera trap surveys yields insights on prey responses to human-mediated predation risk

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Abstract

Human disturbance directly affects animal populations but indirect effects of disturbance on species behaviors are less well understood. Camera traps provide an opportunity to investigate variation in animal behaviors across gradients of disturbance. We used camera trap data to test predictions about predator-sensitive behavior in three ungulate species (caribou Rangifer tarandus; white-tailed deer, Odocoileus virginianus; moose, Alces alces) across two boreal forest landscapes varying in disturbance. We quantified behavior as the number of camera trap photos per detection event and tested its relationship to predation risk between a landscape with greater industrial disturbance and predator abundance (Algar) and a "control" landscape with lower human and predator activity (Richardson). We also assessed the influence of predation risk and habitat on behavior across camera sites within the disturbed Algar landscape. We predicted that animals in areas with greater predation risk (more wolf activity, less cover) would travel faster and generate fewer photos per event, while animals in areas with less predation risk would linger (rest, forage), generating more photos per event. Consistent with predictions, caribou and moose had more photos per event in the landscape where predation risk was reduced. Within the disturbed landscape, no prey species showed a significant behavioral response to wolf activity, but the number of photos per event decreased for white-tailed deer with increasing line of sight (m) along seismic lines (i.e. decreasing visual cover), consistent with a predator-sensitive response. The presence of juveniles was associated with shorter behavioral events for caribou and moose, suggesting greater predator sensitivity for females with calves. Only moose demonstrated a positive association with vegetation productivity (NDVI), suggesting that for other species influences of forage availability were generally weaker than those from predation risk. Behavioral insights can be gleaned from camera trap surveys and provide information about animal responses to predation risk and the indirect impacts of human disturbances.

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