

# Factors affecting the detectability and distribution of the North American river otter

by

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## ABSTRACT

The North American river otter (*Lontra canadensis*) was extirpated throughout much of its range but is now recovering in many areas. Consequently, there is a need to determine river otter occupancy and habitat associations. We conducted sign surveys from January to April 2008 and 2009 in eastern Kansas to assess how local- and landscape-scale habitat affects river otter occupancy and how survey methods and habitat affect the detectability of river otter sign. Multiple observers surveyed 3-9 400-m stretches of stream and reservoir shorelines for 110 randomly-selected sites and measured local-scale (within a 100 m buffer of site) habitat variables (e.g., stream order, sinuosity, proportion of land cover types) and landscape-scale (Hydrological Unit Code 14 watershed) habitat variables (e.g., road density, shoreline diversity, proportion of land cover types). We then modeled occupancy and detection probability as a function of these covariates using Program PRESENCE. The overall probability of occupancy accounting for detection probability was 0.329. The best-fitting model indicated river otter occupancy increased with the proportion of woodland cover and decreased with the proportion of cropland and grassland cover at the local scale. The best-fitting model also indicated occupancy increased with decreased shoreline diversity, waterbody density, and stream density at the landscape scale, possibly because of the influence of large reservoirs in the watershed. Occupancy was not affected by land cover or human disturbance at the landscape scale, perhaps due to our relatively homogeneous study area or because river otters are habitat generalists. Detection probability for 400-m surveys was highest in mud substrates ( $p = 0.600$ ) and lowest in snow ( $p = 0.180$ ) and litter substrates ( $p = 0.267$ ). Detection probability for scat was more than double that for tracks, and detection probabilities were 17-64% lower for novice observers than experienced observers. Detection probability also increased with survey length. Sign surveys are a useful technique for monitoring many species, including river otters, and accounting for detection probability will improve estimation of occupancy. Furthermore, understanding the ecological factors and the scale important to river otter occurrence will be useful in identifying areas for restoration and management efforts.