ABSTRACT

THESIS: A Comparison of Bat Activity in a Managed Central Hardwood Forest

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Bats exploit forest resources based on species-specific adaptations, resulting in differences in activity across forested landscapes. Forest management practices alter forests, impacting species differently and presumably affecting bat activity. Application of forest management that promotes bat conservation requires further understanding of bat response to silvicultural practices. We surveyed timber harvest treatments on two Indiana State Forests to compare bat activity across forest management treatments, in forests adjacent to harvests, and at locations across the harvest-forest gradient from May to July 2013 and 2014. We used Wildlife Acoustics Song Meter SM2BAT+ detectors to survey bats in relation to four treatment types: clear cut, patch cut, shelterwood cut, and intact forest. Detectors were deployed at two points within each treatment and three points on the forested periphery of treatments and recorded for three consecutive nights. We examined bat activity using *N*-mixture models that estimate abundance and probability of detection for an open population and used Akaike's Information Criterion to select the best models. Eastern red bats and hoary bats were more active in harvest treatments than control treatments. Big brown, eastern red, and tri-colored bats were most active at harvest edges. Northern long-eared and Indiana/little brown bats were most active at harvest edges and in adjacent forest and hoary bats were most active at harvest centers. All species were active in forests adjacent to harvests. Variables affecting detection probability differed among species and included air temperature, relative humidity, barometric pressure, dew point, cloud cover, wind speed, and forest clutter. Differences in bat activity across these managed forests suggest bat assemblages benefit from management that employs an array of silvicultural methods, provides edge habitat, and maintains adjacent forest stands. Our results can be used to predict effects of forest management practices on bat activity to maximize bat usage of forests.