ABSTRACT

THESIS: EVALUATING BAT RESPONSE TO HUMAN-ALTERED LANDSCAPE IN A MIDWESTERN RIVER CORRIDOR: AN ABUNDANCE MODELING ANALYSIS USING BIOACOUSTICS

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Bats face numerous conservation challenges across the United States including wind energy development, the spread of white-nose syndrome, and habitat loss. Human alterations to natural environments can impact the presence of bats. How habitat alterations affect different bat species is not clearly known. Our goal is to examine bat use across a gradient of habitats altered by humans. During the 21-22 summer seasons, we used acoustic detectors to survey a variety of sites to examine bat response to the human-altered habitats along the White River corridor in Delaware County, IN. To ensure sampling occurred across a range of habitat types, we created an a priori model categorizing 1-km long sections of habitat into five habitat groups based on habitat structure and human influence. Wildlife Acoustics SM4+ echolocation detectors were used to collect acoustic data at each of the 30 sites for three nights twice each summer. Habitat and environmental covariates were measured using artificial light measurements, field observation data, and ArcGIS Pro. Calls were analyzed using Kaleidoscope and BCID software along with manual identification based on species rarity and call structure attributes. We conducted a Dail-Madsen N-mixture modeling analysis to estimate call abundance and detection probabilities to evaluate the effects of habitat structure on bat use. Species abundance exhibited a wide variety of responses to urban variables. Prominently,

Myotis species exhibit an extreme negative relationship with even low levels of artificial light. Most of our species models, whether a forest-obligate or a generalist species, predicted that higher levels of riverbank canopy percentage yield an increased abundance of bats, suggesting that forests and forest-edges are an essential resource for urban bat communities. Our aim is to gain a better understanding of species-specific habitat requirements for struggling bat populations and aid future management decisions regarding the effects of land development on bats.