BAT OCCUPANCY OF FORESTS AND MANAGED SAVANNA AND WOODLAND IN THE MISSOURI OZARK REGION

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ABSTRACT

Many Missouri land management agencies are restoring savannas and woodlands using prescribed fire and forest thinning, and information is needed on how wildlife species respond to these management activities. Our objectives were to 1) determine the relationship of temporal and environmental factors to the probability of detection (p), and 2) determine how site occupancy (Ψ) varies among savannas, woodlands, and forests as a function of vegetation structure and management history for 5 common bat species in the Missouri Ozark region: big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), northern long-eared bat (*Myotis septentrionalis*), evening bat (*Nycticeius humeralis*), and tri-colored bat (*Perimyotis subflavus)*. We identified sites that were actively managed for savanna and woodland conditions, and control areas on similar landforms that had no recent management and had succeeded to more closed canopy forest. We used Anabat detectors to survey bats during August 2010, May to July 2011, and May to June 2012. We fit single-season occupancy models for each species. We evaluated *a priori* hypotheses in an information theoretic approach by first evaluating factors affecting p and then evaluating support for site occupancy models that included habitat and landscape effects. The probability of detecting bat species with acoustic detectors varied by species and was related to temperature, relative humidity, barometric pressure, tree density, Julian date, distance to water, and visit. Generally, higher

temperatures, lower humidity, lower tree density, and later dates in the summer resulted in higher *p* for several bat species in the Missouri Ozark Highlands. The probability a site was occupied by foraging bats varied among species as a function of percent forest and urban land cover, stand stocking, distance to water and roads, number of fires in the last 10 years, and vegetative composition. It is important to consider the effects on *p* when conducting acoustic surveys of bats. In general, vegetative structural conditions created by savanna and woodland restoration and management resulted in greater occupancy of the big brown bat, eastern red bat, evening bat, and tri-colored bat than was observed in mature, non-managed forest.