

The effects of wetland networks distribution on bat activity

AS IT TURNS OUT, BATS MAY NOT BE TOO HAPPY ABOUT

being stuffed in a belfry—it may just be their best choice for a roost site in a highly fragmented landscape. Additionally, being limited to any one habitat type in a landscape may restrict some bat species' ability to thrive. A new study points out that managing protected areas without consideration of the broader landscape connections is not conducive to the viability of this mobile group of mammals (Lookingbill et al. 2010). True, bats need areas in which to forage and roost, and a “mosaic arrangement of those areas is crucial to maintaining bat activity,” note the authors.

In the context of increasing urbanization and wetland depletion, Lookingbill et al. (2010) studied the importance of wetland habitat connectivity in five national parks within the mid-Atlantic United States. The parks chosen for this study combine a variety of land cover types amid a gradient of rural to urban development: Rock Creek Park (forest surrounded by high-density urban development), Monocacy National Battlefield (large tracts of pasture, near the Washington, D.C., metro area), Harpers Ferry National Historical Park (mixture of forest, agricultural, and riverine habitats), Antietam National Battlefield (largely pastureland), and Catocin Mountain Park (95% forested).

In these parks, five species of bats, all with different feeding habits and behavior, were the focus. Investigators inventoried bat activity levels via acoustic monitoring—96 detection stations in all, located within various land covers. Bat activity was correlated with land cover data captured in satellite imagery and compared with a theoretical network model to graphically illustrate the connectivity of wetland areas.

The authors hypothesized that the spatial distribution of wetlands is critical for allowing bats to use landscapes effectively. They correctly predicted that bat activity would be higher for more connected wetlands than for those that were isolated from one another, and that the importance of these connected landscape features would differ for each bat species. For three of the five species (tri-colored [*Perimyotis subflavus*], eastern red bat [*Lasiurus borealis*], and little brown myotis [*Myotis lucifugus*]), the size of and distance between wetlands were the most important factors for feeding activity. Though wetlands were not correlated with activity of northern myotis (*Myotis septentrionalis*) and were not as strongly correlated as other habitat types with activity levels for big brown bat (*Eptesicus fuscus*), these species' use of many different foraging areas is indicative of the importance of a mixture of habitat types for bats.

The arrangement of wetlands in the landscape in terms of size, distance between wetland patches, the type of connections between those wetlands, and the availability of roosting sites is critically important for bats. Indeed, the authors stress that the area and connectivity of wetland foraging habitat are similarly important to the percentage of urban, forest, and open land cover types and roosting areas in a landscape. If management efforts are to be effective, the foraging movement abilities of each bat species and the spatial distribution of wetlands relative to these movements must be considered. Because one cannot generalize a conservation strategy for wetlands to benefit bats, the authors argue that strategies for protection of bats should be species specific, not focused on bats as a group.

Lookingbill et al. (2010) further assert that future research should focus on integrating detailed information on individual bat flight lines, roosting locations, potential movement barriers, and wetland configuration. So that bats' varied foraging and roosting needs are met, including large connected networks of wetlands, the authors suggest that managers of small parks develop conservation strategies in cooperation with adjacent landowners.

Reference

- Lookingbill, T. R., A. J. Elmore, K. A. M. Engelhardt, J. B. Churchill, J. E. Gates, and J. B. Johnson. 2010. Influence of wetland networks on bat activity in mixed-use landscapes. *Biological Conservation* 143:974–983.
- Jonathan Nawn, Amy Stevenson, and Jeff Selleck;
reviewed by T. Lookingbill