

Breeding bird use of isolated wetlands along a gradient of urbanization in the northeast US

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**ABSTRACT.** As natural habitats become fewer in number and more fragmented as a result of urbanization, ecosystem services provided by small isolated wetlands may become increasingly important. For example, wildlife habitat provided by wetlands in urban landscapes may help support both wetland obligates and species that can opportunistically take advantage of higher productivity promoted by mesic conditions. However, little is known of either use of wetlands by birds or the impacts of human disturbance on wetland functions and services in these vulnerable systems. We examined breeding bird communities in urban and rural wetlands and nearby uplands in the northeast US to test the hypothesis that increasing urbanization would result in changes in habitat use. From mid-May through June 2008 and 2009, we conducted 10-min long, 50-m radius point counts at 99 randomly chosen sites along a gradient of watershed urbanization. Bird abundance and diversity was significantly higher at wetlands versus uplands ( $t = 2.02$  and  $2.07$ ;  $p = 0.02$  in both cases), and at urban wetlands versus urban uplands ( $t = 4.92$  and  $3.26$ ;  $p = 0.001$  and  $0.002$ , respectively), but not at rural wetlands versus rural uplands. Overall, spatial modeling indicated that more species were seen at wetland versus upland sites, but when just human-tolerant species were considered, the difference between wetland and upland habitat use was less. Species-specific habitat models using general vegetation classes showed differences in bird-habitat associations as watersheds became more urbanized. In particular, several species that were not associated with wetlands at rural sites (e.g., Carolina wren *Thryothorus ludovicianus*; common yellowthroat *Geothlypis trichas*) showed a strong positive association with wetlands in more urbanized landscapes. Our results suggest: 1) birds may be responding to mesic conditions by preferentially using wetland habitats, particularly in urban areas; 2) wetlands may also be supporting less ubiquitous or human intolerant birds that are targets for conservation; and 3) changes in the extent of urbanization may impact bird use of remnant natural habitats to the extent that wetlands may be inordinately beneficial to maintaining populations of some species in human-dominated landscapes. Our findings potentially demonstrate the importance of wetlands in urban settings, and add to the body of evidence that supports the protection and restoration of small isolated wetlands in urban landscapes.

**KEYWORDS:** isolated wetlands; ecosystem services; urbanization; birds; habitat