

Effects of lakeshore vegetation on Wisconsin avian and anuran populations

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Riparian areas are hotspots of wildlife diversity and are also particularly attractive for housing development, which continues to rise at unprecedented rates. Lakeshore development in northern Wisconsin often results in reduced riparian vegetation in the forest understory layer. This study investigated effects of decreased riparian vegetation structure on the diversity and abundances of birds and frogs at 3 spatial scales relevant to riparian land management: parcel (30 m of shoreline), whole-shore (340 m of shoreline), and whole-lake scales. For parcel and whole-shore sites, we paired 10 forest sites with 10 lawn sites by lake. At the lake scale, we measured bird diversity and frog abundances at 10 lakes with varying proportions of lakeshore covered by lawn. We found no evidence of green frog (*Rana clamitans*) or bullfrog (*Rana catesbeiana*) abundances correlating with riparian vegetation category. Nor did avian species richness relate to riparian vegetation category at the whole-lake scale. However, we found higher avian species richness at parcel-sized forest sites with dense understory vegetation (between 0.2 and 2 m high) than at developed sites lacking dense understory vegetation structure (Wilcoxon signed ranks test $T = 4.5$, $p < 0.001$). Avian richness also increased at sites with greater canopy coverage ($F_{2,7} = 7.4$, $p = 0.02$). We found higher within-guild species richness at forest sites than at lawn sites for the following avian guilds: insectivorous, woodland, ground-nesting, canopy-nesting, open-cup nesting, and interior species. The remaining guilds - frugivorous, omnivorous, urban, edge, and cavity nesting species - did not vary significantly with riparian vegetation. Aerial insect abundances, which were also higher at forest sites than at lawn sites, may help explain bird distributions. Woodland and insectivorous bird species richness both increased with increasing insect abundance. Our findings suggest that riparian landscaping by individual lakeshore parcel owners can alter local bird communities.