# Urbanization Impacts on Mammals across Urban-Forest Edges and a Predictive Model of Edge Effects

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## Abstract

With accelerating rates of urbanization worldwide, a better understanding of ecological processes at the wildland-urban interface is critical to conserve biodiversity. We explored the effects of high and low-density housing developments on forest-dwelling mammals. Based on habitat characteristics, we expected a gradual decline in species abundance across forest-urban edges and an increased decline rate in higher contrast edges. We surveyed arboreal mammals in sites of high and low housing density along 600 m transects that spanned urban areas and areas turn on adjacent native forest. We also surveyed forest controls to test whether edge effects extended beyond our edge transects. We fitted models describing richness, total abundance and individual species abundance. Low-density housing developments provided suitable habitat for most arboreal mammals. In contrast, high-density housing developments had lower species richness, total abundance and individual species abundance, but supported the highest abundances of an urban adapter (*Trichosurus vulpecula*). We did not find the predicted gradual decline in species abundance. Of four species analysed, three exhibited no response to the proximity of urban boundaries, but spilled over into adjacent urban habitat to differing extents. One species (*Petaurus australis*) had an extended negative response to urban boundaries, suggesting that urban development has impacts beyond 300 m into adjacent forest. Our empirical work demonstrates that high-density housing developments have negative effects on both community and species level responses, except for one urban adapter. We developed a new predictive model of edge effects based on our results and the literature. To predict animal responses across edges, our framework integrates for first time: (1) habitat quality/preference, (2) species response with the proximity to the adjacent habitat, and (3) spillover extent/sensitivity to adjacent habitat boundaries. This framework will allow scientists, managers and planners better understand and predict both species responses across edges and impacts of development in mosaic landscapes.

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