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Factors affecting the distribution and nesting of urban birds.

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Urbanisation is a key factor contributing to declines in biodiversity worldwide, usually as a result of decreases in green space and canopy cover, and increases in anthropogenic activity and rubbish. However, variation in factors such as the amount of green spaces and extent of tree canopy cover can enhance urban habitats to increase local biodiversity. As green spaces are often larger and more abundant in wealthier areas of a city, people in less affluent urban areas may encounter less biodiversity regularly—a pattern understood as the 'luxury effect'. In the first part of my project, I investigated the relationship between bird distribution and green space, canopy cover, and local wealth in the city of Christchurch, and how this varies between endemic, native, and introduced birds.

To investigate factors affecting bird distribution in Christchurch, I selected 60 survey sites that spanned the entire area encompassed by the city. At each of the 60 survey sites I conducted five point-counts. Surveys lasted 5 minutes and sites were separated by at least 150 m to avoid double counting individual birds. I repeated these surveys in both autumn and spring 2024 to account for changes in the seasonal distribution and detectability of birds. Using Generalised Linear Mixed Models, I then compared bird species richness and abundance per survey to percent green space (NDVI), percent canopy cover, and the New Zealand Index of Deprivation 2023. I also examined the effect of factors such as latitude, longitude, temperature, wind speed, extent of cloud cover, traffic levels, and number of pedestrians, all of which could influence bird distribution and detectability. In total I recorded 45 species of birds, of which 28 were native species, but 90% of Christchurch bird abundance could be accounted for by just 12 species. The most abundant endemic species was the New Zealand fantail (*Rhipidura fuliginosa*), the most abundant native species was the silvereye (*Zosterops lateralis*), and the most abundant introduced species was the house sparrow (*Passer domesticus*). Abundance and species richness of endemic birds tended to decline in areas with low socioeconomic development. There was also a tendency for canopy cover to be associated with increases in species richness and abundance across endemic, native, and introduced species.

Apart from large-scale changes in the urban environment, birds in cities are likely to encounter more pollution and exposure to rubbish and other waste products. As the abundance of rubbish increases in urban environments, studies overseas have found birds use increasing amounts of this anthropogenic material for constructing nests. It is unclear which factors drive birds to use anthropogenic nest materials, as rubbish use can vary between different sites and bird species. Anthropogenic waste may even provide nesting materials in urban areas which otherwise lack the natural nesting materials to sustain bird populations, as the availability of select natural material categories likely differs between urban and natural sites. In the second part of my project, I investigated how frequently birds in Christchurch use anthropogenic nest materials, and whether certain natural materials are more or less accessible to birds in urban areas.

To investigate anthropogenic nest material use in Christchurch, I collected and disassembled 41 common blackbird (*Turdus merula*) nests from the University of Canterbury (15 nests), and Kowhai bush, Kaikoura (26 nests). I compared the relative weights of nest components including twigs, grass, leaves, moss, bark, roots, anthropogenic material, and mud. I also compared the overall mass and dimensions (internal and external) of nests. As expected, I found that anthropogenic material and leaves contributed more to nest mass at the urban site, while moss and roots contributed more at the forest site. No anthropogenic waste was found in the nests of blackbirds from the forest study site at Kaikoura. Anthropogenic material in urban nests consisted largely of plastic waste, but also strings, cloth, and other artificial fibres incorporated into the nest. Nests at the University of Canterbury were significantly heavier and had greater external depths than Kowhai bush nests. Although the possible effects of plastic waste on blackbirds are unknown, its widespread use in nests warrants further study.

I would like to express my gratitude to the Marj Davis Scholarship and Birds New Zealand for their support of my research. I have now completed my thesis and in the process of preparing my work for publication in scientific journals.