TEMPORAL CO-OCCURRENCE IN A COMMUNITY OF SUBTROPICAL AUSTRALIAN BIRDS

Nicholas Hudson[1]

[1]The University of Queensland

April 13, 2024

Abstract

I aimed to better understand the community ecology of sympatric birdlife in subtropical South East Queensland, Australia using patterns of temporal species co-occurrence and principles from network theory. In line with expectation, a hierarchical clustering analysis showed that dates that were successive were joined by the shortest branch lengths because of similar patterns of observed bird species. The only date sampled in the Southern hemisphere Autumn was awarded its own branch in the tree, indicating these observations were relatively distinct. Estimates of total observed bird biomass were substantively higher in the Autumn sample. Ranking each species on its average pairwise correlation to the other 87 species in the set shows that, unsurprisingly, raptors (such as Whistling Kites, Haliastur splenurus) tend to be the most negatively correlated (hypergeometric enrichment statistic $P = 0.00029$) indicating their presence is inhibitory to other avian species. On the other hand, Silvereyes (Zosterops lateralis) possess the highest number of total connections, the highest radiality (or 'network influence') metric within the inferred co-occurrence network and have the second highest average positive correlation to all other bird species in the set (+0.32). Collectively, this means Silvereyes can be seen as an indicators whose presence indicates an enhanced likelihood of observing a diversity of other bird species. Network clustering analysis detects a large module of positively connected bird species within the overall structure (dominated by non-threatening diminutive species as Z. lateralis, Little Friarbirds Philomon citreogularis and Red Backed Fairy Wrens Malurus melanocephalus), whereas all but one of the raptors sit on the periphery. The use of the PCIT network reconstruction algorithm is demonstrated for the first time in community ecology.

Hosted file

`Hudson_Bird_co_occurrence_Manuscript_File.docx` available at https://authorea.com/users/767337/articles/826091-temporal-co-occurrence-in-a-community-of-subtropical-australian-birds