Responses of avian feeding ecology to human-induced environmental changes

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How quickly can birds respond to changes in their environment? This is an important question if we want to understand if species can persist in the face of rapid human-induced changes in the environment. In this project I will investigate if avian populations can rapidly respond to anthropogenic impacts via changes in their feeding ecology and if such changes can explain failure or success of conservation actions. New Zealand birds are particularly interesting, because the translocations some populations have gone through serve as a unique large-scale experiment across species.

I will create two long-term datasets of feeding ecology and trophic niche across lineages of land-birds using: (1) stable isotope signatures (nitrogen and carbon) of feathers; and (2) morphology, including classical measurements and geometric morphometrics, with a particular focus on the beak shape (a trait known to undergo rapid change in natural populations). I will investigate 11 endemic New Zealand bird species, divided in three groups of sister taxa (i.e., closely-related and readily comparable): (1) Nestoridae + Strigopsidae (kakapo, kea, and kaka); (2) Callaeidae + Notiomystidae (hihi, North and South Island kokako, North and South Island saddlebacks, and huia); (3) Meliphagidae (tui and bellbird).

These datasets will be built using museum specimens and will allow me to assess how rapid species change their feeding ecology and related morphology. The data will then be used to investigate whether the fate of these species (that varied from extinction to population expansions) can be explained by the breadth of their feeding niche, by rapid changes in morphological traits, and/or shifts in food sources. Feeding ecology could play an important role in the outcome of translocation programs, since a successful settlement depends on the birds' ability to either find similar food items or switch their diet. The latter option, however, may be unattainable for some species, resulting in poor adaptation and failure. Therefore, I expect that the outcomes of this study will be immediately applicable to current conservation programs of some of the world's most threatened species.

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North Island Kaka, *Nestor meridionalis septentrionalis*, collected 14 August 1927, Tararua Range, New Zealand. Field Collection 1927-1966. CC BY-NC-ND 4.0. Te Papa (OR.001922) https://collections.tepapa.govt.nz/object/626043
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Kea, *Nestor notabilis*, collected Arahura Valley, Westland, New Zealand. Acquisition history unknown. CC BY-NC-ND 4.0. Te Papa (OR.023235) https://collections.tepapa.govt.nz/object/627000
Tui, *Prosthemadera novaeseelandiae novaeseelandiae*, collected no data, New Zealand. Acquisition history unknown. CC BY-NC-ND 4.0. Te Papa (OR.025083) https://collections.tepapa.govt.nz/object/537458
Bellbird, *Anthornis melanura melanura*, collected Ohura, Taranaki, New Zealand. Purchased 1939. CC BY-NC-ND 4.0. Te Papa (OR.014293) https://collections.tepapa.govt.nz/object/535281