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The vocalisation of tui (*Prosthemadera novaeseelandiae*)

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Abstract

This study investigates the vocalisation of tui and its individual, gender and regional variations.

A population of tui at Tawharanui Regional Park was studied in order to investigate the characteristics, diversity, gender variation and seasonal variations of tui vocalisation. In 2.4 hours of recordings collected from 48.5 hours of field sampling between July and December, 2010, 303 distinctly different songs were recorded, which included four types of vocalisations. These were long-range broadcasting songs, short-range interactive songs, alarm calls and distress calls. In 30 randomly selected songs from different individuals, 264 distinctly different syllables were observed. The level of syllable repetition and syllable sharing between individuals were low. A significantly greater proportion of trill and a significantly lower minimum frequency were found in long-range songs than in short-range songs. A greater proportion of trill in the long-range songs is possibly due to: 1. Long trill components being more effective in long-range transmission than short bouts of trill, 2. High frequency trill is less likely to suffer from sound degradation in open habitats than lower frequency syllables and 3. Trill is costly to produce and may advertise the genetic quality of the singer, therefore are used more in long-range broadcast songs rather than in short-range interactive songs. Significantly lower minimum frequencies in long-range songs is likely to facilitate the transmission of sound further in distance and through vegetations. Minimum frequencies may also correlate with the size of the singer, which is likely important information to advertise in long-range songs for mate attraction and territory defence.

Male songs were not significantly longer in duration than female songs. Males however had a much larger repertoire of syllables and male songs contained a significantly larger proportion of rapid multiple note repetition syllables, both of which are likely sexually-selected traits linked to genetic diversity and the ability to defend high-quality territories. Tui songs in breeding season had a greater proportion of trill components compared to that in non-breeding season. Trill has been found to be another sexually-selected characteristic of males. Statistical analysis also suggested that at the population level, tui sing a greater number of songs during the non-breeding season than during the breeding season. However this observation is likely due to stronger territorial behaviour of tui in breeding season resulting in a reduction in the density of birds in one specific area.

Tui songs recorded from the Chatham Islands were compared to those from Tawharanui Regional Park in order to explore the regional variation in tui vocalisation. Long-range male songs recorded from Tawharanui had a significantly greater proportion of trill, inflection points in the terminal note and longer song duration than that from Chatham Island. These characteristics have all been demonstrated as being sexually-selected traits that are positively correlated with male genetic diversity, suggesting that the genetic diversity of individuals in the mainland population is higher than that of the island population. The acoustic adaptation hypothesis could also help to explain the significantly higher proportion of trill component in the long-range songs of the mainland population, as the mainland study site contained more open vegetation than the Chatham Islands sites and trill transmits more effectively in such habitats. The mainland population also had a larger song repertoire and syllabic diversity at the population level and the two populations exhibited 7.5% syllable similarity when comparing syllable repertoires. There was, surprisingly, no significant overall difference in the multivariate dispersion of spectral characteristics when comparing both short and long-range songs between populations, however this is likely due to the effect of sample size. Differences in habitat type, opportunities for immigration and emigration, levels of male-male competition and sexual selection pressures all likely drive the overall variation observed when comparing the structure of both long-range and short-range songs and would explain the difference observed in the song and syllable repertoire between the two populations.

This study has provided baseline data of song type, individual, gender, seasonal and regional differences in tui vocalisation, which will help develop our understanding of communication in tui. Knowledge of tui vocalisation can help in determining individuals' reproductive potential, past breeding success and the role of songs in tui breeding success. Such information is important for the conservation of tui, particularly in areas where tui population is declining and requires conservation efforts and management such as translocation.



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