Exploring the spatial distribution of exotic earthworms in New Zealand

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Exotic earthworms contribute to New Zealand's productive agricultural landscape. We collated earthworm species data from across New Zealand to determine how the distribution has changed since the last nationwide survey in the 1980's, where some species had been found to have sporadic distribution.

Data was collected for both earthworm abundance (385 points) and presence/absence data (493 points). More earthworm records were observed in the North Island than the South Island. Aporrectodea caliginosa (Savigny) remained the most common species recorded in New Zealand.

Potential environmental predictors of earthworm community distribution were selected in order to determine the important drivers. Variables included soil pH, phosphate retention, carbon, profile available water, potential rooting depth, soil type, slope, altitude, monthly water balance, and mean annual temperature. Geostatistical analysis of the data found both location within the landscape and climate to be important variables driving earthworm distribution, but drivers differed between individual species.

Habitat suitability was determined using an Ecological Niche Factor Analysis (ENFA). Some of New Zealand's most common species were found to live in 'average habitats' (A. caliginosa) and under a range of conditions [Octolasion cyaneum (Savigny), Lumbricus rubellus (Hoffmeister)]. Other species with more sporadic distribution were found to live in 'extreme habitats' [Lumbricus terrestris, (Linnaeus)] and under a narrow range of conditions [Aporrectodea longa, (Ude)].

The implications of the different environmental drivers influencing earthworm communities, and what they may mean for our agricultural systems will be discussed.