The New Zealand Sustainability Dashboard

ARGOS

Research Summary 15/05

PREDICTING LAND-USE CHANGE IMPACTS ON BIODIVERSITY

Setting biodiversity management targets

Setting biodiversity management targets often relies on subjective processes such as expert opinion or political pressures from key stakeholders. Other parties may call these targets into question as the processes used to identify them are not clear or repeatable.

Here, we introduce a biodiversity risk assessment framework that provides a more transparent approach for setting biodiversity management targets.

The framework recognises that identifying meaningful targets and action plans for managing biodiversity requires an understanding of the relationships between land management and biodiversity.

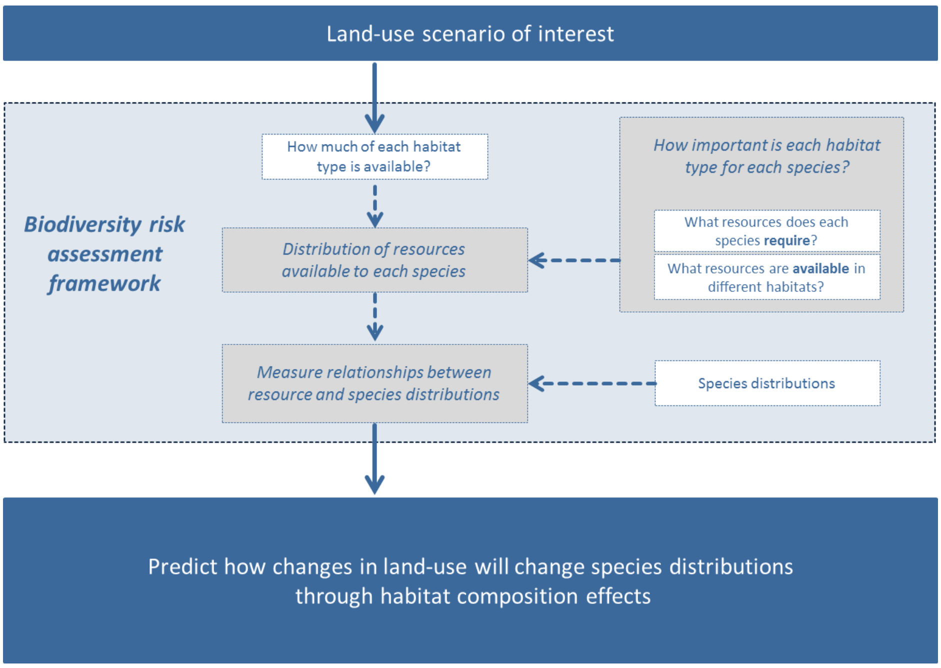
New Zealand falcon (*Falco novaeseelandiae*).
(Image: New Zealand Winegrowers.)

Biodiversity risk assessment framework

The framework links[1] species requirements to the resources provided by different habitat types (see figure).

Advantages of the framework include allowing the user to:

- Predict the biodiversity outcomes of different land-use scenarios.
- Rigorously test, and readily update, the underlying data sources and assumptions.
- Identify which components of the framework should be prioritised for future refinement.



[1] Using a trait-based modelling approach

Catriona MacLeod, Andrew Gormley, Jamie Wood, Daniel Tompkins [Landcare Research] & Simon Butler [University of East Anglia, UK]

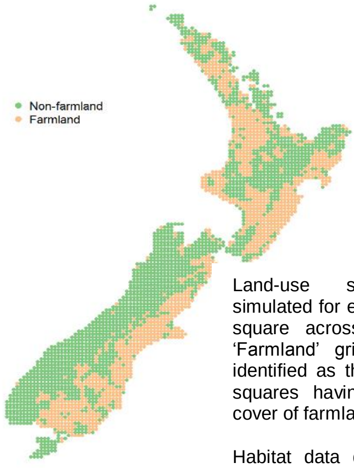
Example application:

Setting woody vegetation targets in farmland

We investigated the effect of different land-use scenarios on bird biodiversity in agricultural landscapes. Specifically we focussed on the effects of varying:

- A minimum cover target for woody vegetation in farmland from 5% to 50% (increasing the cover in steps of 5%).
- The type of woody vegetation cover added to farmland, considering four options: exotic forest, native forest, native scrub or exotic scrub.

Below, we provide some examples of predicted changes in bird communities in farmland areas in response to these land-use changes.



Land-use scenarios were simulated for each farmland grid square across New Zealand. 'Farmland' grid squares were identified as those 10 × 10 km squares having at least 50% cover of farmland habitats.

Habitat data derived from the Landcover Database (LCDB2) and bird data from the New Zealand bird atlas (1999-2004).

Changes in species occupancy

Both native and exotic passerines (also known as perching birds) are found in New Zealand's farmland habitats.

Here, we consider how the average occupancy (i.e. the proportion of farmland grid cells where each species was predicted to occur) is predicted to change in response to increasing cover and varying composition of woody vegetation.

Although predicted responses vary considerably among species in both extent and direction, native passerines generally increase, while exotic species decrease (below).

Weakest responses are associated with increasing exotic scrub cover.

Tūī (*Prosthemadera novaeseelandiae*), native passerine. (Image: Sid Mosdell. Licensed under CC BY 2.0 via Wikimedia Commons)

Blackbird (*Turdus merula*), exotic passerine. (Image: Keven Drew)

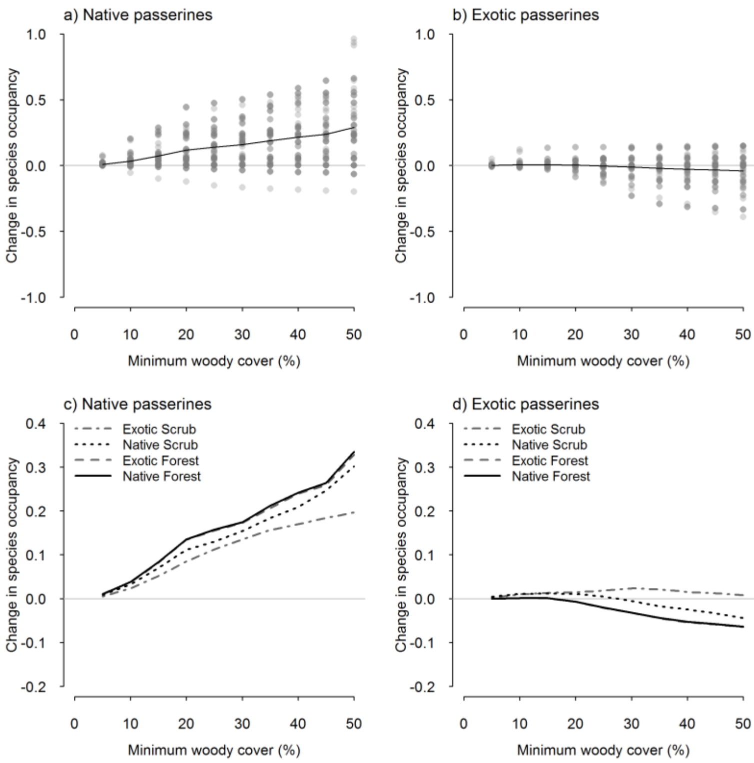


Figure: Predicted changes in species occupancy for 16 native and 14 exotic passerine bird species across the range of woody vegetation cover targets simulated. Points represent individual species under different simulation scenarios (a & b). Lines show the mean change relative to their respective baseline measures across all simulation scenarios (a & b) and for specific vegetation classes (c & d).

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