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# Avian surrogates in terrestrial ecosystems: theory and practice

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**Things we know**

1 Surrogates should be special, but not too specialised: niche theory may help.
2 Reliable conservation surrogates can be transferrable among forest ecosystems.
3 Focusing on functional diversity can reveal underlying mechanisms for the surrogacy relationship.
4 Surrogacy relationships are dynamic.
5 Accounting for detectability increases the reliability of the surrogacy relationship.

**Knowledge gaps**

6 How do we account for the influence of ecological structure and life history variation on surrogate–target relationships?
7 How can citizen science initiatives provide opportunities for testing and validating surrogacy relationships?
8 When should we abandon conservation surrogates in favour of direct measurements?
9 Can we use artificial habitat attributes as surrogates?
10 Can we use anti-surrogates to measure loss or recovery of biodiversity composition or function?

## Introduction

Terrestrial realms comprise 29% of the Earth's land surface and support most of the studied biodiversity. Forests comprise 30% of the global landmass, ~22% of which remain as natural primary forests, and only 5% of primary forest is located in protected areas (Mackey *et al*. 2015). For primary forests, the conservation questions often focus on which species are present and what species/services might be lost with forest degradation and loss. About 65% of global forest lands have been harvested and, since most are regenerating naturally (7% in plantations; FAO 2010), the biodiversity conservation and management questions usually relate to species persistence, and whether, and at which stages, species