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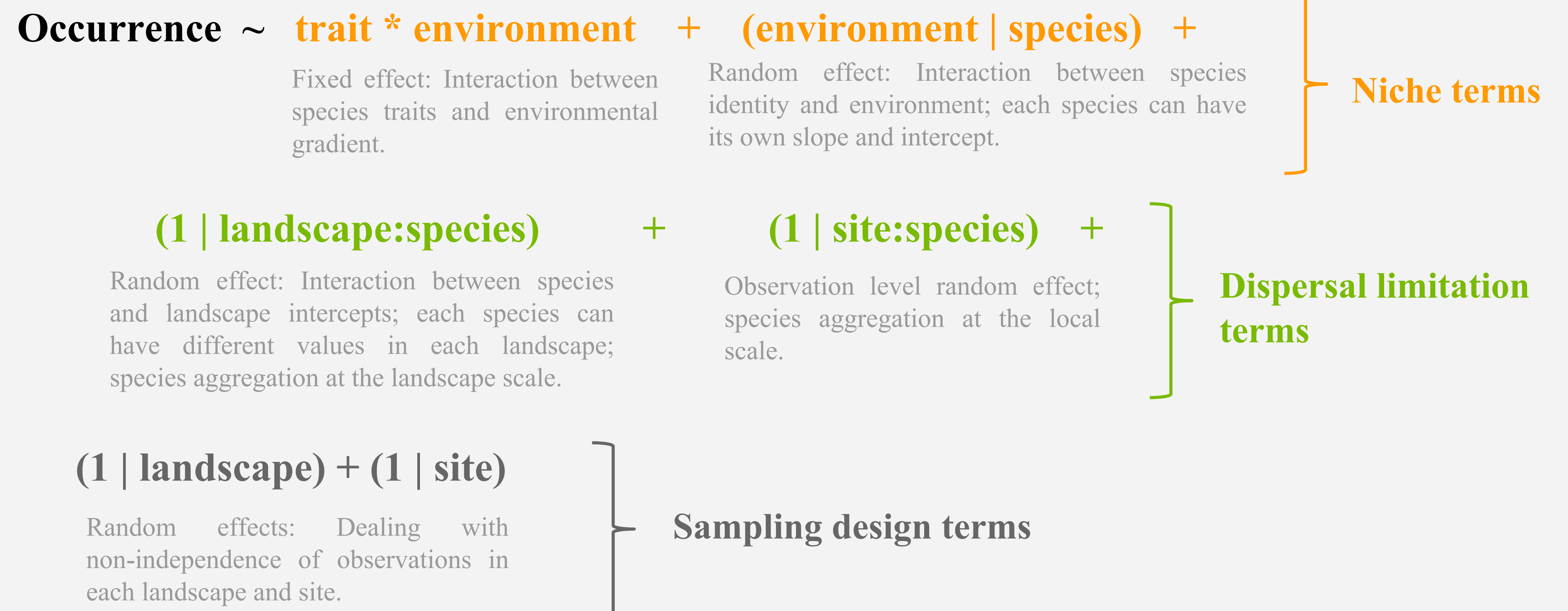
BACKGROUND

- Use of Generalized Linear Mixed Models (GLMMs) in multivariate abundance/occurrence data of species as a model-based inference for trait-environment correlations.
- Use of marginal and random effects partial R^2 to the variance partitioning of model terms.

Goal

To apply and to extend a GLMM along with variance partitioning to quantify the relative importance of niche and neutral processes assembling bird communities in tropical fragmented landscapes

PROPOSED GLMM (lme4 R syntax)



STUDY CASE

Landscape effects on bird community assembly

Habitat loss and fragmentation together with **matrix** (non-habitat) **quality** at the landscape scale might increase the effects of:

- **Environmental filter** (niche process) by selecting species with specific traits to cope with more degraded habitats, and
- **Dispersal limitation and drift** (neutral processes) due to decrease in community abundances and increase in isolation.

Hypothesis

The relative importance of **niche and dispersal limitation processes** will be **greater** in communities embedded in landscapes with both **low matrix quality and low habitat cover** compared to communities embedded in landscapes with both high matrix quality and high habitat cover.

Datasets

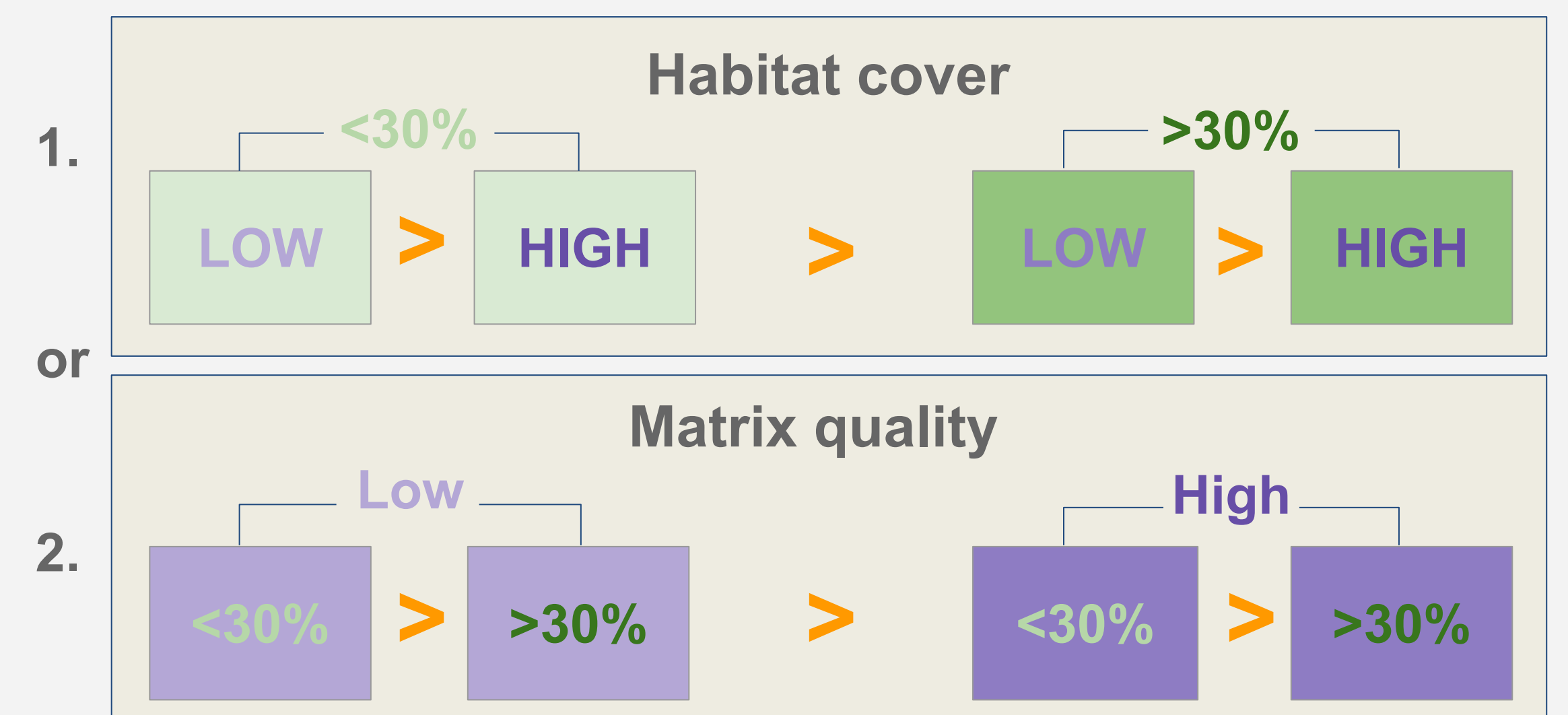
- Point count survey in forest remnants in the Brazilian Atlantic forest.
- 23 (1.256 ha) focal landscapes:
 - 4 sampling sites (4 replicates each) in each landscape
- **4 landscape's context:**
 - **Habitat cover above or below 30% fragmentation threshold** (i.e. the minimum habitat amount for a species to survive in a landscape)
 - **High or low matrix quality**
- **Environmental gradient:** % local habitat cover (800m radii)
- **Species traits:** nest type, foraging strata, foraging substrate

PREDICTIONS for:

- Variance ratio of niche and neutral terms:

$$\frac{\text{niche.terms}}{\text{dispersal.limitation.terms}}$$

- Partial R^2 of niche terms
- Partial R^2 of neutral terms



RESULTS

Variance ratio

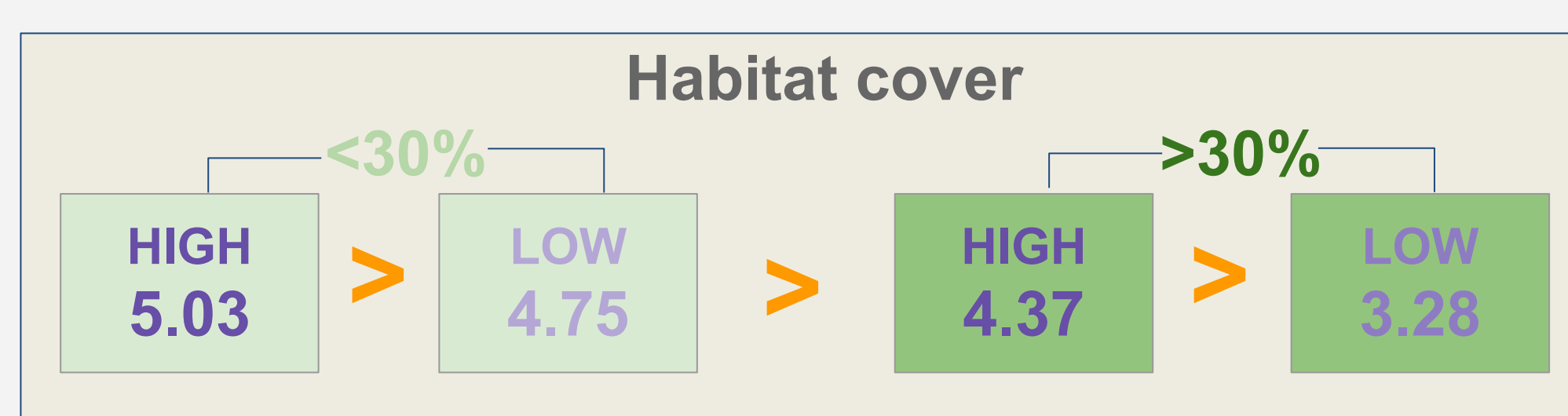


TABLE 1: Partial R^2 of model terms in each landscape context dataset. Percentages inside parentheses are relative proportion of niche and dispersal limitation terms.

Habitat cover	Matrix quality	Niche	Dispersal limitation	Others	TOTAL
<30%	low	0.50 (82%)	0.11 (18%)	0.05	0.66
	high	0.41 (84%)	0.08 (16%)	0.02	0.51
>30%	low	0.35 (76%)	0.11 (24%)	0.05	0.51
	high	0.40 (82%)	0.09 (18%)	0.03	0.51

<30% habitat cover 1.43x >
>30% habitat cover
Difference of 0.15 (8%)

Low quality 1.38x > high quality
Difference of 0.03 (8%)

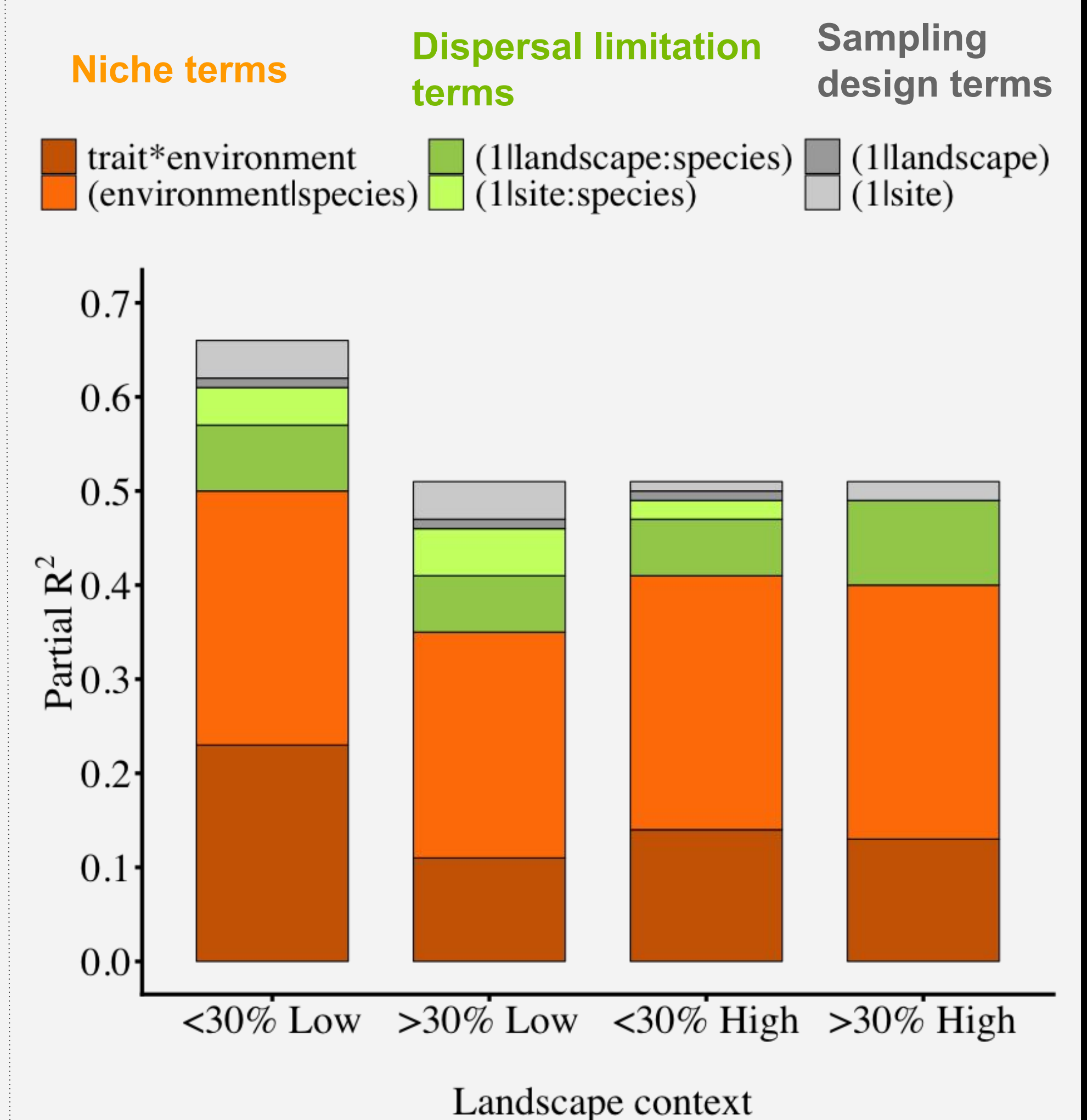


FIGURE 1: Partial R^2 of model terms in each landscape context dataset: habitat cover <30% or >30%; matrix quality high or low.

CONCLUSIONS

- Different landscape elements act in distinct processes assembling bird communities under local habitat loss:
 - **Habitat loss and fragmentation** at the landscape scale influence environmental filter (**niche processes**) of community assembly.
 - **Matrix quality** in the landscape influences dispersal limitation (**neutral processes**) of community assembly.

NEXT STEPS

- To use computer simulations of synthetic communities to test the GLMM + R^2 framework.
- To evaluate the framework for abundance data and other response distributions.