

# Sampling networks of ecological interactions

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*Running headline:* Sampling networks

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## 0.1 Summary

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## 0.2 Introduction

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A & B (2011).

Biodiversity assessment aims at sampling individuals in collections and determining the number of species represented. Given that, by definition, samples are incomplete, these collections enumerate a lower number of the species actually present. The ecological literature dealing with robust estimators of species richness and diversity in collections of individuals is immense, and a number of useful approaches have been used to obtain such estimates (Colwell, 2009; Gotelli & Colwell, 2011, 2001; Hortal, Borges & Gaspar, 2006; Magurran, 1988). Recent effort has been also focused at defining essential biodiversity variables (EBV) (Pereira *et al.*, 2013) that can be sampled and

measured repeatedly to complement biodiversity estimates. Yet sampling species or taxa-specific EBVs is just probing a single component of biodiversity; interactions among species are another fundamental component, the one that supports the existence of species. For example, the extinction of interactions represents a dramatic loss of biodiversity because it entails the loss of fundamental ecological functions (Valiente-Banuet *et al.*, 2014). This missed component of biodiversity loss, the extinction of ecological interactions, very often accompanies, or even precedes, species disappearance. Interactions among species are a key component of biodiversity and here I aim to show that most problems associated to sampling interactions in natural communities have to do with problems associated to sampling species diversity. I consider pairwise interactions among species at the habitat level, in the context of alpha diversity and the estimation of local interaction richness from sampling data (Mao & Colwell, 2005). In the first part I provide a succinct overview of previous work addressing sampling issues for ecological interaction networks. In the second part I discuss specific rationales for sampling the biodiversity of ecological interactions.

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### 0.3 Material and Methods

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### 0.4 Results

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### 0.5 Discussion

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### 0.6 Acknowledgements

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### 0.7 Data archiving

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**Table 1:** Table 1. Simple\_table.

First Header	Second Header	Third Header
First row	Data	Very long data entry
Second row	<b>Cell</b>	<i>Cell</i>

## 0.8 Tables

Table 1.

Table 2.

**Table 2:** Table 2. Prototype table

Grouping		
First Header	Second Header	Third Header
Content	<i>Long Cell</i>	
Content	<b>Cell</b>	Cell
New section	More	Data

## 0.9 Figures

Figure 1.

Figure 2.

Figure 3.

## 0.10 Supplementary Material

## Bibliography

- Colwell, R.K. (2009) Biodiversity: concepts, patterns, and measurement. *The Princeton Guide to Ecology* (ed. S.A. Levin), pp. 257–263. Princeton University Press, Princeton. 1
- Gotelli, N.J. & Colwell, R.K. (2011) Estimating species richness. *Biological Diversity Frontiers in Measurement and Assessment* (eds. A.E. Magurran & B.J. McGill), pp. 39–54. Oxford University Press, Oxford, UK. 1

- Gotelli, N. & Colwell, R. (2001) Quantifying biodiversity: procedures and pitfalls in the measurement and comparison of species richness. *Ecology Letters*, **4**, 379–391. 1
- Hortal, J., Borges, P. & Gaspar, C. (2006) Evaluating the performance of species richness estimators: sensitivity to sample grain size. *Journal of Animal Ecology*, **75**, 274–287. 1
- Magurran, A. (1988) *Ecological diversity and its measurement*. Princeton University Press, Princeton, US. 1
- Mao, C. & Colwell, R.K. (2005) Estimation of species richness: mixture models, the role of rare species, and inferential challenges. *Ecology*, **86**, 1143–1153. 2
- Pereira, H.M., Ferrier, S., Walters, M., Geller, G.N., Jongman, R.H.G., Scholes, R.J., Bruford, M.W., Brummitt, N., Butchart, S.H.M., Cardoso, A.C., Coops, N., Dulloo, E., Faith, D., Freyhof, J., Gregory, R.D., Heip, C., Hoft, R., Hurtt, G., Jetz, W., Karp, D.S., Mcgeoch, M., Obura, D., Onoda, Y., Pettorelli, N., Reyers, B., Sayre, R., Scharlemann, J.P.W., Stuart, S., Turak, E., Walpole, M. & Wegmann, M. (2013) Essential biodiversity variables. *Science*, **339**, 277–278. 1
- Valiente-Banuet, A., Aizen, M.A., Alcántara, J.M., Arroyo, J., Cocucci, A., Galetti, M., García, M.B., García, D., Gomez, J.M., Jordano, P., Medel, R., Navarro, L., Obeso, J.R., Oviedo, R., Ramírez, N., Rey, P.J., Traveset, A., Verdú, M. & Zamora, R. (2014) Beyond species loss: the extinction of ecological interactions in a changing world. *Functional Ecology*, **29**, 299–307. 2