Ecography

**E6203**
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# Supplementary material

## 1. Sampling method

Epigaeic soil fauna were captured along 150 m long and 5 m wide transects. A linear direction was followed whenever possible but frequent deviations were needed due to uneven ground and very dense vegetation. Transects were marked with ropes to facilitate recognition. Along each transect, arthropods from the soil (mainly epigean) and herbaceous vegetation were surveyed with a set of pitfall traps, while arthropods from woody plant species were sampled using a beating tray. Pitfall traps consisted of plastic cups of 4.2 cm diameter and 7.8 cm depth. Thirty pitfall traps were used per transect. Half of the traps were filled with a non-attractive solution (ethylene glycol antifreeze solution), and the remaining with a general attractive solution (Turquin), prepared mainly with dark beer and some preservatives (for further details on the method and its application see Turquin 1973 and Borges et al. 2005). A few drops of liquid detergent were added to both solutions to reduce surface tension. The traps were sunk in the soil (with the rim at the surface level) every 5 m, starting with a Turquin trap and alternating with the ethylene traps. They were protected from rain using a plastic plate, about 5 cm above surface level and fixed to the ground by two pieces of wire. The traps remained in the field for two weeks.

Canopy sampling was conducted during the period that pitfall traps remained in the field, when the vegetation was dry. A square 5 m wide was established every 15 m (10 squares in total per transect). In each square, a specimen of each of the three most abundant woody plant species was sampled. In most of the study sites, three species clearly dominated over the remaining plants and the choice was evident. However, in some transects, less than three were present and only those were considered. For each selected plant, a branch was chosen at random and a beating tray placed beneath. Five beatings were made using a stick. The tray consisted of a cloth inverted pyramid 1 m wide and 60 cm deep (adapted from Basset 1999), with a plastic bag at the end. Samples were sorted and the specimens preserved in 70% alcohol with glycerine.

During the summers of 1999 to 2004, a total of eighteen native forest fragments distributed across seven of the nine islands were sampled, involving 111 sites (3290 pitfall traps and 3337 beating samples) (see also Gaspar et al. 2008). In addition, in Terceira (see also Borges and Brown 1999, Cardoso et al. 2009), Pico (Borges and Brown 1999), Graciosa (Borges et al. 2006a) and Santa Maria (Borges unpubl.), an additional 64 sites were sampled (2970 pitfall traps), covering all the available habitat types present, i.e. natural grasslands, exotic forests, semi-natural pastures and intensively managed pastures.

## 2. Sampling effort analysis

The analyses carried out for this work required that habitats besides forests were thoroughly sampled, with similar values of survey completeness (defined as the proportion of the estimated species that have already been observed). Only this way could we guarantee that the species considered as forest specialists were not wrongly classified as such, due to low sampling effort in other habitats. Here we discuss the case of the island of Terceira, based on data and analyses presented in Cardoso et al. (2009). In total, 81 sites/transects were sampled following the sampling method presented above. The sampling was intentionally biased towards natural forests, the habitats previously known to host higher numbers of endemic species and higher beta diversity. Hence, 45 sites were placed in natural forests, 9 in exotic forests, 11 in semi-natural pastures and 16 in intensively managed pastures (Cardoso et al. 2009). For each transect we calculated the estimated richness using the Chao1 estimator (Chao 1984), with pitfall or beating samples as the effort unit. However, the estimates of species richness were far from reliable. As an alternative to completeness, we calculated the sampling intensity for each site, defined as the specimens to species ratio, a crude measure of sampling effort (Cardoso et al. 2008a, b). Additionally, we estimated the final slopes of overall species richness accumulation curves for all sites in the island (following the formula in Cardoso et al. 2008a, b). All curves were sample-based and rescaled to individuals, as suggested by Gotelli and Colwell (2001). The sampling intensity and slopes were both different between pasture and forest habitats, pastures presenting statistically significantly higher intensities (Mann–Whitney $p < 0.011$ in all paired comparisons) and lower slopes (Mann–Whitney $p < 0.037$ in all paired comparisons) than forests (see Cardoso et al. 2009). This indicates that effort was in fact higher outside forest sites, implying that our classification of forest species, at least of all species present in Terceira Island, was reliable.

## 3. Forest dependent endemic species

For defining forest-dependent species we followed a conservative threshold of 85% of the individuals of the species collected in native vegetation. For all the species considered as a native forest endemics here, a small number of individuals (<15%, after standardising for sampling effort, has been found in any other type of land use, in spite of the intensive survey effort recently carried out in anthropogenic habitats in some of the islands (Terceira, Pico, Graciosa and Santa Maria; Borges and Brown 1999, Borges et al. 2005, 2006a, b, Lopes et al. 2005, Borges and Wunderlich 2008).

Here we present the analytical data for the forest dependent endemic species of Araneae, Coleoptera and Hemiptera distributed on Terceira Island (Table S1). Although the decision for the characterization of a species as forest-dependent or not, has been based on the distribution of the total number of species' individuals across the archipelago, we validate the choices made using the information from Terceira, which is the best studied island.

Table S1. The forest dependent archipelagic endemic species of Araneae, Coleoptera, and Hemiptera found on Terceira Island. For each species the total number of individuals collected in Terceira is given along with the percentage of individuals collected in native forest fragments. Since a different number of sites was sampled in native and non-native habitats (see Cardoso et al. 2009), the percentage has been calculated after standardising for the different number of sites involved.

| Group | Species | Number of individuals | Percentage of individuals found in native forest in Terceira |
|---|---|---|---|
| Araneae | *Savigniorrhipis acoreensis* Wunderlich, 1992 | 5526 | 100% |
| | *Rugathodes acoreensis* Wunderlich, 1992 | 1816 | 100% |
| | *Gibbaranea occidentalis* Wunderlich, 1989 | 1458 | 100% |
| | *Sancus acoreensis* (Wunderlich, 1992) | 1445 | 100% |
| | *Acorigone acoreensis* (Wunderlich, 1992) | 104 | 98% |
| | *Lasaeola oceanica* Simon, 1833 | 61 | 100% |
| | *Walckenaeria grandis* (Wunderlich, 1992) | 42 | 100% |
| | *Minicia floresensis* Wunderlich, 1992 | 28 | 100% |
| | *Porrhomma borgesi* Wunderlich, 2008 | 29 | 89% |
| | **Neon acoreensis* Wunderlich, 2008 | 9 | 68% |
| | *Typhochrestus acoreensis* Wunderlich, 1992 | 1 | 100% |
| Coleoptera | *Trechus terrabravensis* Borges, Serrano & Amorim, 2004 | 329 | 100% |
| | *Cedrorum azoricus azoricus* Borges & Serrano, 1993 | 270 | 100% |
| | *Alestrus dolosus* (Crotch, 1867) | 115 | 100% |
| | *Laparocerus azoricus* Drouet, 1859 | 112 | 99% |
| | *Atheta dryochares* Israelson, 1985 | 16 | 100% |
| | *Pseudechinosoma nodosum* Hustache, 1936 | 4 | 100% |
| | *Atlantocis gillerforsi* Israelson, 1986 | 2 | 100% |
| | *Phloeosinus gillerforsi* Bright, 1987 | 2 | 100% |
| | *Athous azoricus* Platia & Gudenzi, 2002 | 1 | 100% |
| | *Phloeostiba azorica* (Fauvel, 1900) | 1 | 100% |
| | † *Tarphius azoricus* Gillerfors, 1986 | 1 | 0% |
| Hemiptera | *Cixius azoterceirae* Remane & Asche, 1979 | 3471 | 100% |
| | *Strophingia harteni* Hodkinson, 1981 | 1087 | 100% |
| | *Pinalitus oromii* J. Ribes 1992 | 686 | 100% |
| | *Aphrodes hamiltoni* Quartau & Borges, 2003 | 282 | 98% |
| | *Cixius azoricus azoricus* Lindberg, 1954 | 21 | 100% |
| | *Eupteryx azorica* Ribaut, 1941 | 6 | 100% |
| | *Javesella azorica* Remane, 1975 | 1 | 100% |
| | *Orthotylus junipericola attilioi* J. Ribes & Borges, 2001 | 1 | 100% |

* *Neon acoreensis* is a newly described species present in seven islands of the Azores (Borges and Wunderlich 2008). Out of the 15 known individuals of the species collected so far across the islands, only 2 have been found in non-native habitats in Terceira Island. We regard these specimens as most probably belonging to sink "populations" sourced from the nearby native forest fragments. Thus, we have considered it as a forest-dependent species.

† *Tarphius azoricus*: *Tarphius* is one of the most diverse insect genera found in the Azores, with eight endemic species, and they are clearly dependent on native vegetation (Borges et al. 2005, Gaspar et al. 2008). The species is almost exclusively found within native forest in the rest of the Azorean Islands and thus has been assigned as forest dependent. The fact that in Terceira the only individual belonging to *Tarphius azoricus* was found in an isolated small fragment of mixed exotic forest surrounded by intensive pastures and located in the older part of the island is a clear indication that this species is highly endangered in this island.

# 4. Calculation of extinction debt

Table S2. The species–area–age equations used and the respective species–area equations. S: number of forest-dependent archipelagic endemic species; A: area; G: geological age; SE b: standard error for non-standardized regression coefficients (see Methods for details). The degrees of freedom (DF), F and p-values are also presented. Statistically significant relationships are highlighted in bold.

It is not always clear which estimate of island age is most appropriate in biological terms, especially when different taxa are considered (Whittaker et al. 2008). Our results are based on the estimated age of origin (maximum age) of each of the islands because this is more or less agreed upon (Borges and Hortal 2009) and because this provides a common framework for analysis.

| Taxon/island area | Equation | SE intercept | SE $b_A$ | SE $b_G$ | DF | $R^2$ | F-value | p-value |
|---|---|---|---|---|---|---|---|---|
| Coleoptera (total area) | **$\mathrm{LogS} = -0.915 + 0.678 \times \mathrm{LogA} + 0.076 \times G$** | 0.288 | 0.126 | 0.025 | 2.6 | 0.87 | 20.14 | <0.01 |
|  | **$\mathrm{LogS} = -0.771 + 0.699 \times \mathrm{LogA}$** | 0.418 | 0.185 | – | 1.7 | 0.67 | 14.28 | <0.01 |
| Coleoptera (>300 m) | **$\mathrm{LogS} = -0.383 + 0.471 \times \mathrm{LogA} + 0.116 \times G$** | 0.198 | 0.092 | 0.026 | 2.6 | 0.86 | 18.78 | <0.01 |
|  | $\mathrm{LogS} = 0.068 + 0.380 \times \mathrm{LogA}$ | 0.324 | 0.171 | – | 1.7 | 0.42 | 4.97 | 0.06 |
| Coleoptera (>500 m) | $\mathrm{LogS} = -0.103 + 0.324 \times \mathrm{LogA} + 0.154 \times G$ | 0.299 | 0.129 | 0.047 | 2.5 | 0.69 | 5.30 | 0.06 |
|  | $\mathrm{LogS} = 0.680 + 0.052 \times \mathrm{LogA}$ | 0.271 | 0.156 | – | 1.6 | 0.018 | 0.11 | 0.75 |
| Coleoptera (present area) | $\mathrm{LogS} = 0.584 + 0.137 \times \mathrm{LogA} + 0.074 \times G$ | 0.217 | 0.161 | 0.046 | 2.4 | 0.40 | 1.31 | 0.37 |
|  | $\mathrm{LogS} = 0.882 - 0.032 \times \mathrm{LogA}$ | 0.128 | 0.138 | – | 1.5 | 0.10 | 0.06 | 0.82 |
| Araneae (total area) | **$\mathrm{LogS} = -0.979 + 0.780 \times \mathrm{LogA} + 0.026 \times G$** | 0.189 | 0.170 | 0.03 | 2.6 | 0.79 | 11.064 | 0.01 |
|  | **$\mathrm{LogS} = -0.930 + 0.787 \times \mathrm{LogA}$** | 0.183 | 0.164 | – | 1.7 | 0.77 | 22.93 | <0.01 |
| Araneae (>300m) | **$\mathrm{LogS} = -0.318 + 0.531 \times \mathrm{LogA} + 0.067 \times G$** | 0.238 | 0.153 | 0.04 | 2.6 | 0.68 | 6.33 | 0.03 |
|  | **$\mathrm{LogS} = -0.055 + 0.478 \times \mathrm{LogA}$** | 0.235 | 0.0.163 | – | 1.7 | 0.55 | 8.60 | 0.02 |
| Araneae (>500 m) | $\mathrm{LogS} = -0.154 + 0.439 \times \mathrm{LogA} + 0.133 \times G$ | 0.405 | 0.189 | 0.068 | 2.5 | 0.53 | 2.82 | 0.15 |
|  | $\mathrm{LogS} = 0.523 + 0.204 \times \mathrm{LogA}$ | 0.367 | 0.172 | – | 1.6 | 0.19 | 1.41 | 0.28 |
| Araneae (present area) | $\mathrm{LogS} = 0.921 + 0.068 \times \mathrm{LogA} - 0.001 \times G$ | 0.061 | 0.046 | 0.013 | 2.4 | 0.52 | 4.34 | 0.10 |
|  | $\mathrm{LogS} = 0.916 + 0.071 \times \mathrm{LogA}$ | 0.028 | 0.031 | – | 1.5 | 0.52 | 5.39 | 0.07 |
| Hemiptera (total area) | **$\mathrm{LogS} = -0.060 + 0.321 \times \mathrm{LogA} - 0.007 \times G$** | 0.184 | 0.080 | 0.016 | 2.6 | 0.73 | 7.96 | 0.02 |
|  | **$\mathrm{LogS} = -0.070 + 0.319 \times \mathrm{LogA}$** | 0.171 | 0.075 | – | 1.7 | 0.72 | 17.92 | <0.01 |
| Hemiptera (>300 m) | **$\mathrm{LogS} = -0.088 + 0.347 \times \mathrm{LogA} + 0.016 \times G$** | 0.146 | 0.067 | 0.019 | 2.6 | 0.82 | 13.27 | ,<0.01 |
|  | **$\mathrm{LogS} = -0.026 + 0.334 \times \mathrm{LogA}$** | 0.122 | 0.064 | – | 1.7 | 0.79 | 27.05 | 0.001 |
| Hemiptera (>500 m) | $\mathrm{LogS} = 0.334 + 0.145 \times \mathrm{LogA} + 0.027 \times G$ | 0.178 | 0.077 | 0.029 | 2.5 | 0.42 | 1.84 | 0.25 |
|  | $\mathrm{LogS} = 0.465 + 0.110 \times \mathrm{LogA}$ | 0.096 | 0.056 | – | 1.6 | 0.39 | 2.88 | 0.14 |
| Hemiptera (present area) | $\mathrm{LogS} = 0.491 + 0.088 \times \mathrm{LogA} + 0.013 \times G$ | 0.095 | 0.071 | 0.020 | 2.4 | 0.28 | 0.79 | 0.51 |
|  | $\mathrm{LogS} = 0.545 + 0.057 \times \mathrm{LogA}$ | 0.046 | 0.050 | – | 1.5 | 0.45 | 1.28 | 0.31 |

## 5. Predicted extinctions

Table S3. Number of forest-dependent archipelagic endemic arthropods of Coleoptera, Araneae and Hemiptera for the nine Azorean Islands and the respective predicted number of species that should be found based on the species–area–age models calculated using the total area of each island (Pred. 1) and the area of each island above 300 m (i.e. area occupied by native forest ca 300 yr ago; Pred. 2). 95% CL: lower and upper bound of 95% confidence limits for predicted response.

| Island | Coleoptera | Pred. 1 (ALL) | 95% CL | Pred. 2 (>300) | 95% CL | Araneae | Pred. 1 (ALL) | 95% CL | Pred. 2 (>300) | 95% CL | Hemiptera | Pred. 1 (ALL) | 95% CL | Pred. 2 (>300) | 95% CL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Graciosa | 2 | 0.19 | 0.03–1.24 | 0.81 | 0.20–3.31 | 3 | 0.12 | 0.01–1.56 | 0.71 | 0.07–7.45 | 3 | 0.83 | 0.25–2.82 | 0.90 | 0.32–2.53 |
| Corvo | 1 | 0.14 | 0.02–0.91 | 0.50 | 0.11–2.19 | 0 | 0.11 | 0.01–1.42 | 0.54 | 0.05–6.26 | 2 | 0.86 | 0.26–2.91 | 0.84 | 0.28–2.48 |
| Flores | 8 | 1.15 | 0.32–4.10 | 2.69 | 0.88–8.26 | 11 | 1.02 | 0.18–5.75 | 2.90 | 0.45–18.72 | 5 | 2.11 | 0.90–4.64 | 2.30 | 1.01–5.23 |
| Faial | 4 | 0.25 | 0.04–1.30 | 0.75 | 0.19–2.88 | 8 | 0.21 | 0.02–2.05 | 0.83 | 0.09–7.99 | 5 | 1.13 | 0.38–3.32 | 1.13 | 0.41–3.02 |
| Pico | 14 | 0.59 | 0.15–2.36 | 1.29 | 0.38–4.35 | 10 | 0.62 | 0.09–4.08 | 1.65 | 0.22–12.68 | 4 | 1.80 | 0.73–4.38 | 1.79 | 0.73–4.42 |
| São Jorge | 4 | 0.28 | 0.05–1.42 | 0.81 | 0.21–3.02 | 11 | 0.25 | 0.03–2.29 | 0.93 | 0.10–8.56 | 6 | 1.23 | 0.43–3.49 | 1.21 | 0.45–3.23 |
| Terceira | 11 | 1.92 | 0.56–6.49 | 4.68 | 1.56–14.03 | 11 | 1.52 | 0.29–7.94 | 4.42 | 0.71–27.61 | 8 | 2.40 | 1.04–5.00 | 2.96 | 1.24–6.22 |
| São Miguel | 17 | 0.56 | 0.11–2.78 | 2.11 | 0.61–7.38 | 11 | 0.34 | 0.04–3.03 | 1.69 | 0.21–13.53 | 6 | 1.28 | 0.43–3.41 | 1.43 | 0.57–3.59 |
| Santa Maria | 14 | 0.10 | 0.01–1.46 | 1.17 | 0.18–7.36 | 7 | 0.03 | 0.00–0.99 | 0.47 | 0.02–10.28 | 3 | 0.46 | 0.06–2.01 | 0.48 | 0.12–1.86 |

## 6. Alternative mechanism

An alternative mechanism for explaining the lack of relationship between the current extent of native forest with the number of forest dependent species, is that larger islands have more species, independent of the current area of their native forests, due to their larger size. Thus, due to the larger species pool, more species would be expected to be found in a fragment within a larger island. We tested the relationship between all the endemic species of the three taxa considered here with the total area of the islands, and compare it with the respective species–area–age relationship (Table S4). If larger islands have more forest-dependent species, then this should be valid for archipelagic endemic species in total. Note that 600 yr ago most, if not all of the islands' area was covered by native forest.

Table S4. Species–area and species–area–age models for the archipelagic endemic species of Coleoptera, Araneae and Hemiptera. Models are compared through both the adjusted $R^2$ values and the Akaike information criterion (AIC). Both values allowed the comparison of the models that have different complexity, by penalising species–area–age models due to the higher number of parameters involved. The models with lowest AIC were preferred as they were the most informative with less complexity (more parsimonious).

| Taxon | Model | adj. $R^2$ | F-value | p-value | AIC |
|---|---|---|---|---|---|
| Coleoptera | Species–area | 0.57 | 11.44 | 0.01 | –24.59 |
| | Species–area–age | 0.78 | 15.24 | <0.01 | –30.11 |
| Araneae | Species–area | 0.71 | 20.76 | <0.01 | –24.53 |
| | Species–area–age | 0.68 | 9.44 | 0.01 | –22.94 |
| Hemiptera | Species–area | 0.06 | 1.49 | 0.26 | – |
| | Species–area–age | 0.02 | 1.01 | 0.42 | – |

# 7. Predictive accuracy of the species–area–age models used

Table S5. Results of the cross-checking for the predictive accuracy of the two species–area–age models used, i.e. for the total area of the islands and for the area above 300 m. A) Observed number of species for the total area of the islands and the respective predicted numbers using the parameter estimations from the species–area–age model of the areas >300m. B) Observed number of species for the area of the islands above 300 m and the respective predicted numbers using the parameter estimations from the species–area–age model of total area of the islands. In all the cases the coefficient of determination ($R^2$) of the relationship between observed and predicted number of species (log-transformed values) was higher than 0.65 ($p<0.05$).

A)

| | Total area of islands | | | | | |
|---|---|---|---|---|---|---|
| | Coleoptera | | Araneae | | Hemiptera | |
| Island | Observed | Predicted | Observed | Predicted | Observed | Predicted |
| Graciosa | 2 | 5.63 | 3 | 6.33 | 3 | 3.74 |
| Corvo | 1 | 1.90 | 0 | 2.41 | 2 | 2.24 |
| Flores | 8 | 7.63 | 11 | 9.36 | 5 | 4.94 |
| Faial | 4 | 5.70 | 8 | 8.29 | 5 | 5.00 |
| Pico | 14 | 7.76 | 10 | 12.57 | 4 | 6.77 |
| São Jorge | 4 | 6.42 | 11 | 9.72 | 6 | 5.62 |
| Terceira | 11 | 17.80 | 11 | 19.94 | 8 | 7.41 |
| São Miguel | 17 | 27.27 | 11 | 30.04 | 6 | 9.39 |
| Santa Maria | 14 | 31.08 | 7 | 19.18 | 3 | 5.37 |

B)

| | Area of islands above 300 m | | | | | |
|---|---|---|---|---|---|---|
| | Coleoptera | | Araneae | | Hemiptera | |
| Island | Observed | Predicted | Observed | Predicted | Observed | Predicted |
| Graciosa | 2 | 0.44 | 2 | 0.32 | 1 | 1.25 |
| Corvo | 1 | 0.63 | 0 | 0.63 | 2 | 1.77 |
| Flores | 7 | 3.89 | 11 | 4.18 | 5 | 3.65 |
| Faial | 3 | 2.70 | 8 | 3.37 | 5 | 3.53 |
| Pico | 13 | 5.52 | 10 | 8.21 | 4 | 5.19 |
| São Jorge | 4 | 4.36 | 11 | 5.99 | 6 | 4.50 |
| Terceira | 10 | 7.54 | 11 | 7.37 | 7 | 4.37 |
| São Miguel | 17 | 13.06 | 10 | 12.96 | 5 | 5.41 |
| Santa Maria | 13 | 2.90 | 7 | 1.27 | 3 | 1.77 |

Considering the uncertainty inherent in analysing a system for which we have excellent present day distributional data but lack systematic historical distribution data, two conclusions may be drawn. First, the result from the >300 m area calculation suggests that there may have been more species originally present than are now known, indicating that some extinction may already have occurred in the period since forest loss was first initiated by people (see Cardoso et al. 2010). Second, the results for the total area, which underestimates the species number found only above 300 m, supports the contention that there is an extinction-debt still to pay for the species found above 300 m.

## 8. Test for autocorrelation of the residuals of the species–area–age models used.

Table S6. Results for the Durbin-Watson statistic to detect the presence of autocorrelation in the residuals from the species–area–age models applied (Table 3) (lower critical value = 0.629; upper critical value = 1.699). This statistic tests for autocorrelation in the residuals from a regression analysis. If the value is below the lower critical value there is positive autocorrelation; if the value is above the upper critical value there is no autocorrelation; if the value is between both critical values the test is inconclusive.

| Data set | Durbin-Watson values |
|---|---|
| Coleoptera total area | 2.030 |
| Coleoptera (300 m) | 3.030 |
| Araneae total area | 2.010 |
| Araneae (300 m) | 1.436 |
| Hemiptera total area | 2.755 |
| Hemiptera (300 m) | 3.377 |

## 9. Comparing species abundances

In order to evaluate our predictions based on the available data on species abundance, we compare the average species abundance per transect (i.e. average number of individuals of archipelagic endemic forest-dependent species per transect) for Graciosa Island, with the rest of the archipelagos islands (Table S7). Currently there is no primary native forest on Graciosa; only a very small patch of secondary native vegetation occurs, dominated by small-sized *Erica azorica*, an early successional endemic shrub. Hence our prediction is that for the surviving forest-dependent species their abundance should be indicative of a progressive reduction towards extinction.

Based on the total area of the remaining forest fragments in each island, the rest of the islands were divided in two categories: Islands with large fragments, with total native forest area >9 km$^2$ (i.e. Terceira, Pico and Flores) and islands with small fragments, with total native forest area <3 km$^2$ (i.e. Santa Maria, Faial, São Miguel and São Jorge) (Table S7).

The pattern arising from the comparison of the rest of the islands, is quite fuzzy, concurring with a number of studies concluding that the responses to forest loss and fragmentation related to the abundance can be strikingly species-specific and at times highly idiosyncratic (Fahrig 2001, Tscharntke et al. 2002). At the same time, the phenomenon of density compensation as a result of the extinction of competitors and/or predators cannot be excluded (Whittaker and Fernández-Palacios 2007); see for example the average abundance of *Gibbaranea occidentalis* in Santa Maria, the island with the smallest fragment of native forest.

Table S7. Average abundance per transect (i.e. average number of species individuals per transect) of archipelagic endemic forest-dependent species of Coleoptera, Araneae, and Hemiptera present in Graciosa Island, in comparison with the rest of the archipelagic islands. The islands were grouped by the size of remaining native forest fragments. TER – Terceira; PIC – Pico; FLO – Flores; São Jorge; SMG – São Miguel; FAI – Faial; SMR – Santa Maria; GRA – Graciosa.

| | | | Large forest remnants | | | Small forest remnants | | | |
|---|---|---|---|---|---|---|---|---|---|
| Species | Family | GRA | TER | PIC | FLO | SMG | SJG | FAI | SMR |
| Coleoptera | | | | | | | | | |
| *Laparocerus azoricus* | Curculionidae | 0.09 | 2.53 | | | 0.25 | 0.25 | | |
| *Metophthalmus occidentalis* | Lathridiidae | 0.09 | | | | | | | 1 |
| Araneae | | | | | | | | | |
| *Gibbaranea occidentalis* | Araneidae | 0.09 | 29.78 | 14.44 | 10.58 | 21.00 | 15.25 | 5.13 | 46.25 |
| *Pisaura acoreensis* | Pisauridae | 0.09 | 1.00 | 1.38 | 1.25 | 0.92 | 2.25 | | |
| *Rugathodes acoreensis* | Theridiidae | 0.09 | 39.35 | 22.75 | 7.67 | 38.67 | 48.00 | 3.25 | 15.00 |
| Hemiptera | | | | | | | | | |
| *Aphrodes hamiltoni* | Cicadellidae | 0.91 | 5.25 | 7.38 | 8.33 | 0.50 | 8.25 | 5.75 | 7.50 |
| *Eupteryx azorica* | Cicadellidae | 0.09 | 0.14 | 0.063 | | 0.063 | 0.75 | | |
| *Pinalitus oromii* | Miridae | 0.09 | 14.58 | 48.94 | 17.92 | 6.25 | 50.25 | 22.63 | 33.00 |

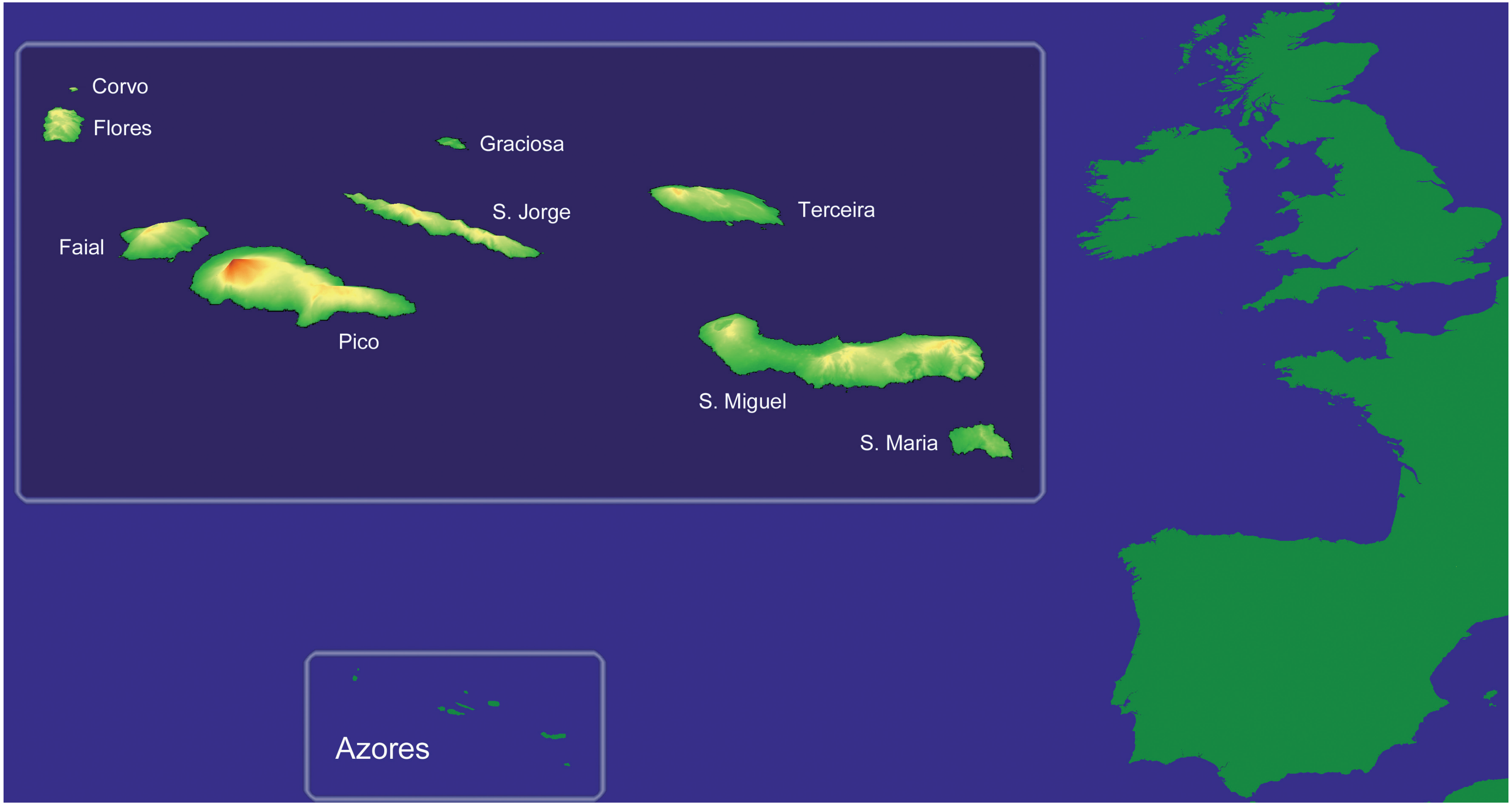

Figure S1. Map and location of the Azorean islands. Shading reflects the topography of the islands.

## 10. References

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