Ecography

E5908

Rhodes, J. R., Lunney, D., Moon, C., Matthews, A. and McAlpine, C. A. 2010. The consequences of using indirect signs that decay to determine species' occupancy. – Ecography 33: xxx–xxx.

Supplementary material

Decay trial study area and site and plot descriptions

The Port Stephens study area was located within a 4000 ha area known as the Tomago Sandbeds, managed as a water catchment, containing large forest fragments. The forest communities include swamp forest, dry forest, low forest and woodlands, dominated by eucalypts, including swamp mahogany *Eucalyptus robusta*, blackbutt *E. pilularis*, as well as broad-leaved paperbark *Melaleuca quinquenervia.* The Coffs Harbour study area is dominated by moist open and closed eucalypt forests with a coastal sclerophyll complex and dry open eucalypt forest to the north and rainforest to the southwest. Most of the fertile river valleys and coastal plains have been cleared for agriculture and urban development, while the elevated slopes remain largely forested.

In Port Stephens there were five plots. These were located: 1) at the base of a mature swamp mahogany *E. robusta* tree just above the high water mark of the swamp, with 100% leaf litter in an ecotone woodland; 2) at the edge of open woodland under a mature scribbly gum *E. signata* tree, with a thick grassy understory in an ecotone open forest; 3) at the base of a large smooth-barked apple *Angophora costata* tree at the base of a dune that gave way to a swamp, with thick understory and 10% leaf litter in a tall open forest ecotone; 4) at the base of a large blackbutt *E. pilularis* tree on an elevated position on the south side of a large dune with 100% litter cover in a tall open forest ecotone; and 5) in a dry swamp with no understory except sparse bracken fern on thick, moist leaf litter in a broad-leaved paperbark *M. quinquenervia*/ swamp mahogany association. Plots were generally a few hundred metres apart.

In Coffs Harbour there were four sites: 1) Raleigh; 2) Carson's Road; 3) Dutton's Estate; and 4) Bellingen. Then, within each site, there were three plots, each in a different topographical location: one on a ridge, one on a midslope, and one in a gully. Exceptions to this were that, at Dutton's Estate, all three plots were classified as gully, and at Bellingen two plots were located within each topographical type, giving a total of six plots there. At the Raleigh site (site 1), the ridge plot was in dry, partially cleared forest, the midslope plot was in moist, shaded, south-east facing flooded gum *E. grandis* forest with ground litter, and the gully plot was in moist, shaded, grassy, south-east facing flooded gum forest. At the Carson's Road site (site 2), the ridge plot was in moist tallowwood *E. microcorys* forest, with ground leaf litter, open to the north and west, the midslope plot was in very moist, south facing, closed flooded gum forest with ground leaf litter, and the gully plot was in very moist, south facing brush box *Lophostemon confertus*/flooded gum closed forest with ground leaf litter. All three plots at the Dutton's Estate site (site 3) were in flat, moist, closed mixed forest with ground leaf litter. At the Bellingen site (site 4), the ridge plots were on exposed and grassy to bare ground, with tall moist forest to the south and east, and the midslope and gully plots were in moist, tall mixed forest, with leaf litter ground layers. Sites were generally several kilometres apart, while plots within sites were between fifty and a few hundred metres apart.

Procedures for assessing model fit

Posterior predictive checks were conducted by generating simulated predictions from the posterior parameter distributions and comparing these to actual data. First, we conducted global goodness-of-fit tests, using the deviance as a measure of model fit (Hosmer and Lemeshow 2000) and all 150 000 samples from the posterior parameter distributions. For each parameter sample, we calculated the deviances for the actual and simulated data and then calculated the proportion of parameter samples where the deviance for the actual data was greater than the deviance for the simulated data. This provided a posterior predictive p-value indicating whether the actual deviances were a likely realisation of the deviances that would arise if the model were true (Gelman et al. 2004). Second, we constructed an empirical quantile-quantile plot of the residuals, $r_{ij} = (y_{ij}/n_{ij}) - S_{ij}$, based on the approach described by Landwahr et al. (1984). However, instead of generating the simulated quantiles and bounds from a single set of parameter values, we generated them from 3000 samples of the posterior parameter distributions. If the model adequately describes the data, then the quantile-quantile plot should lie close to the 1:1 line. Deviations from the 1:1 line can indicate the presence of outliers, or inadequacies in model structure and distributional assumptions (Landwehr et al. 1984).

Figure showing the quantile-quantile plots

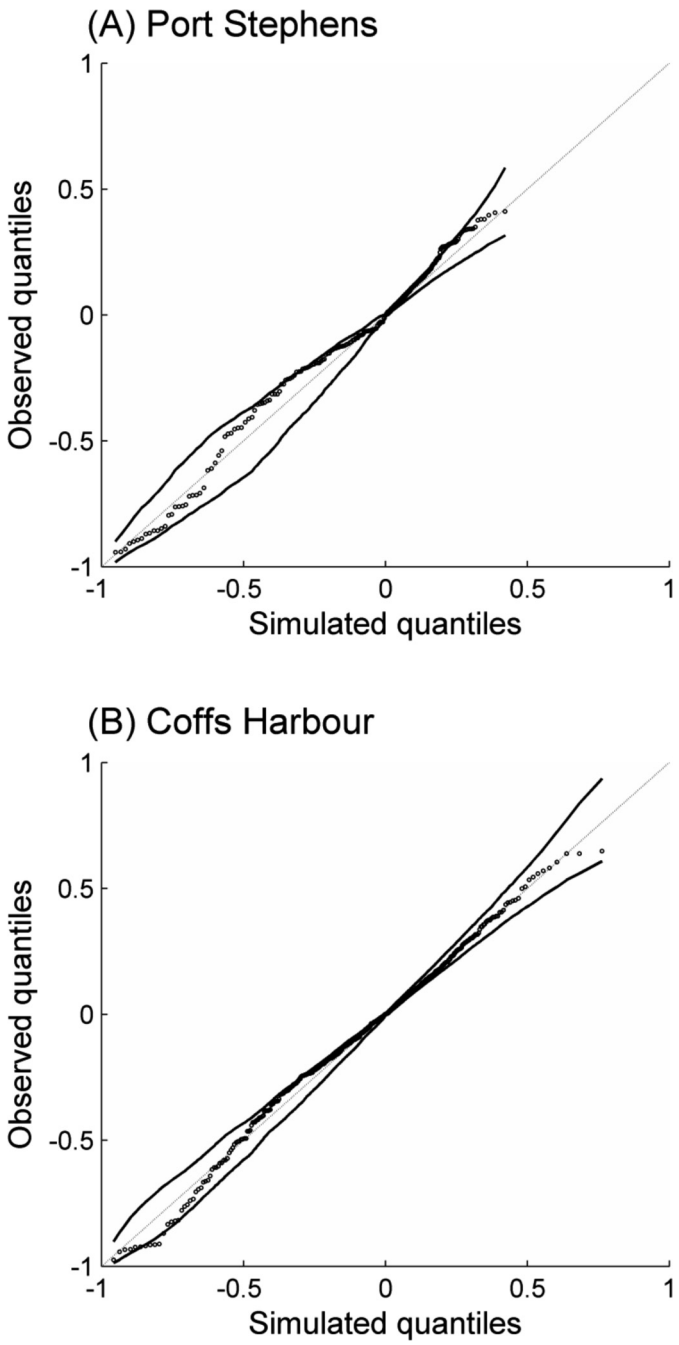

Figure S1. Quantile-quantile plots for: (A) the most parsimonious Port Stephens model and (B) the most parsimonious Coffs Harbour model. Points show the observed quantiles for a single set of (randomly chosen) posterior parameter values, solid lines show the 95% credible intervals for the simulated quantiles, and the dotted line shows the 1:1 line.

References

Gelman, A. et al. 2004. Bayesian data analysis. – Chapman and Hall/CRC.

Hosmer, D. W. and Lemeshow, S. 2000. Applied logistic regression. – Wiley.

Landwehr, J. M. et al. 1984. Graphical methods for assessing logistic regression models. – J. Am. Stat. Assoc. 79: 61–71.