Ecography

ECOG-02618
Webb, T. J., Barry, J. P. and McClain, C. R. 2016. Abundance–occupancy relationships in deep sea wood fall communities. – Ecography doi: 10.1111/ecog.02618

Supplementary material

Appendix 1

Deployment of wood falls

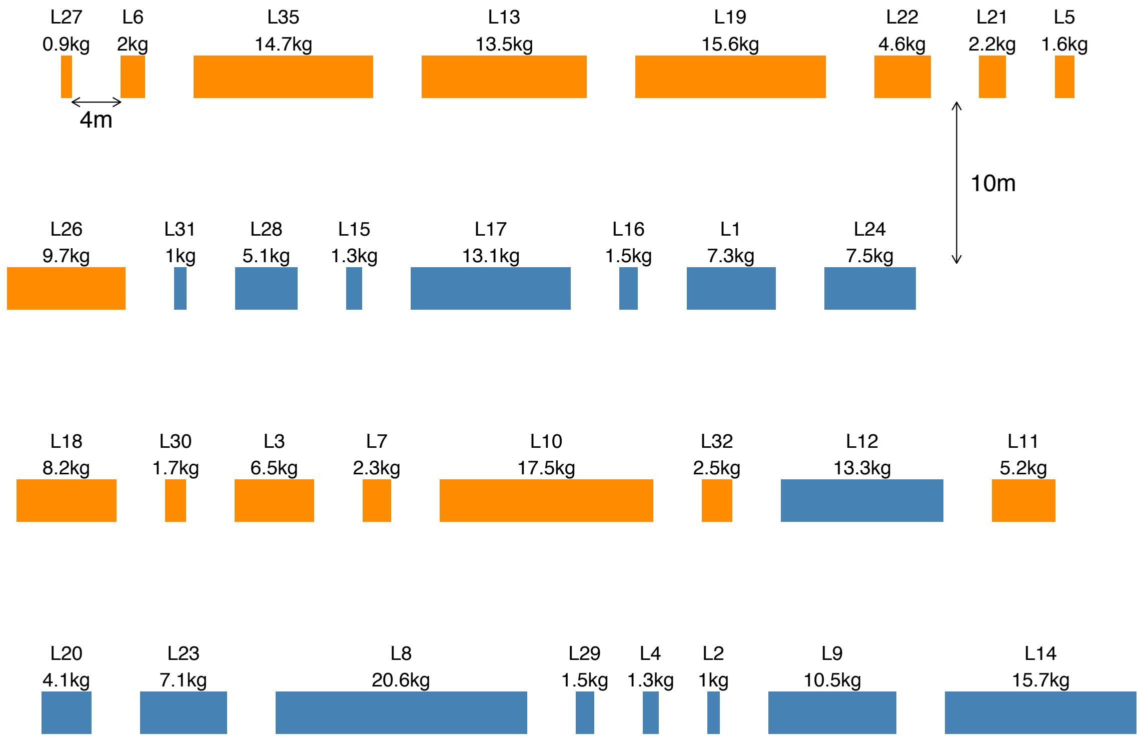

Figure A1. Schematic of the deployment of 32 *Acacia* sp. logs at 3203 m in the Northeast Pacific Ocean (Station Deadwood: 36.154098° N, 122.40852° W) in November 2006. Logs were deployed in 4 rows of 8, each row 10m apart from one another with ~4-5m between individual logs within a row. The total area of deployment was c. 160m^2. In this schematic, each log is represented by its unique identifying number, followed by its mass in kg (thus '27, 0.9' indicates log #27, which was 0.9kg). Logs collected after 5y (CS1) are shown in orange, those collected after 7y (CS2) are shown in blue.

Choice of abundance measure

All individuals of each species were counted on all logs. Species-level average abundance could therefore be calculated as the mean number of individuals per occupied log (mean abundance), or as the mean number of individuals per unit mass of occupied log (mean density). The issue with mean abundance is that the total number of individuals across all species, and the maximum abundance of any single species, increases with weight of log (Fig. A2A) so that species occurring primarily on large logs may have higher mean abundance than those occurring primarily on small logs, with no difference in density. However, density has the opposite issue: the lower-bound to density is a direct function of weight of log, 1/(weight of log), occurring when only a single individual of a species occures on a log (Fig. A2B). In general, the scaling of maximum abundance with weight of log is less pronounced than the scaling of minimum density with weight of log, shown by the quantile regression fits on Fig. A2. This is partly because of the hard lower limit to abundance (a single individual), and the fact that species occur at this minimum abundance on all logs (median of 3.5 species at an abundance of 1 across all logs, with at least one species occurring at an abundance of 1 on all logs and at least two species on 28/32 logs). In contrast, the upper limit of abundance is not tightly defined by weight of log. A simple linear regression of log(abundance) against log(weight of log) reveals a signifinant positive relationship (slope 0.31 ± 0.072) but with very low explanatory power (R^2 = 0.04). The corresponding relationship between log(density) and log(weight of log) is negative (slope -0.69 ± 0.072) and considerably stronger (R^2 = 0.16). Given that abundance is less dependent than density on weight of log, we preder to use abundance in all our analyses of AORs in these communities.

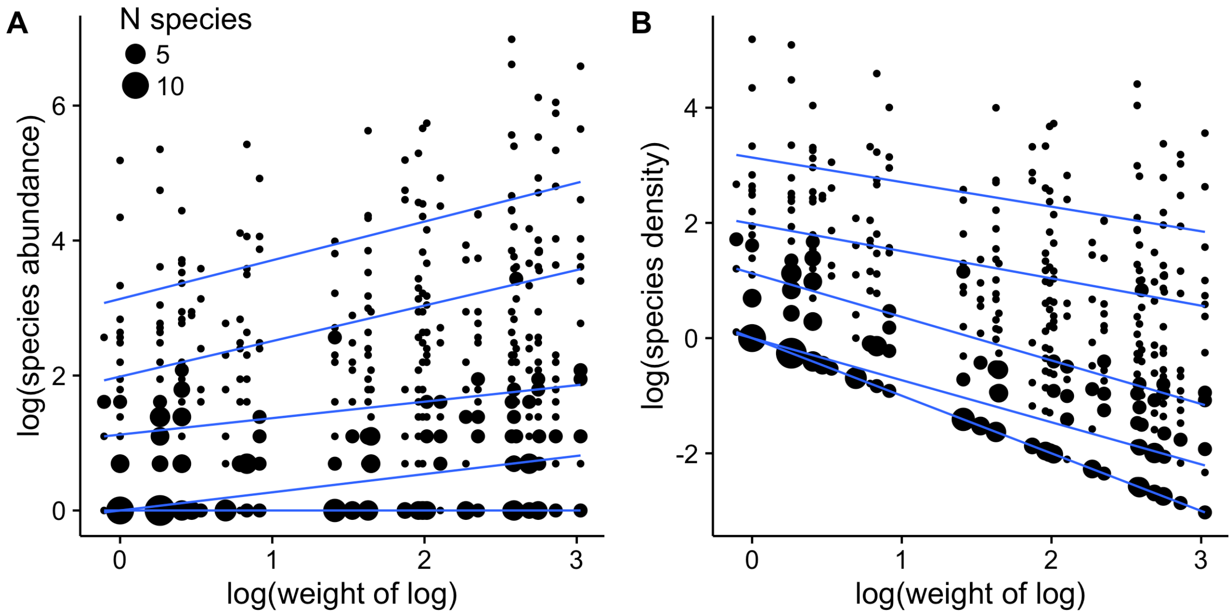

Figure A2. Relationship between (A) number of individuals per log (abundance) and (B) number of individuals per kg log (density) and weight of log. Each point represents individuals of any species occurring at a given abundance or density on a specific log. Points are scaled to number of species represented by that number of individuals on each log. Blue lines show fits from a quantile regression at 0.1, 0.25, 0.5, 0.75 and 0.9 quantiles. Maximum abundance increases noisily with weight of log, whereas minimum density decreases deterministically with weight of log, justifying our choice of abundance over density in our analyses of abundance occupancy relationships.