

12.3 Field experiments

Field manipulative experiments include, for example, caging experiments to exclude or include predators, controlled pollution of experimental plots, and big-bag experiments with plankton. Their use was historically (unsurprisingly) predominantly for univariate *population* rather than *community* studies, although some early examples of multivariate analysis of manipulative field experiments include [Anderson & Underwood \(1997\)](#) , [Morrissey, Underwood & Howitt \(1996\)](#) , [Gee & Somerfield \(1997\)](#) and [Austen & Thrush \(2001\)](#) . The following example is one in which univariate, graphical and multivariate statistical analyses have been applied to meiobenthic communities.

Azoic sediment recolonisation experiment with predator exclusion {Z}

[Olafsson & Moore \(1992\)](#) studied meiofaunal colonisation of azoic sediment in a variety of cages designed to exclude epibenthic macrofauna to varying degrees: A – 1 mm mesh cages designed to exclude all macrofauna; B – 1 mm control cages with two ends left open; C – 10 mm mesh cages to exclude only larger macro-fauna; D – 10 mm control cages with two ends left open; E – open unmeshed cages; F – uncaged background controls. Three replicates of each treatment were sampled after 1 month, 3 months and 8 months and analysed for nematode and harpacticoid copepod species composition.

Univariate indices. The presence of cages had a more pronounced impact on copepod diversity than nematode diversity. For example, after 8 months, H' and J' (but not S) for copepods had significantly higher values inside the exclusion cages than in the control cages with the ends left open, but for the nematodes, differences in H' were of borderline significance ($p = 5.3\%$).

Graphical/distributional plots. No significant treatment effect for either nematodes or copepods could be detected between k -dominance curves for all sampling dates, using the ANOSIM test for curves, referred towards the end of [Chapter 8 \(page 8.5\)](#).

Multivariate analysis. For the harpacticoid copepods there was a clear successional pattern of change in community composition over time (Fig. 12.4), but no such pattern was obvious for the nematodes. Fig. 12.4 uses data from Table 2 in Olafsson and Moore's paper, which are for the 15 most abundant harpacticoid species in all treatments and for the mean abundances of all replicates within a treatment on each sampling date. On the basis of these data, there is no significant treatment effect using the 2-way crossed ANOSIM test with no replication[¶] (see [page 6.8](#)), but the fuller replicated data may have been more revealing.

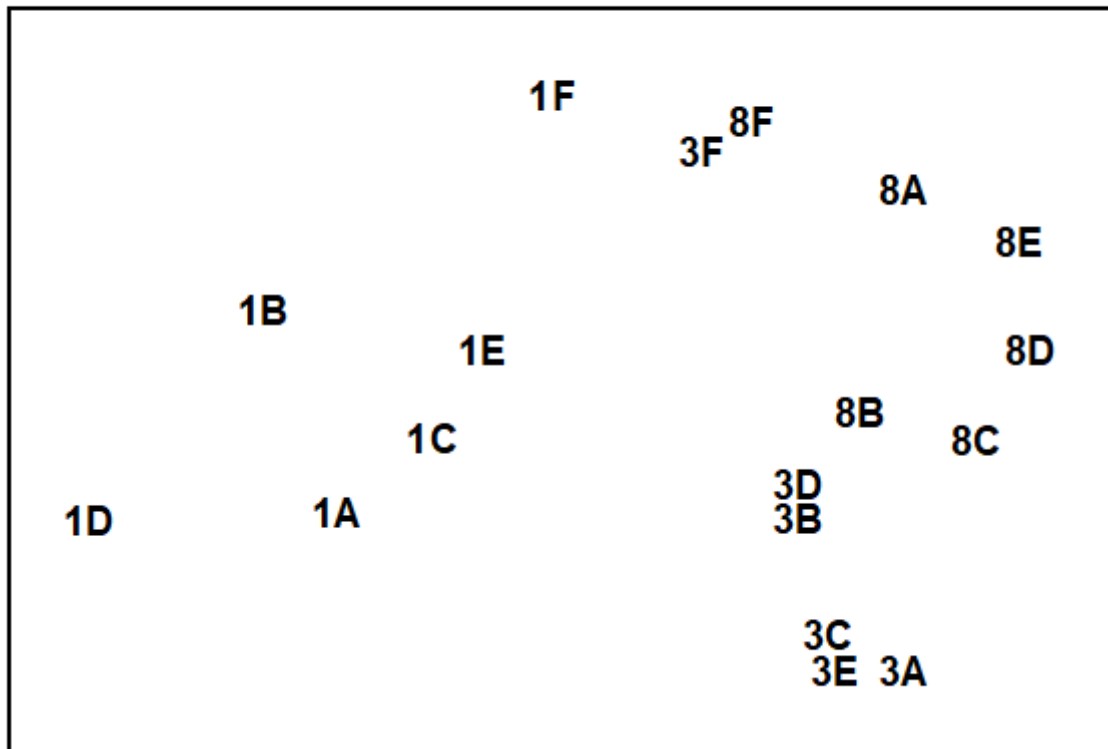


Fig. 12.4. Azoic sediment recolonisation experiment {Z}. MDS configuration for harpacticoid copepods (4th root transformed abundances) after 1, 3 and 8 months, with 6 different treatments (A–F), see text (stress = 0.07).

¶ Note, however, that this test (or the equivalent PERMANOVA test which exploits the interaction term as its residual) will be uninformative in the presence of large treatment \times time interactions, which is a likely possibility here.

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