The following supplements accompany the article

Estimating ecological count-based measures from the point-intercept method

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Supplement 1 – Implementation

The typical user may encounter two situations. In the first, there is a single location, for example an aerial photograph, over which the ecological estimates have to be obtained. Here, there is no need for replications and the analysis can be conducted for all individuals sampled. However, in another typical situation many sampling units (e.g. quadrats) are used as replicates and are often averaged to obtain estimates of the ecological parameters. Thus, we also offer a tool to calculate the desired estimates over user-specified size bins that can later be easily averaged across sampling units. The provided R functions and Excel spreadsheets help the user to perform the appropriate calculations.

R functions:

In the R functions, the user has to insert the X-Y relative coordinates of the sampling points (i.e. the spatial organization of the points) and the diameters of the sampled individuals (IndBasedPIM.R) in order to obtain the matching densities based on the appropriate ESAs (see Eq. 1). For calculation based on size bins (BinnedPIM.R) it is necessary to also include the desired size bins. The R function can calculate the ESAs for any spatial organizations of the sampling points, including random sampling. **It is important to note that the supplied coordinates must be in the same units as the diameter estimates.**

Excel worksheets:

The calculation of the ESAs when the sampling points are randomly dispersed is too complicated to perform with Excel. Thus, **the Excel spreadsheets should be used only if the points are evenly dispersed over the sampled area**. Here, the user has first to select the Excel file according to the desired output – individual density estimates (IndBasedPIM.xls), or estimates binned according to size categories (BinnedPIM.xls). In both cases, the spatial organizations of the sampling points have to be inserted in order to obtain the ESAs. Practically, the PIM can be applied in the field by using the linear-point intercept method, in which sampling points are placed in one line along a measuring tape, or by using the quadrat-point intercept method, in which sampling points are placed within a quadrat. The user must select the relevant worksheet according to the sampling technique. In all worksheets, the density and frequency of each sampled individual, or size-bin, are calculated, as well as the total density and mean size of the sampled population.

Supplement 2 – Real data example

We sampled corals at a depth of ca. 1.5 m in front of the Interuniversity Institute (IUI) in Eilat (Israel, Red Sea). We used 80 quadrats of 0.5 by 0.5 m, where intersections between strings of a grid within the quadrats determined 16 evenly dispersed sampling points (4 rows by 4 columns 10 cm apart; see Fig. 1S). In each quadrat, numbers and sizes of Faviid corals, which are very abundant in this reef, were quantified following: (1) the conventional QM; and (2) the PIM, in which we sampled the population with arrays of 16 points as described above. The total number of corals counted by the quadrat method was 972, while 336 corals were counted by the PIM.

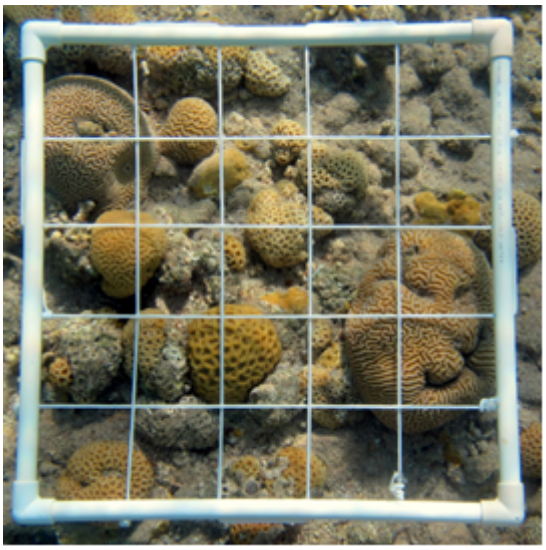

Fig. 1S. The quadrat-point intercept method. A 0.5 by 0.5 m quadrat with a grid of strings determining 16 evenly dispersed sampling points (the intersections between the strings) 10 cm apart.