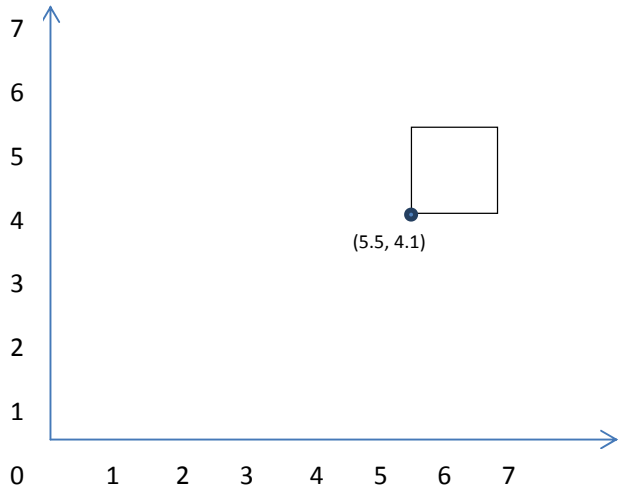
Answers: Investigating Populations

Exercise 1

1. Each area should have a sample grid laid out using two tape measures. Co-ordinates should be generated randomly using a random number table or generator button on calculator for example. These co-ordinates should then be used to position the quadrat within the sample grid, always placing the quadrat consistently *e.g.* the bottom left corner of the quadrat on the co-ordinate.
   Placing of the quadrats needs to be random in order to ensure there is no bias in collecting the data and that selection is completely objective.



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Partners include: Environment Agency, Natural England, National Trust, Peak District National Park Authority, United Utilities and Yorkshire Water.

2. The size of the quadrat depends upon the size of the vegetation and the sample area that needs covering. When studying small species where there is high diversity a smaller standard sized quadrat (0.5m x 0.5m) should be used to ensure species are not overlooked and results are more accurate. On moorlands where the species tend to be larger a larger quadrat can be used in order to sample a greater area of the moorland. A single plant of Heather or Bilberry for example would fill an entire quadrat, limiting results if a small quadrat were used. A 2m x 2m quadrat is more appropriate here.
   The decision as to how many samples to take is important if ecologists want to ensure a representative sample. Too few samples may mean that the sample average does not represent the true situation if some anomalous quadrats were placed or if the vegetation is very variable across the sample area.
   Deciding how many to place can be guided by taking a running mean as data is collected. When three consecutive means show no variation two further samples should be collected and then sampling can stop.

3. The ecologist should record the percentage frequency of the species. Abundance as a frequency or count of individual plants may be difficult to count accurately due to problems separating individual plants and therefore time consuming. However, if a measure of diversity is to be used a count of each species is necessary.

4. The data should be analysed using first of all the Simpson's diversity index to measure and compare the diversity of each site. If the results for this are not clear then the diversity measures will have to be tested for significance using Chi squared test (given the data are counts not measurements and that a test for difference is required rather than correlation).

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Exercise 2

Voles should be captured using traps such as Longworth traps which do not harm the animals. The Voles should be counted and marked in a way so as not to harm them nor make them stand out from other Voles. With small rodents, a good way of marking them is to clip off some of their guard hairs in a small area, leaving the downy hairs beneath showing.

The marked Voles should then be released back in to the environment and allowed to mix with the population. After sufficient time another trapping should take place and the number of Voles counted once more, this time noting those that have previously been trapped and those that have not.

The size of the population can then be estimated using the Lincoln index.

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