

Table 16 Considering different sampling methods.

Method/procedure	Design description	Considerations
Systematic sampling	<p>Samples are chosen in a systematic, or regular way, e.g. every ten minutes, or every hour, or every seventh person.</p> <p>This is used when the environment or population has an expected environmental gradient or change (spatially or temporally), but the degree of change may be uncertain.</p>	<p>Can give good coverage (spatially of an area) and is straightforward to design but has the potential to miss areas when surveying along particular points or lines (transects), which will lead to gaps and an under- or over-representation of certain groups or features in an area.</p>
Stratified sampling	<p>Samples are taken at pre-determined places or times based on an understanding of the study area in terms of the groups, individuals and sub-groups.</p> <p>This is used when the environment or population has an observed environmental gradient or change (spatially or temporally), and the expected change can be used to inform the sampling procedure.</p>	<p>This approach reduces the potential for bias in areas of variation, but the sampling design frame needs to take account of the underlying characteristics of the area or population in order to make the correct selections.</p> <p>In some instances, it can be impossible to get data on groups in order to stratify the sample (e.g. ethnicity of tourists to a town).</p>
Random sampling	<p>This is sampling using random numbers to generate times and/or co-ordinates for when a sample should be taken.</p> <p>This is used when the environment or population has no known environmental gradient or is thought to occur at random. It can also be used when there is no assumed knowledge of the population.</p>	<p>This sampling approach should minimise any elements of human bias and therefore sample error. However, random sampling can leave gaps in the sampling design frame, or lead to an undesirable clustering of points.</p> <p>It can also be time consuming to undertake compared to stratified or systematic sampling.</p>

Measurement errors

These are mistakes made when collecting the data, such as problems reading a clinometer or thermometer. A good investigation will usually try to minimise these through practice and careful procedures. Repeat measurements will reduce errors and **anomalies**.

Operator errors

These relate to the different interpretations as data is collected by different people. They are especially relevant with any bi-polar scoring systems, or where judgements are being made using a numerical scale. If you are working in a group for instance, pre-calibration may help, or averaging results before interpretation.

Questionnaires and interviews: response and non-response errors

If you are carrying out questionnaires and interviews then there is a special type of category that may be worth consideration. The process whereby ideas are exchanged and recorded during an interview or questionnaire is subject to error. For example, questions can be misunderstood, or respondents may feel pressured in responding to the researcher's own ideas.

Non-response errors are linked with interview and questionnaire sampling – biases associated with who did or who did not respond.