

Procedural Guideline No. 3-2

In situ survey of intertidal biotopes using abundance scales and checklists at exact locations (ACE surveys)

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Background

This method is adapted from standard Marine Nature Conservation Review procedures (Connor and Hiscock 1996).

Purpose

To provide as accurate an estimate as possible of the abundance and species richness of intertidal biotopes at exact locations. It is applicable to the following attributes.

Surveys that record the abundance of species at particular locations will be appropriate to assessing quality in terms of species richness and the abundance of species. A generic attribute is the maintenance or increase in species richness in the biotope and/or abundance of key (rare, fragile, declining or representative) species in biotopes, subject to natural change.

This method can also establish or re-establish the species that are present in biotopes at a site, including their abundance.

Advantages

Records are obtained rapidly and, if significant change is suggested, a check can be undertaken immediately for possible reasons. More species can be discerned *in situ* than by video or photographs. The records are sufficiently detailed to analyse against other biotope records in order to assess species richness or the presence of unusual features or rare/scarce species using the MNCR database.

Disadvantages

Abundance scale results are not amenable to statistical analysis. Worker variability can be high using this technique. There is no video film (but there may be still photographs) to check back to if change is suggested and results need validation.

Logistics

Equipment

- appropriate transport and safety equipment
- checklist of species to be searched for and recorded with indication of abundance scale to be used for each

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- 'crib notes' or sketches to assist identification of 'difficult' species
- abundance scale.
- writing boards
- spade and fork (for sediment shores)
- collection equipment (reference specimens)
- camera (for site location pictures, illustrative recording or checking of records)
- digital camera (if features are to be identified on photographs for relocation but not permanently marked)
- hand-held GPS for location of site

Personnel

Experienced marine biologists able to identify the conspicuous species likely to be present (separate botanist and zoologist advisable where plants and animals are present).

Method

Baseline survey or repeat monitoring

Locate survey stations according to the key site attributes which have been identified and/or to represent the main biotopes present. At the precisely located survey station(s)² record the type of shore substratum present and the abundance of all conspicuous species but ensure that especial attention is paid to those on the check list³ including recording estimates of density or percentage cover where possible.

Inspection survey

Inspection surveys are a rapid check allowing several sites to be assessed in the course of one low tide period. Locate the survey station precisely. Check the species present and their abundance against the results of the baseline or previous monitoring survey. If any species appear to be present in greater or lesser abundance or are not previously recorded, carefully estimate their percentage cover or density and abundance.

Field techniques

The site must be marked or capable of easy identification (for instance, a particular overhang or boulder can be identified from a photograph). Marking can be temporary and included in location photographs (chalk marks, tape measure laid on a transect, etc.) or permanent (for instance, drill holes in the rock, metal studs embedded in plastic plugs or resin – but not protruding bolts which may be dangerous to walkers). If the field recorder cannot identify a species, discretion can be used in collecting a small sample or photographs can be taken. The field recorder should estimate density or percentage cover of taxa in the field rather than try to remember the abundance scale. The abundance scale to be used for each species must be indicated on the checklist. Repeat photographs must be taken from the same angle of the same area as the first survey.

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- 2 This will be an Ordnance Survey six-figure grid reference for the site supported by photographs and sketches of the shore as required to show exact location of each survey station. On rock, the survey site must be located exactly and this might require marking (see below). The area of rock to be included must be stated (for instance, 'in a rectangular area 5m either side and 1m below the marker hole on the shore'). On sediment shores, a dGPS might be required or transit marks on shore features (not usable in misty conditions). A survey brief might be, for instance: 'Record the abundance of epifauna over 10m² (3.16 x 3.16m) and infauna by digging over at least 1m² from the muddy sand avoiding areas of standing water. Use a riddle to sieve sediments from digging-over.'
 - 3 These will be key or characteristic species or species of particular conservation importance. For instance, in the littoral fringe on a rocky shore, *Pelvetia canaliculata*, *Lichina confinis*, *Verrucaria maura*, *Chthamalus stellatus*, *Elminius modestus*, *Lasaea rubra*, *Patella vulgata*, *Melarhaphé neritoides*, *Littorina neglecta* and *Littorina saxatilis* might be checklist species – none are rare or unusual or of particular marine natural heritage importance although increased abundance of *Chthamalus stellatus* might suggest warmer conditions. Including *Lasaea rubra*, which is <2mm in size, ensures that it is properly searched for. On a lower shore sandflat, there might be a special requirement to search for rare or unusual species such as the sea urchin *Spatangus purpureus*, and so on.

Laboratory techniques

Identify specimens and transcribe notes to record abundance of conspicuous species on MNCR recording forms. Note actual records of density or percentage cover if taken. Process photographs to check species identification and abundance against completed forms if necessary.

Data analysis

Enter data, including digital photographs, into an appropriate database, e.g. Recorder 2000. Compare the data with that from previous visits. Consider if differences suggested are likely to be real. All differences of more than one abundance grade should be significant if care has been taken to exclude worker inaccuracies. If data are entered during the field survey directly into the database, comparison with previous records and with other locations can be undertaken immediately. The abundance scale must include specific reference to each species included in ACE survey at a location.

Accuracy testing

Trials have shown that, if the field worker does not concentrate hard to estimate density or percentage cover, considerable differences (\pm two abundance categories) can result. Some differences of interpretation also occur, particularly with regard to percentage cover, and careful reading of the abundance scale instructions are required. Species may not be spotted or recorded unless the field worker is aided by a checklist (produced from previous survey of the same site). Rare species are often observed by chance and comparison of records may suggest spurious differences in presence between visits.

QA/QC

- At the start of a survey, comparative exercises to calibrate worker variability in both identification and estimating abundance are to be undertaken.
- All of the species to be recorded must be indicated on the abundance scale.
- Re-survey to be undertaken at the same time of year as the initial survey.
- Quadrats are to be used to aid accuracy of estimating density.
- Recording is to be backed up with photographs.

Data products

- Database records of abundance scale ratings for conspicuous species and those of conservation importance.
- Photographs of survey locations.
- Records of survey points with co-ordinates⁴ and associated notes.

Cost and time

Fieldwork

About 15 minutes per station. Surveys might record from one site on the falling tide and one on the rising tide so that workers might be at sites for four hours per tide.

⁴ Recorded using dGPS – see Procedural Guideline 6-1.

Laboratory

Depends on how many specimens require identification but results should be written-up on the same day as the survey.

Health and safety

- Particular care is to be taken to avoid being cut off by the tide.
- Work should not be undertaken alone.
- Risk assessments must be addressed for the specific locations where survey is being undertaken.

References

- Baker, J M and Crothers, J H (1987) Intertidal rock. In: *Biological surveys of estuaries and coasts*, (eds Baker, J M and Wolff, W) 157–197. Cambridge University Press, Cambridge.
- Connor, D, and Hiscock, K (1996) Data collection methods, in: *Marine Nature Conservation Review: Rationale and methods* (ed. K Hiscock), 51–65 and Appendices 5–10, 126–158. Peterborough, Joint Nature Conservation Committee.
- Hiscock, K (ed.) (1985) *Rocky Shore Survey and Monitoring Workshop, 1–4 May 1984*. London, British Petroleum International.
- Hiscock, K (1998) *In situ* survey of intertidal biotopes using abundance scales and checklists at exact locations (ACE surveys). Version 1 of 23 March 1998. In *Biological monitoring of marine Special Areas of Conservation: a hand book of methods for detecting change. Part 2. Procedural guidelines* (ed. K Hiscock), 3 pp. Peterborough, Joint Nature Conservation Committee.