Field Work on Beaches and Rocky Headlands

Field Methods

Level

5-8+

Key question

What is the best method of sampling a particular organism, or environment?

Key outcome

Acquire skills appropriate for different types of field work, particularly in a marine setting.

Adapted with permission from field notes prepared by Dr Gee Chapman, University of Sydney, NSW.

The methods described below are accepted by the scientific community as appropriate for study of marine and terrestrial habitats. Older students will be able to select the most appropriate technique once they have been provided with a choice. Groups may all use a different technique and compare results afterwards. Identification of species and detailed quadrats/transects may only be needed for older students. Selection of the most appropriate technique may be made by the teacher, or, in conjunction with classes of older students, who should be provided with an outline of the methods, the objectives of the field study, and constraints which may operate (e.g. cost of getting to a site, equipment availability, size of group, etc).

What you need

Data sheets, pen, boards
Measuring tapes (10-30 m)
Field guides as required
Sampling nets
Tin cans to use as corers in sand or gravel, or post hole diggers
Plastic or wooden or wire metre grids
Small tent pegs for defining corners
Survey poles

What you do

You work in small groups or in pairs. Collect your equipment (a bucket is handy) and recall your safety instructions.

Start by clearly defining your study area. Use existing boundaries that will not move or disappear. Often boundaries are clear-cut whereas other areas are not so distinct and the study area may change over time, depending on the weather; for example, the interface between a rocky shore and sandy beach. If there are no natural boundaries to your study area, measure each of the corners of the area from two set landmarks. This will allow you to identify the same area in the future. Make sure you check the measurements, write them down and store them somewhere safe (see Figure 1a & 1b).

Determine how you will survey the area. There are three main ways of finding out how many different types of animals and plants are found in your study area: area searches; transect searches; and point searches. These searches will ensure that you do not bias your results by searching more thoroughly in some areas than others.

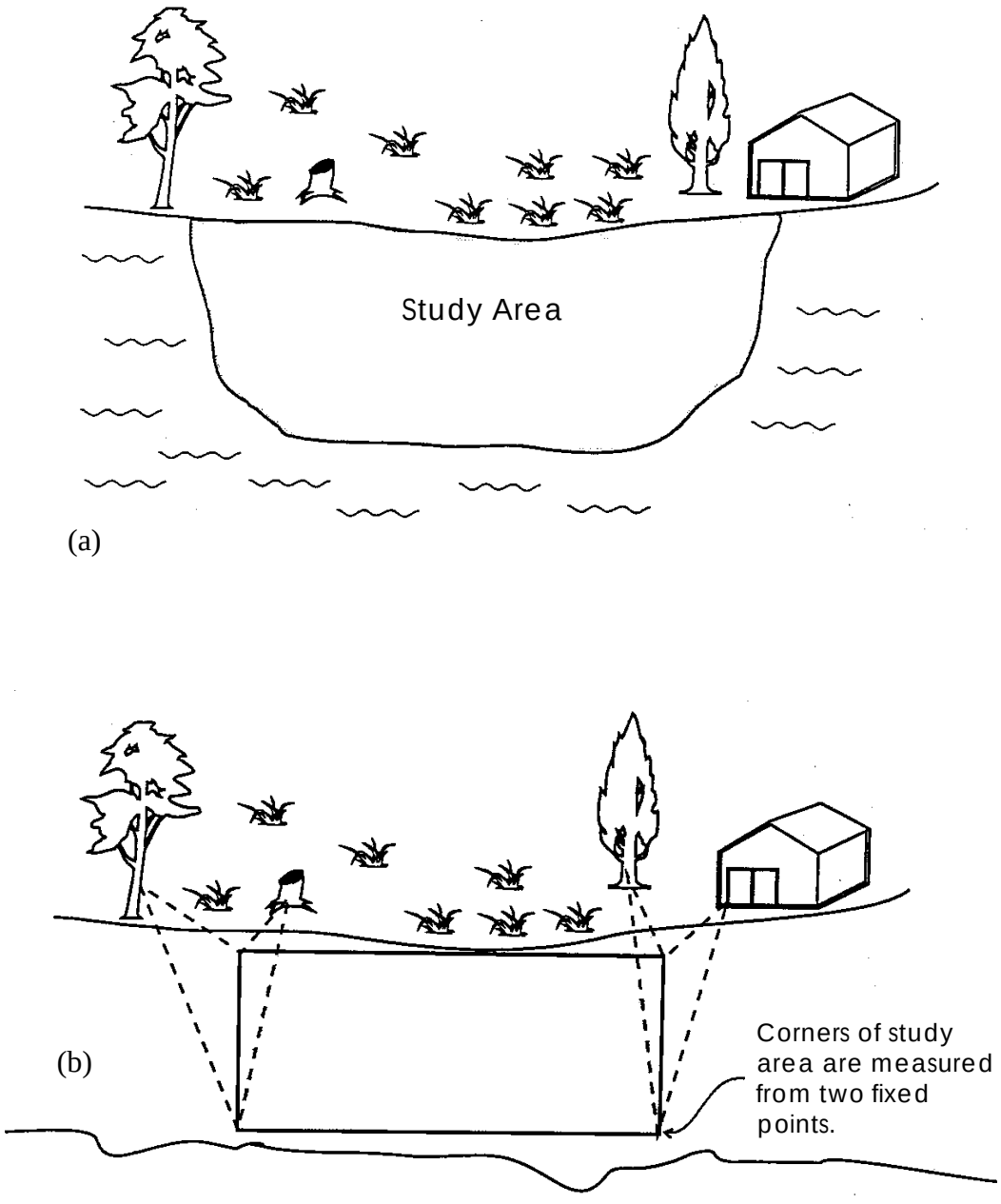


Figure 1. Identify the boundaries of your study area, by (a) using natural boundaries, or (b) measuring the corners of the area from two natural landmarks. This will allow you to identify the same area in future. Make sure that you check the measurements, write them down, and store them away somewhere safe

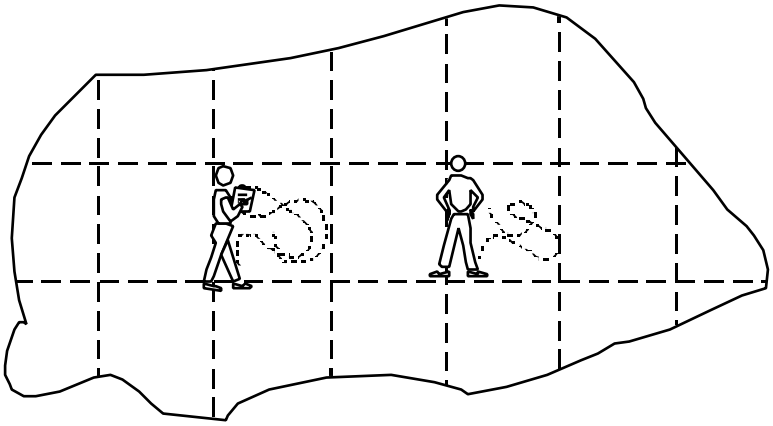


Figure 2. Area search

- Area search. For species that stay still or move very slowly, like barnacles or plants, you can do a systematic search of the entire area, noting any new species that you can find. To do this, divide the study site into grids and allocate each grid (or area) to one person or a small group. This sort of search is usually done for a set period of time, for example, 10 or 30 minutes, depending on your enthusiasm (Figure 2).

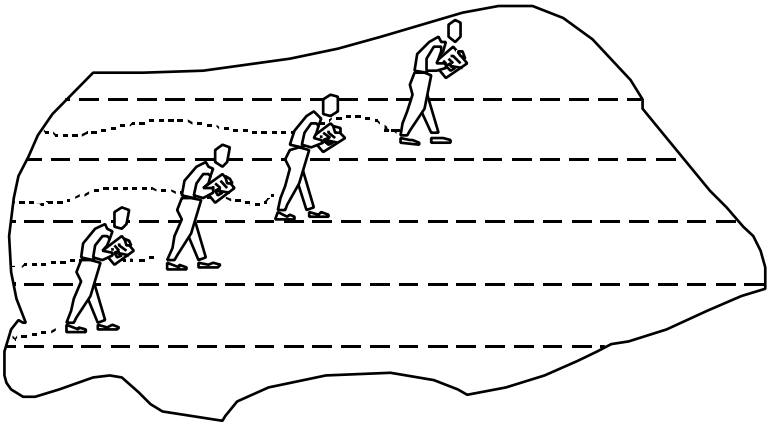


Figure 3. Transect search

- Transect search. This is like an area search, but people search along a strip of ground, rather than within a grid. To do this a row of searchers walk relatively close to and parallel to each other across the area, somewhat similar to a police search. In this case, you note each new species either side of you in your transect. This can be easier than an area search because people are working in closer cooperation and tend to stay in contact with one another. This makes it much easier to talk about any problems that you find or difficulties that you may have identifying something (Figure 3).

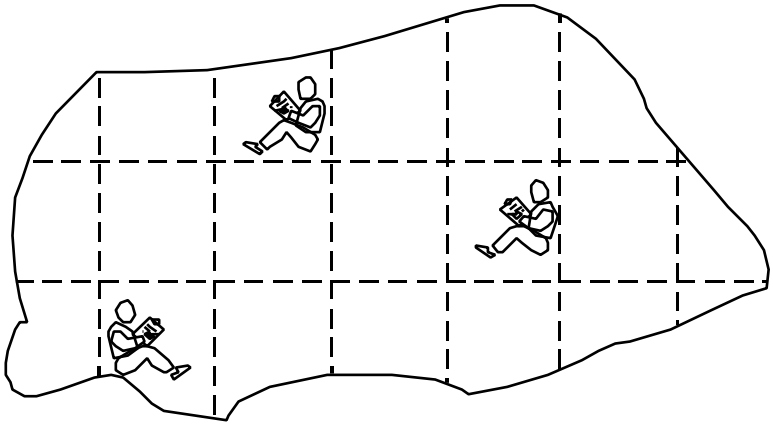


Figure 4. Point search

- Point search. Animals that move around a lot or which might be easily disturbed, such as birds, can be studied in this way. To do this, each searcher is given a place in the study site where they sit still. They then record the animals that they can see or hear during a set period of time. If people are too close together, they may count the same animals time and time again. Alternatively, if people are too spread out, animals can be missed (see Figure 4).

To record what lives in your study area you need to use data sheets. Prepare these data sheets in advance and give them to all the members of the group. After the field study it is easier to put together lists of species if everyone has recorded their data in a similar way. Sheet one shows the type of data sheet that can be used for rocky shores or other habitats. Species that you know and recognise may be listed in the first column in advance, and will simply need a tick mark in the fourth column if they are found. Sheet two is a bird data sheet. Sheet three is a plant identification data sheet.

How to determine the number of plants or animals within your study area. You need to get your counts from representative parts of your entire study area (Figure 5). You usually cannot do this by selecting random areas in which to count. Simply by chance a particular part of the study area may not be included in the samples, hence the sampling is biased and is not representative of the study area.

- If you can identify patches of different habitat in the study area, choose a few sites within each of these patches of habitat in which to count the animals and plants (Figure 6).
- If you cannot identify patches of different habitat, divide your area into smaller patches and take some samples in each patch. Using a grid is a convenient way of doing this (Figure 7), but you do not have to use a grid. If you still cannot count everything in each sampling site, choose smaller samples within each sampling site. These should be random samples to remove bias.

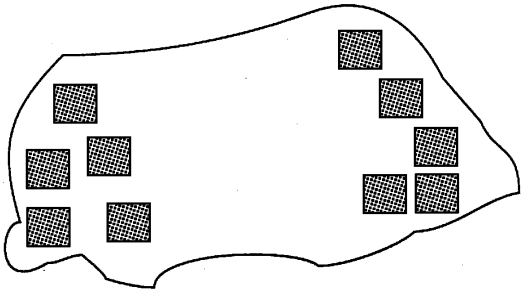


Figure 5. Examine representative parts of your study area

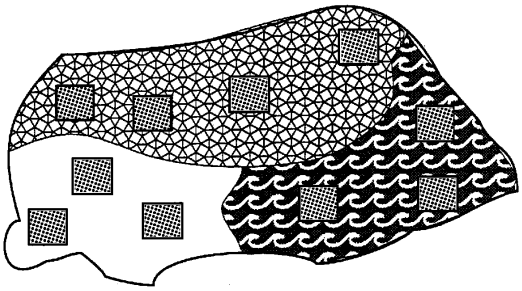


Figure 6. Count the plants and animals

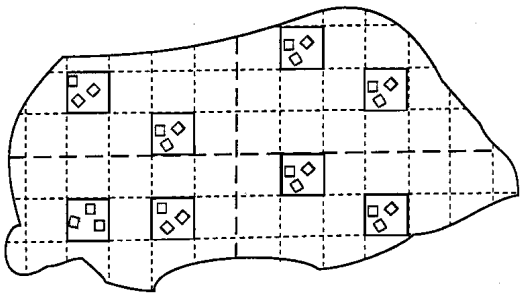


Figure 7. A grid can be a useful device

Sampling devices. A sampling device is anything that identifies the part of your study area in which you get your counts of the different animals and plants. Its size and shape depends on the types of organisms you are counting and the habitat in which they live.

- For mud and sand, corers or grabs collect some of the sediment in which the animals live. You can make these by using empty tin cans.
- For fish and plankton, use nets that are dragged through water.
- For many plants and slow-moving or attached animals, ecologists mark off an area of the ground and sample the organisms in that area. These areas are called quadrats.

The size of a quadrat depends entirely on the sizes and numbers of species in which you are interested. You must use quadrats that are large enough to contain the species – you

would not try to count trees in one metre by one metre quadrats, but also small enough so that you can actually count all of the individuals in them. Large quadrats are usually marked out in the field, whereas smaller quadrats are often built in advance because they are easy to carry and quick to use. When using quadrats to count seaweed or colonial animals such as sponges and bryozoans a grid of points is placed on the ground to measure how much habitat the organisms occupy, rather than how many of them occur within the area. The number of points occupied by each species gives you an estimate of the area it occupies (Figure 9).

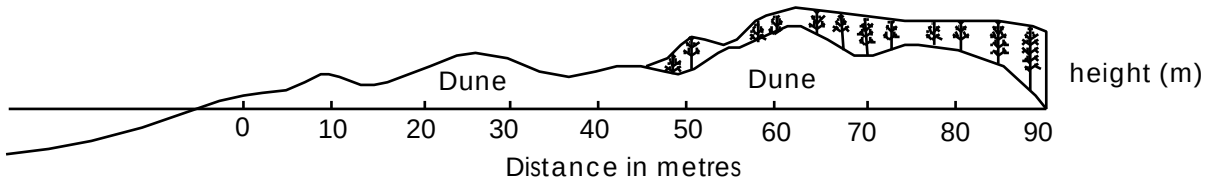


Figure 9. Profile diagram

Profile of the Area

To show the positions of the quadrats in the area studied, a profile is useful, as it shows the layers or strata in an ecosystem.

Mark off the position of each station along the horizontal axis of a sheet of graph paper. Using a pole with metres marked on it, record the height of each station above the lowest point on the transect. Record height on the vertical axis of the graph (see profile diagram).

Micro-habitats

Record different types of micro-habitats within your ecosystem, for example:

- under rocks
- areas of heavy vegetation
- exposed areas
- in rock pools.

19	3	2	2	3	5
● :	A=3	B=0	C=1	D=2	E=1

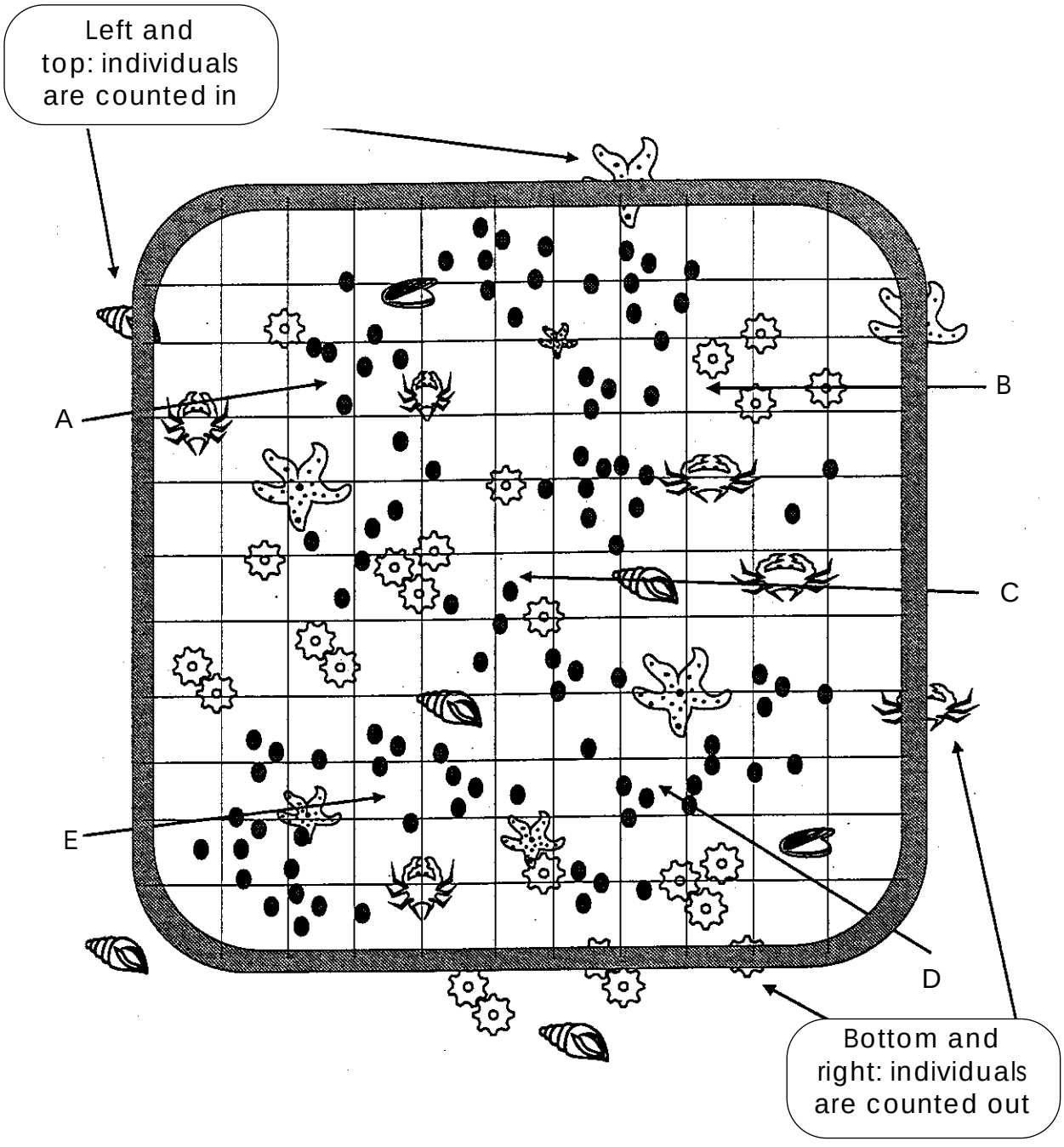


Figure 8. Illustration of a grid used to measure the amount of habitat occupied by colonial organisms such as sponges or bryozoans

Data sheet 1

A data sheet that can be used for rocky shores or other habitats

Area/Grid number/Transect number ____

Date ____

Time ____

Observer____

Name if known	Description	Drawing	Present

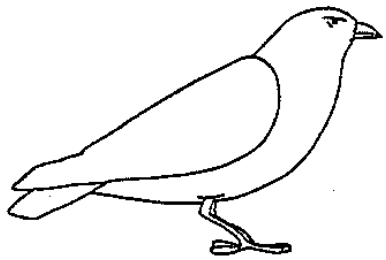
Field Methods

Data sheet 2

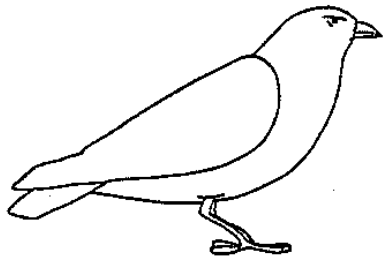
Identification guide for Birds at:_____

Area/Grid number/Transect number_____ Date / / Time of Day :

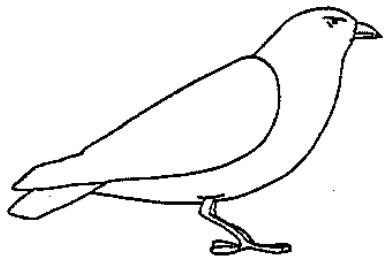
Observer _____



Name (if known) _____
Size_____
Call _____
Habitat _____
Behaviour _____



Name (if known) _____
Size _____
Call _____
Habitat _____
Behaviour _____



Name (if known) _____
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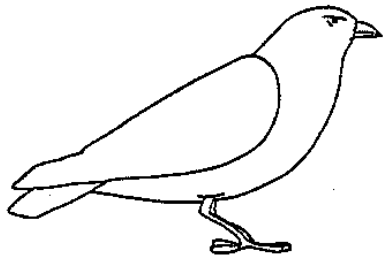
Habitat _____
Behaviour_____



Name (if known)_____
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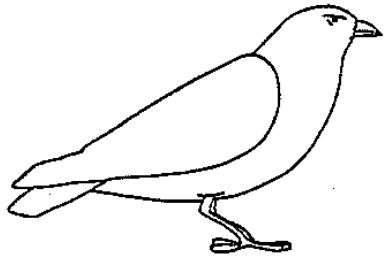
Habitat _____
Behaviour_____



Name (if known)_____
Size_____
Call_____
Habitat_____
Behaviour _____

Field Methods

Data sheet 3

Identification guide for plants at:_____

Area/Grid Number/Transect number:_____ Date: __/__/_____ Time:_____

Observer:_____

Name if known_____ Leaf colour_____

General shape of plant_____ Type of branching_____

Size of plant _____ Flowers_____

Leaf shape _____

Name if known_____ Leaf colour_____

General shape of plant_____ Type of branching_____

Size of plant _____ Flowers_____

Leaf shape _____

Name if known _____ Leaf colour_____

General shape of plant_____ Type of branching _____

Size of plant_____ Flowers_____

Leaf shape_____

Name if known_____ Leaf colour_____

General shape of plant_____ Type of branching_____

Size of plant _____ Flowers_____

Leaf shape _____

Name if known_____ Leaf colour_____

General shape of plant_____ Type of branching_____

Size of plant _____ Flowers_____

Leaf shape _____

Name if known _____ Leaf colour_____

General shape of plant_____ Type of branching _____

Size of plant _____ Flowers_____

Leaf shape _____

Other comments: