Evolution and Biodiversity Laboratory
Collection and Sampling Instructions

This chapter will provide instructions for collecting data from your study areas. You will collect samples from two different terrestrial habitats of your team's choice.

I. Determining Your Study Area

When your team has decided which two habitat types to compare, you must locate one of each type that you can reach and survey without undue logistical difficulty and without breaking any laws. (Be sure it is legal to physically be on the property you plan to survey before you begin your work!)

II. Randomizing Tool: Random Numbers Generator

Random number generators are available as free applications for your phone or laptop. A simple search should yield a variety from which you can choose.

The best generators allow you to choose the range within which to generate random numbers, such as 1-10, 1-50, 1-100, etc. This versatility will allow you to choose the numbers best suited to the size of your study site.

To delineate your study area, you should measure a set distance along an x axis and a y axis. Your survey lines will lie within the rectangle you delineate, as in Figure 1.

![Figure 1](image-url)  

**Figure 1.** Example of a study area delineated with twine or other clearly visible material.

Note the “0” point at the convergence point of your axes. This is where you will stand at the start of a randomly generated survey location.
Choose a range of numbers in your random number generated that is best suited to the size of your study site. For example

- for a study site of one hectare, use a range of 1 – 100
- for a study site of 100 m², use a range of 1 – 10
- and so on.

The range of numbers you choose should allow you to survey a reasonable sample of your total study site.

III. Collecting Data
You will use a series of transects, quadrats, or a combination of both (your choice) to sample and census the species found in the two habitats.

Before you begin:

- know the area of your study site
- know the appropriate length for your transect lines
- and/or the appropriate area for your quadrats
- have your twine, nails and quadrats (as appropriate) ready at hand
- have your Biodiversity Tally Sheet (linked to syllabus) on a clipboard ready at hand

Use the following instructions for the survey method your team has chosen.

A. Line Transect
Recall that a line transect is a straight line (or narrow section) through a habitat, along which the investigator moves to count organisms.

1. Stand at the zero point of your study area rectangle.
2. Generate a random number with your random number generator.
3. Take that many normal-sized paces along the x axis.
4. Generate a second random number with your random number generator.
5. Take that many normal-sized paces along the y axis.
6. Lay your transect line perpendicular to your y axis, securing it with a nail at each end.
7. Walk along the transect and record the individual organisms you can see and identify without leaving the transect line.
   a. If you are not sure of an individual’s identity, take a photo and use iNaturalist to help you identify it.
   b. You can also use a Google Image Search with appropriate keywords.
   c. If you are unable to identify a species, list it as “species a” with a description of its notable phenotypic traits. (Use a different ID letter for each unidentified species.)

Replicate this procedure at least three times.
B. Strip Transect
Recall that a **line transect** is a straight line (or narrow section) through a habitat, along which the investigator moves to count organisms.

1. Stand at the zero point of your study area rectangle.
2. Generate a random number with your random number generator.
3. Take that many normal-sized paces along the x axis.
4. Generate a second random number with your random number generator.
5. Take that many normal-sized paces along the y axis.
6. Lay your transect line perpendicular to your y axis, securing it with a nail at each end.
7. Extend the width of the transect line to form a strip of the width your team has chosen.
8. Survey the area within the strip transect and record the individual organisms you can see and identify without leaving the transect area. Do not count an organism if less than 50% of its body lies outside the strip.
   a. If you are not sure of an individual’s identity, take a photo and use iNaturalist to help you identify it.
   b. You can also use a Google Image Search with appropriate keywords.
   c. If you are unable to identify a species, list it as “species a” with a description of its notable phenotypic traits. (Use a different ID letter for each unidentified species.)

**Replicate this procedure at least three times.**

C. Quadrat
Recall that a **quadrat** is a small area of habitat, typically square.

1. Stand at the zero point of your study area rectangle.
2. Generate a random number with your random number generator.
3. Take that many normal-sized paces along the x axis.
4. Generate a second random number with your random number generator.
5. Take that many normal-sized paces along the y axis.
6. Place the lower left corner of your quadrat at the randomly generated point.
7. Survey the area within the quadrat and record the individual organisms you can see and identify that fall at least 50% inside the quadrat.
   a. If you are not sure of an individual’s identity, take a photo and use iNaturalist to help you identify it.
   b. You can also use a Google Image Search with appropriate keywords.
   c. If you are unable to identify a species, list it as “species a” with a description of its notable phenotypic traits. (Use a different ID letter for each unidentified species.)

**Replicate this procedure at least three times.**
D. Quadrats Along a Transect

Quadrats can be placed along a transect to reduce the subjectivity inherent in a survey of many species along a transect line, some of which may be more visible from a distance than others.

1. Stand at the zero point of your study area rectangle.
2. Generate a random number with your random number generator.
3. Take that many normal-sized paces along the x axis.
4. Generate a second random number with your random number generator.
5. Take that many normal-sized paces along the y axis.
6. Lay your transect line perpendicular to your y axis, securing it with a nail at each end.
7. To place a quadrat, generate two random numbers, as before.
8. Use the transect line as your x axis, and pace off the two random numbers (first perpendicular to the x axis, then parallel to it).
9. Place the lower left corner of your quadrat at this randomly generated point.
10. Survey the area within the quadrat and record the individual organisms you can see and identify that fall at least 50% inside the quadrat.
   a. If you are not sure of an individual’s identity, take a photo and use iNaturalist to help you identify it.
   b. You can also use a Google Image Search with appropriate keywords.
   c. If you are unable to identify a species, list it as “species a” with a description of its notable phenotypic traits. (Use a different ID letter for each unidentified species.)
11. Walk along the transect and record the individual organisms you can see and identify without leaving the transect line.
   a. If you are not sure of an individual’s identity, take a photo and use iNaturalist to help you identify it.
   b. You can also use a Google Image Search with appropriate keywords.
   c. If you are unable to identify a species, list it as “species a” with a description of its notable phenotypic traits. (Use a different ID letter for each unidentified species.)

Replicate this procedure at least three times.

IV. Recording Ancillary Information

At your sampling sites, record all relevant environmental variables, such as

- air temperature
- water temperature
- weather conditions
- soil moisture (subjective scale)
- light condition/quality
- etc.

Note whether these are different from one sampling day/locality to the next.
Remember: abiotic variables will NOT necessarily allow you to pinpoint a cause for any differences in biodiversity you see between your habitats, but they may give you a starting point to generate ideas for further research.

Remember: Your team will survey two different habitats on Day One, and repeat the procedure on Day Two

Each survey should include a minimum of three random samples (transects, quadrats, or transects with quadrats) from each habitat.

When you have completed both rounds of data collection, you will have collected a total of TWELVE replicates, SIX from each locality for later analysis.