

Marine Biology of the Chesapeake Bay
LAB 2 – Surveying ecological communities.
Quadrat Sampling & Plankton Tows.

Ecological communities present challenges to biologists who attempt to catalogue the diversity and the relative abundance of species present in natural systems. However, ecologists cannot document community patterns without sampling, and thus s/he must carefully weigh the various pros and cons associated with sampling techniques. In this lab, we will employ a small number of some of the many approaches that exist to describe populations and communities. Specifically, we will use a quadrat-based sampling method to estimate the density of trees in a forest, and a net-based capture method to characterize some of the organisms living in the plankton.

One convenient way to measure ecological variables such as abundance and species diversity is by sampling with quadrats. Quadrats are plots of known dimensions that are placed randomly throughout a habitat of interest. The organisms of interest that fall within the quadrat are counted, measured, weighed, etc. In lab, we will use quadrat-based sampling to estimate the density of trees in the “Forest of Campus Richmond.” The upland forests on UR’s campus contain many of the most common trees in our area, and we will survey the lake-facing slope to determine the density of trees in this forest. While you are in the forest, think about environmental factors that might be important in shaping the current density of trees in the forest. Also think about why certain species are present here, but others are not (e.g., do you see any redwoods?).

Another objective of the lab today is to sample the organisms that live in the plankton of Westhampton Lake. We will sample water in the field using plankton nets. Samples will be returned to the lab and we will begin to assess characteristics of the plankton community in this freshwater habitat. Later in the semester we will build on these skills to examine plankton communities in the Chesapeake Bay.

Your goals are to:

1. Employ a quadrat sampling strategy to examine tree density in a Virginia forest.
2. Effectively use a plankton net to examine the unseen communities suspended in water.

In the field

1. Spend 10–15 minutes examining the general characteristics of the forest near the lake and find appropriate sites for your surveys.

In the field (cont)

2. QUADRAT SURVEYS:

Once you have identified a suitable stretch of forest, lay out a 100m² quadrat (10X10m square). Use colored flags to mark the corners of your quadrat.

Record in your notebooks the number of trees you encounter as well as their diameter at breast height (dbh). Keep track of how many quadrats you sample (you should do more than 1) so that we will know the total area surveyed. Often, only a portion of an individual will be in the quadrat. To minimize edge:area effects, it is important that we have a standard rule for dealing with this problem. Our guideline will be that trees that are within the quadrat boundary will be counted, and trees that fall on the E and N edges of the quadrat line will also be counted. Trees on the W and S edges will be ignored. It is important to record these rules so others could follow the same procedure during future sampling trips. In the lab, calculate the average density of trees (# of trees per meter squared) and the average dbh of trees in the forest for the entire class.

3. PLANKTON TOWS

Take a moment to study the plankton net and become familiar with the equipment. We will use two different methods for sampling plankton communities. The first involves sampling organisms that are found within the first 10 cm of the surface. To do this, you should deploy the plankton net with a sample bottle attached to the end. The plankton net should then be towed for 1 min along the shore by slowly moving walking parallel to the shoreline. Try to keep the net at the same distance from shore at all times and always move at the same rate. Keep the top edge of the net's opening at the water line. After 1 min, pull the net out of the water and ensure that the contents in the bottle are not emptied back into the pond. Remove the bottle on the cod end and transfer the contents to a storage bottle. Wash the net without the end bottle 2-3 times by dipping into the water. Also wash the end bottle and re-attach it to the end of the net for the next deployment. You will then sample the plankton populations that live within the entire water column. Find a location (like the bridges going to the island or the walkway on the outside of the student center) where you can reach over the water. As a precaution, make sure you keep one end of the rope tightly secured to your body so you don't accidentally drop the equipment into the lake. To minimize agitation of the bottom, always lower the net very slowly and carefully. Once you are just above the bottom, pause for at least 30 seconds, then raise the net at a rate of approximately 1 meter per second. Raise the net out of the water in one motion until the plankton bucket is just above the surface. While hanging on to the net with one hand, splash lake water on the *outside* of the net to dislodge plankton that may still adhere to the inside of the net. After washing all plankton into the bottle, detach the bottle and transfer the contents into a new storage bottle. **KEEP TRACK OF WHICH BOTTLE CAME FROM WHICH TOW.** Wash the net as before. Take your samples to the lab and use the stereomicroscopes to describe some of the common organisms found in the lake.