A simple sampling method that lets students see the forest AND the trees

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For many years students in my General Botany and Introductory Biology courses have taken field trips to three different woods. In the past neither 'traditional sampling' (laying out quadrats, measuring diameter at breast height, etc.), nor 'no sampling' (just looking at the woods) worked well to help these students understand that each woods is a community controlled by certain trees, with characteristic herbs and shrubs associated with them, and that the areas are quite similar (three tree layers and an herb layer), yet very different (species composition).

For the past few years we have used a simple sampling method, which seems to help the students to see the trees as well as other plants, and gives them enough data (though primitively collected) to compare the two areas.

I'll describe how we do the sampling and the kind of information we get, and discuss

how the class and I go about drawing conclusions in (A) two different course settings, (B) the first two labs of a non-majors Biology course, and (C) the last two labs of a mixed-majors Botany course.

A. How we do the sampling:

Students work in groups of two to four (three is probably best). They need a 4 meter-plus piece of string (with the ends knotted together so that it will outline a meter square sample area), four marker flags, and a clipboard to hold the data sheet for the group. The data sheet tells the students what to do. The information in the data sheet is the crux of this paper.

DATA SHEET: McGilvra's Woods - Solomons's Woods - Campus Woods

What to do when you get to the site:

1. Go 15 paces into the area. (This is to get you away from the road!)
2. Decide how many more paces you will go (it should be a multiple of 4) - write it here _____.
3. Go that many paces.
4. Where your foot landed on the last pace is the corner of your plot. Lay out your plot using the flags to hold the string tight.

What to sample:

Canopy trees: bigger than the fingers on both hands will go around. Identify the two trees closest to your plot.

	McGilvra's Woods	Solomon's Woods	Campus Woods
1			
2			

Understory trees: bigger than the fingers on one hand will go around; smaller than a 'tree.' Identify the two samplings closest to your plot, and within six feet of your plot.

	McGilvra's Woods	Solomon's Woods	Campus Woods
1			
2			

Seedling trees: smaller than saplings. Are there any seedlings IN your plot? If so, what kind and how many?

McGilvra's Woods	Solomon's Woods	Campus Woods

Ground layer (herbs/non-tree species): List and count the herbs/non-tree species in your plot.

McGilvra's Woods	Solomon's Woods	Campus Woods

Weeds: Are there any weeds in your plot? (I'll help you decide if they are weeds.)

McGilvra's Woods	Solomon's Woods	Campus Woods

While the students sample, I wander around helping them identify trees and herbs (a page of tree leaf sketches, and one of herb sketches is included in the lab manual, but I help a lot with identification). After students have completed their data collection, they leave their sample plot set up, and as a class we visit each plot. The group that sampled the plot 'tells' about it, and I point out things they miss. This "visiting" of each plot is an important part of the lab - it gives students ownership of their plots, and lets them report on something with which they have become very familiar.

B. The kind of information we get (see sample data in table below):

The data show there is virtually no overlap in trees of any age in McGilvra's and Solomon's woods, and each has an abundance of saplings and seedlings. In addition the herb layer is much more diverse in one area than the other. If the two areas were not so "textbook" different, interpretation of the data by these first-level students would be much more difficult! McGilvra's is a climax forest (sugar maple trees, saplings and seedlings), whereas Solomon's is in succession with oak and red maple trees, but red maple in the understory. The Campus woods is severely degraded with few sapling, no seedling trees, and an abundance of buckthorn.

SUMMARY OF DATA FROM 2 LABS, FALL SEMESTER 2000

McGilvra's Woods			**Solomon's Woods**			**Campus Woods**		
Trees #/18	Sugar Maple	10	**Trees #/18**	Red Maple	12	**Trees #/18**	White Oak	8
18 trees total	Basswood	7	18 trees total	Oak	6	18 trees total	Shagbark Hickory	4
	Elm	1					Black Cherry	3
							American Elm	2
Saplings #/18	Sugar Maple	16	**Saplings #/18**	Red Maple	18	**Saplings #/18**	Elm	3
	Basswood	2					Sugar Maple	1
18 trees			18 trees			18 trees		
Possible			Possible			Possible	None close	14
Seedlings	Sugar Maple	7	**Seedlings**	Red Maple	4	**Seedlings**	None	9
# Plots/9	White Ash	1	# Plots/9	Black Cherry	1	# Plots/9		
9 Plots Total	Yellowbud Hickory	2	9 Plots Total	Shagbark Hickory	1	9 Plots Total		
	Black Cherry	1						
	Elm	1						
Ground Layer:			**Ground Layer:**			**Ground Layer:**		
Average # species/plot		6	Average # species/plot		2.8	Average # species/plot		1
Weeds: none			**Weeds:** none			**Weeds:** lots of buckthorn		

C. How we go about drawing conclusions about the two areas:

In the non-majors Biology course (the first two labs of the fall semester):

I compile the student data, and give a data sheet, as shown above, to each student. This is their assignment:

Submit an individual report, due in the next lab. The report should be typed, and a maximum of one page in length.

For the Campus woods and for either McGilvra's OR Solomon's woods, include answers to the following questions:

1. What will these woods be like in 100 years?
2. On what data/evidence do you base your conclusion? Cite the evidence from the class data.
3. If we wanted to present a report to the Campus Commission on the status of the Campus woods, could we do it based on our lab sample? Why or why not?

We look over the data as a lab, and I ask them how they are going to decide the future of the woods. After a bit of discussion most realize that trees will be replaced by saplings, and so on. We also review what's been going on in lecture concerning the scientific method, and the importance of repeated experiments, or large bodies of data to support a hypothesis. Again most realize that with only nine plots we probably shouldn't 'go public' with our guess about the future of the Campus woods. With the data in hand, and after this discussion, students prepare their reports, which are rarely more than a couple of paragraphs long. Most get full credit for their conclusions-as long as they use their data to support them.

In the mixed-majors Botany course (last two labs of spring semester):

There is no assignment associated with these last two field labs in Botany. I collect the student data sheets for my own records, but do not compile them for the class. After we visit each plot in the McGilvra's woods, we briefly discuss the area. Then after Solomon's woods is sampled, I guide the students through a discussion about the difference between the two. (We don't sample the Campus woods in this class.)

By the time we do these labs, the students are used to listening to me, and to each other. They seem to easily see the differences between the two areas, and are able to relate the differences to lecture material on succession. It's the end of the semester, and we usually enjoy ourselves, and look at lots of other different things such as soil type, and the huge diversity of spring ephemerals and other herbs in the sugar maple woods.

In both classes, the sampling gives students the means to actually LOOK AT the trees, saplings, seedlings, and herbs and consider how they fit into the whole forest.