

SECTION 2:

PLANT ECOLOGY

“You just have to start at a particular point and count. Concentrate on what you’re doing and try not to lose track.”

—LIZ JOHNSON
(*Plant Inventory*)

TARGET QUESTION:

How many plants are in each plot?
Why do different plants grow in different areas?

PREREQUISITES:

Team Plot Selection
Core Activities in Section 1



CORE ACTIVITIES:

LESSON 1

Why Count Plants?

LESSON 2



How Many Plants Are There in Each Plot?

LESSON 3



Comparing Data



ASSESSMENTS:

Refining the Explanation
of Biodiversity



WEB COMPONENTS:

FOR TEACHERS

- How to Calculate a Biodiversity Index

FOR STUDENTS

- Plant Inventory*

* All Web reading selections for students are available online and as PDFs.

OVERVIEW OF SECTION 2

Students speculate on why plants are more abundant in some areas of the site than others. They list factors that might account for the differences, such as temperature, humidity, light, soil, rainfall, wind, and human or animal activity, and figure out how they can collect more data on these factors.

They discuss why it might be important to take a count of all the individual plants in each plot and develop a plan for conducting the field study. A reading selection describes how scientists count plants and gives students tips for conducting their own survey. Students then count plants, record their data, and then compare data between plots.

BACKGROUND INFORMATION FOR THE TEACHER

Plants are remarkably adaptive organisms, inhabiting such diverse environments as tropics and tundra, desert and ocean, mountains and marsh. Yet each species has an optimal habitat. There can be many reasons why a plant flourishes in one plot and not in another. For example, because of the differences in slope, or because of the sheltering effect of a large tree, plots just a few feet apart could be receiving very different amounts of water and light. The same conditions of slope or shelter can also be responsible for differences in temperature and wind velocity.

Soil composition has a profound effect on plants. While many plants thrive in rich loam, only some specialized types can survive in sand or in compacted clay, and fewer still can find a foothold on rocky ledges. Each type of soil has a different capacity for retaining moisture, and each contains varying amounts of nutrients to give to the plant.

Human activity plays a large part in determining plant abundance and diversity. If an area is maintained as a park, or if it is farmed, then humans have played a large part in planting, fertilizing, and cultivating the plants. If an area is heavily traveled, paved, littered, exposed to a source of pollution, or clear-cut, then humans have played quite a different role.

**TEACHING TIP: PROBLEM SOLVING**

Taking an inventory of the plants in each plot may present students with new challenges. It is helpful to discuss some of the problems they will encounter before they actually go out into the field. Then the class as a group can decide how to deal with the situations in a consistent manner.

The reading selection provides some practical tips from field biologists. In general they recommend that the plant inventory be a count of all the whole, living plants. Although students may find plant parts, like acorns or fruits, and dead plant material, these should not be included in the count. Grasses and other ground cover that blanket an area should be estimated rather than counted plant by plant.

1 LESSON

LESSON 1 WHY COUNT PLANTS?

TIME 1 or 2 class sessions

MATERIALS ☐ Journals

WEB COMPONENT

Plant Inventory

1. Now that students have analyzed what kinds of plants are present in their plots, ask them to estimate how many plants are growing in their own plot. Have them record their estimate in their journals.

2. Then ask:

- Why might it be important to know how many plants are in your plot?
- What might that number tell you about your plot? About the whole site?
- How could you use those numbers to compare plots at our site and with other sites participating in the project?

3. Discuss the factors that influence the numbers and kinds of plants in each plot. Give students a few minutes to retrieve the data from their journals that relate to the measurements they made of the environmental factors at the site. Have them draw up a two-column chart that lists possible reasons why there may be different numbers of plants in each square and ways they are measuring those differences.

WHY ARE THERE DIFFERENT NUMBERS OF PLANTS IN EACH PLOT?

| Possible reasons for differences | Ideas on how to measure |
|----------------------------------|---|
| Temperature | Thermometer |
| Moisture | Rain gauge, humidity indicator |
| Sunlight/shade | Timed observations, light meter |
| Soil | Tests for pH, particle size, and color |
| Foot traffic | Observations, soil test for compaction |
| Fertilizer | Ask groundskeepers what they use, how much, and where |

SAMPLE

4. Analyze the quality of the data students already collected on the factors they listed. Ask students how they think they could collect more evidence. Encourage them to continue collecting evidence on the effects of environmental factors in future field trips.

5. Then help students develop a plan for how they will go about taking a plant inventory. Ask:

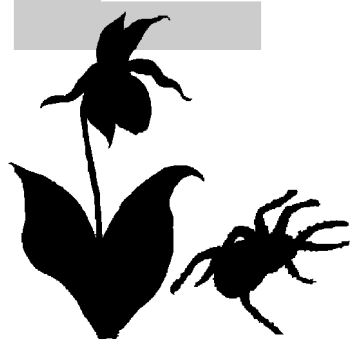
- What will you observe? Count? Measure?
- How many different ways will you record the data?
- What tools will you need?
- What are some of the problems you might have? Describe some scenarios

and ask the class to problem-solve. For example: What will you do if you find an acorn (or some other plant part)? What if you find dead plant parts? What if you have a lot of grass in your plot? Should you count every blade?

Help students come to some agreements so that the entire class deals with the same problem in the same way.

6. *Direct students to the reading selection, "Plant Inventory." Later, discuss the information. Ask students to summarize the different methods the two scientists used to take a plant inventory. Point out some of the problems the scientists faced in the field and ask how they resolved them.*

2 LESSON



LESSON 2

HOW MANY PLANTS ARE THERE IN EACH PLOT?

TIME

1 to 2 field sessions

MATERIALS

- ☐ Journals
- ☐ Hand lenses
- ☐ Frames or markers for team plots
- ☐ Compasses
- ☐ Equipment for measuring environmental factors

1. *At the site, check that students are clear on the key questions. Remind them of their safety rules and then send them off to begin the plant count.*
2. *Circulate among the teams as they work and use some of these questions to help them stay on task:*

| Tasks | Focus Questions |
|--|---|
| <i>To count all the plants in each plot</i> | How are you counting? How has your team divided up the task? |
| <i>To solve problems as they arise</i> | What problems have you encountered about what or how to count? How did you solve them? Should we discuss the problems as a group? |
| <i>To record new questions</i> | What new questions arose today? Where did you record them? |
| <i>To collect data on environmental factors</i> | How are you measuring and recording the environmental factors that influence your plot? What tools are you using? |

3. *If students are not able to complete the plant count in the allotted time, have them mark precisely where they left off. Plan to return to the site within the next few days to finish the count.*

The task and focus questions on the following page can be copied and distributed to students.

TASKS AND FOCUS QUESTIONS

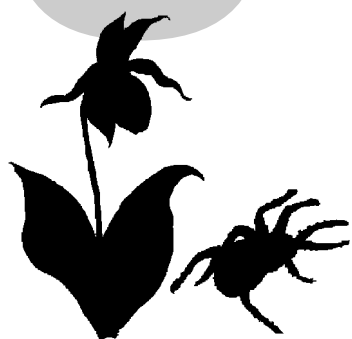
SECTION 2 LESSON 2

FIELD TRIP HOW MANY PLANTS ARE
THERE IN EACH PLOT

| Tasks | Focus Questions |
|---|--|
| <i>To count all the plants in each plot</i> | How are you counting? How has your team divided up the task? |
| <i>To solve problems as they arise</i> | What problems have you encountered about what or how to count? How did you solve them? Should we discuss the problems as a group? Let's remember to post our solutions on the Web. |
| <i>To record new questions</i> | What new questions arose today? Where did you record them? |
| <i>To collect data on environmental factors</i> | How are you measuring and recording the environmental factors that influence your plot? What tools are you using? |

3

LESSON



LESSON 3

COMPARING DATA

TIME 1 class session

MATERIALS ☐ Journals

1. *Back in the classroom, give teams time to go over their data, making sure that each team member has a complete set of notes in his or her personal journal.*

2. *Discuss what students found out. Ask:*

- How did your predictions of numbers of plants compare with the data you collected?
- Were there considerable differences in the numbers of plants from one plot to the next?
- What might those differences mean? What do the numbers of plants tell you about the plot you are examining?
- Have students again speculate on what factors might account for the differences. Are there any other factors they want to add to the list? Record their ideas.



ASSESSMENT: REFINING THE EXPLANATION OF BIODIVERSITY

TIME 1/2 to 1 class session

1. Ask students to summarize what they learned from their experiences in taking a plant count. What can you learn from counting plants? Why do you think different numbers of plants grow in different areas?
2. Review the collaborative explanation of biodiversity that students recorded after they completed Section 1. Have them critique their earlier thinking and decide if they want to improve their statement, add to it, or make changes.
3. Record their new explanation on the class chart or concept web.