

DATA TRANSECTS

In this activity, you will use a model of a transect to study the organisms found in two locations in a restored prairie. You will look for patterns among the components and consider how the information in the patterns can be useful to the scientists restoring the prairie.

Transects

One technique scientists can use to collect data on the number of organisms in a population, whether it is a species being restored or a species causing problems, is a transect. A **transect** is a specific path or area, often marked with a rope or measuring tape. Scientists mark the transect to show where data should be collected. The length of the transect and how often data are collected along the transect depends on what the scientists are studying. When scientists use transects in their work, they often say they are “conducting a transect.” Ecologists often use a **quadrat**, a square or rectangular plot of land marked off, to determine where to collect their samples. In the photographs below, you can see scientists conducting transects in different environments.

Transect data can help scientists find relationships between a population of organisms and other components of an ecosystem. For example, if scientists are studying a population of purple coneflowers in a prairie, they may keep track of how much water is in the soil to look for patterns of soil moisture and how many coneflowers are growing.

GUIDING QUESTION

What patterns do you detect in the two environments, and how might the information in these patterns be useful to scientists?

MATERIALS

For each group of four students

- 1 set of 11 cards for Transect 1
- 1 set of 11 cards for Transect 2
- 2 random number cubes

PROCEDURE

1. Read the information in the chart to the right. You will collect data on the four components of the environment listed.
2. Start with Prairie Transect 1.
3. Roll both random number cubes at the same time. Add the numbers on the cubes to determine your first data sampling point. Select **ONLY** the transect card for that data sampling point.
4. Read the transect card for your data sampling point aloud to your group. Record the data from that transect point in the “Transect 1” table below.

Living and Nonliving Components of the Environment	
LIVING	
Native plants	Plants naturally found in prairies, including purple coneflower, big bluestem, black-eyed Susan, and sandy milkweed
Non-native plants	Plants not naturally found in prairies, including smooth brome and Canada thistle
Grasshoppers	A native prairie insect that eats both native and non-native plants
NONLIVING	
Soil moisture	Can be dry, medium dry, or wet

5. Repeat Procedure Steps 4 and 5 two more times so you collect data from a total of three data sampling points.
6. Repeat Procedure Steps 4–6 for Prairie Transect 2, recording your results in the “Transect 2” table.
7. With your group, discuss the differences you observed in Prairie Transects 1 and 2 based on the data you collected.
8. As a class, calculate the average number of native and non-native plants found in Prairie Transects 1 and 2. Also, note any differences in the soil moisture between the two locations. Discuss the differences you observed in the data you collected.
9. As a class, calculate the average number of grasshoppers found in the two prairie transects. Discuss why you think the scientists have started collecting data on the number of grasshoppers.
10. With your group, discuss what patterns you detected. What might be causing these patterns?
11. As a class, discuss what you would tell the scientists about their efforts to restore the prairie in these two different locations. Are they on the right track? Should they do anything differently in the future? What other questions should the scientists ask themselves?

<i>TRANSECT 1</i>	<i>SAMPLING POINT __</i>	<i>SAMPLING POINT __</i>	<i>SAMPLING POINT __</i>
<i>Native plants</i>			
<i>Non-native plants</i>			
<i>Grasshoppers</i>			
<i>Soil moisture</i>			

<i>TRANSECT 2</i>	<i>SAMPLING POINT __</i>	<i>SAMPLING POINT __</i>	<i>SAMPLING POINT __</i>
<i>Native plants</i>			
<i>Non-native plants</i>			
<i>Grasshoppers</i>			
<i>Soil moisture</i>			

ANALYSIS

1. How did the samples vary across the groups in your class? Why do you think this is?
2. How did the average number of native plants, non-native plants, and grasshoppers differ in the two prairie locations?
3.
 - a. When you compared the two prairie transects, what patterns did you detect?
 - b. What factors or relationships might be the cause of these patterns?
4. Based on the data, does the current process for restoring the prairie seem to be working? Explain your reasoning.

TAKING A LOOK OUTSIDE

How would you describe your local environment? For example, what kinds of organisms are common? What kinds of physical features are in the environment? Are there a lot of human-built structures? What kinds of patterns and relationships can you detect?

Ecologists categorize the two kinds of components of an ecosystem as biotic or abiotic. **Biotic** components are the living organisms in an environment, while **abiotic** components include all of the physical, nonliving components of the environment, including water, temperature and sunlight.

In this activity, you have the opportunity to investigate some of these questions by conducting a transect on your school grounds or another local area. Like in the previous activity, you will keep track of both biotic and abiotic components.

GUIDING QUESTION

What patterns do you observe when you investigate your own environment, and what might be causing these patterns?

MATERIALS

For each group of four students

- 1 piece of string or rope at least 10 meters (m) long
- 1 quadrat
- 1 magnifier
- 1 thermometer
- flagging tape

PROCEDURE

1. As a class, work with your teacher to decide where you will conduct this transect. Think about locations you would like to learn more about and where you are most likely to observe interactions between biotic and abiotic components of the environment.
2. As a class, discuss why you are interested in the chosen location and what you would like to learn about. What initial questions do you have about this environment?
3. Brainstorm what kinds of organisms you expect to find at the location. Also consider what abiotic components you expect to find or that you want to measure.
4. Discuss what questions you want to try to answer as you are collecting your data.
5. As a class, decide how long to make your transects. A reasonable length would be between 10 m and 100 m, depending on the location you will sample. Also, decide on the distance between samples along your transect. For example, if your transect is 10 m long, you may decide to sample every meter, or if your transect is 100 m long, you may decide to sample every 10 m.

6. You will use the quadrat method for your transect. Ensure that you know how to use your quadrat.
7. Each group should cut a piece of string the length of the transect. Mark it at the distances you determined in Procedure Step 5 by tying a piece of flagging tape tightly around the string. As shown in the picture in the introduction, place your quadrat along the side of the string, with the flagging tape centered on one side of the quadrat.
8. As a group, decide where you will place your transect. The transect line should cut straight across the environment you will be sampling.
9. Create a group data table in which to record patterns you find in your quadrat. Your table should contain rows for each quadrat sampling point and columns for each component you will investigate.
10. At each quadrat sampling point, record everything you find or measure. Are you finding biotic or abiotic items? Be sure to look closely for living organisms—they may be under leaves or grass, or in cracks in the pavement.
11. Share your data with the whole class as instructed by your teacher.
12. In your group of four, discuss the following. Be prepared to share your ideas with the class.
 - What organisms did you observe?
 - What abiotic components did you observe?
 - Did you notice any patterns in where you found certain organisms?
 - What might cause these patterns?
13. As a class, based on your results so far, discuss what questions you have about your environment and how you would test those questions.

ANALYSIS

1. What was the most common biotic component in your group's transect?
2. What other components did you note? Were those biotic or abiotic?
3. Describe the relationships you see between the most common type of organism and other components of the environment.
4. What questions would you like to ask about the environment?
5. How would you test those questions?