

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class/Period: \_\_\_\_\_

**Lesson 2.1: Different measures for different needs.**

**Purpose**

Scientists have developed multiple measures to evaluate the biodiversity of a particular site. To understand why scientists use different methods to evaluate biodiversity we will develop our own methods to evaluate the diversity of an everyday object: the cell-phone.

The review below rates each cell phone company from very good (score of 5), good (score of 4), fair (score of 3), poor (score of 2), and very poor (score of 1) on several categories.

<b>Rating Category</b>	<b>Company A</b>	<b>Company B</b>	<b>Company C</b>
Cost of phone	\$100	\$60	\$90
Call Quality and Reliability	5	3	4
Number of free minutes	5	4	4
Available features (call waiting, redial when busy)	5	4	4
Phones are easy to use	4	4	4
Coverage area	5	4	5
Other media (phones play music and videos)	Not Available	4	5
Downloadable Games	Not Available	4	3
Thickness/Size of Phones	4	1	3
<b>Average Score</b>	<b>4.70</b>	<b>3.50</b>	<b>4.0</b>
<b>Total Number of Plan Features</b>	<b>6</b>	<b>8</b>	<b>8</b>

1. Based upon the data in the table, which cell-phone company's plan would you buy? Why? What were the factors that most influenced your decision?
  
2. Do you think your classmates will agree with you that Company \_\_\_\_\_ is the best? Why or why not?

Name: \_\_\_\_\_ Period/Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Lesson 2.3: Examining Biodiversity measures**

**Purpose**

In the previous lesson, you examined three different urban sites and discussed which one you felt had the greatest biodiversity. In this activity, you are going to revisit those sites, examining specific bird data and using different measures of biodiversity.

**Prediction**

Look at the data in the table below. Which of the three sites do you think will have the greatest biodiversity using the Simpson and Shannon-Weaver indices? Why?

**Procedure**

1. For each site record the species richness in the data table on the next page.
2. Describe the species evenness for each site in the table (e.g. even number of each species, a couple of dominant species with high numbers and the rest are low.)
3. Open the spreadsheet *biodiversity\_measures.xls*. The data for the three sites is recorded in the table below. You will need to add the data from one site at a time to calculate the Simpson and Shannon-Weaver indices.
4. Start with Site #1. Species #1 will be the Rock Dove so change the species number to 32. Repeat this with all 10 species. After adding all of the data, record the final Simpson and Shannon-Weaver Indices in the data table on the next page.
5. Repeat the procedure for Site #2 and then Site #3.

Species of Bird	# of individuals counted at site		
	Site #1	Site #2	Site #3
Rock Dove (pigeon)	32	44	20
Black Capped Chickadee	4	22	23
European Starling	43	47	25
House Sparrow	15	42	25
Song Sparrow	1	6	20
House Finch	23	45	24
Dark-eyed Junco	0	0	20
American Crow	4	4	20
Common Grackle	0	5	23
American Robin	0	4	20
<b>Total Number</b>	122	219	220

**Results:**

Record below the species richness. Then use the excel sheet to calculate the Shannon Weaver and Simpsons indices for both sites. Record both indices below.

<b>Site</b>	<b>Species Richness</b>	<b>Species Evenness</b>	<b>Simpsons</b>	<b>Shannon-Weaver</b>
<b>Site 1</b>				
<b>Site 2</b>				
<b>Site 3</b>				

**Conclusion**

1. Which of the three sites had the greatest biodiversity? Explain why it has the highest biodiversity.

**Further Exploration**

1. What do you think will happen to the Simpsons and Shannon-Weaver index if there is only one species? Will it be high, in the middle or low? First make a prediction. Then use the spreadsheet to test your idea and then record your results.



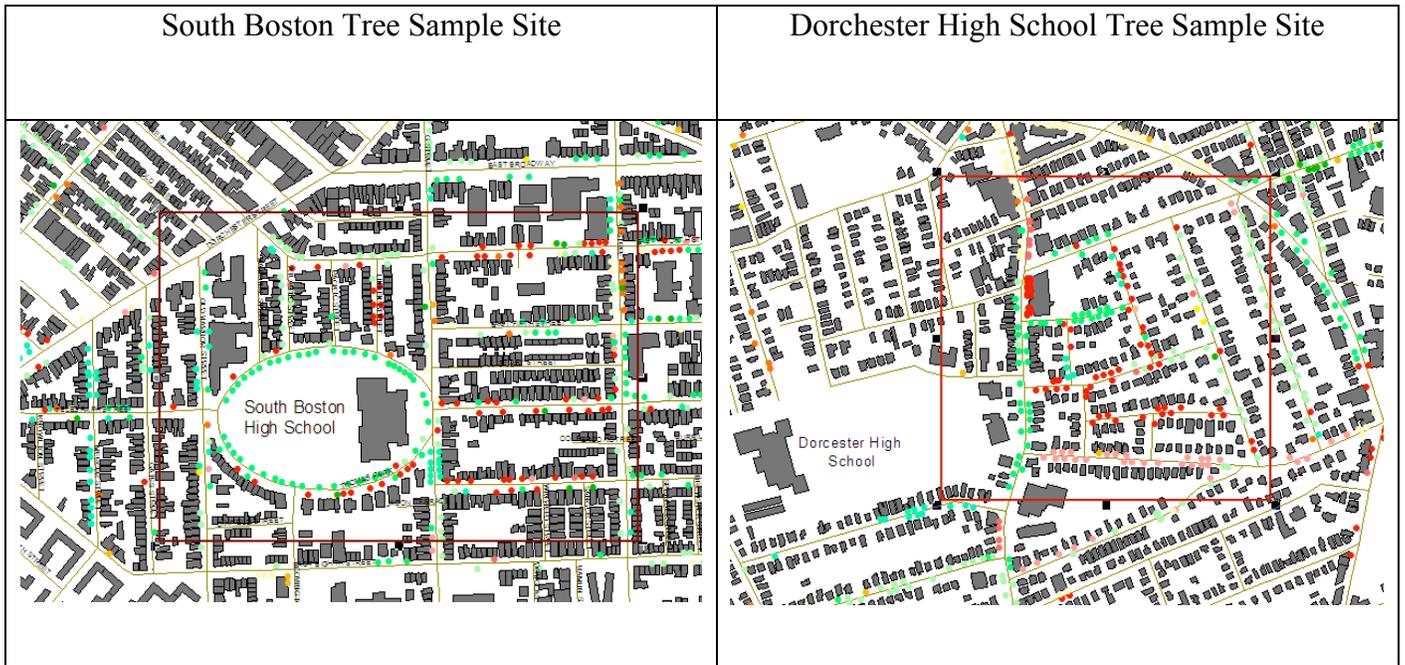


Name: \_\_\_\_\_ Period/Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Lesson 2.4: Measuring biodiversity using tree data – Version 2**

**Background**

During the summer of 2006 a group of volunteers conducted an urban street tree inventory and collected data about trees in the entire city of Boston. Below are two images from the neighborhoods of South Boston and the Codman Square area near Dorchester High School. The square is the study area in which trees were sampled and each dot represents a tree. The gray areas are buildings. The different color dots represent a different species of tree.



South Boston Tree Sample	
American Elm	3
American Sycamore	5
Elm hybrids	5
Green Ash	8
Honey Locust	65
Japanese Tree Lilac	6
Japanese Zelkova	6
Littleleaf Linden	64
London Planetree	12
Norway Maple	38
Total Trees	212
Total Species	10

Dorchester High School Tree Sample	
Callery Pear	7
Ginkgo	26
Green Ash	14
Honey Locust	49
Littleleaf Linden	68
Norway Maple	33
Total Trees	197
Total Species	6

**Prediction**

Looking at the data, predict which area do you think has the greatest tree biodiversity? Why?

**Results**

Record below the species richness. Then use the excel sheet to calculate the Shannon Weaver and Simpson indices for both sites. Record both indices below.

<b>Site</b>	<b>Species Richness</b>	<b>Simpsons</b>	<b>Shannon-Weaver</b>
<b>South Boston</b>			
<b>Dorchester High School</b>			

**Conclusion**

1. Which site has a higher biodiversity? What is your evidence that it has a higher biodiversity?
  
  
  
  
  
  
  
  
  
  
2. What do you think is the best indicator of biodiversity, the number of species, the number of individuals, the evenness, or a combination of all three indicators? Why?