PARKING LOT DIVERSITY – Teacher's Guide

DESCRIPTION:
Students will get an introduction to sampling and measuring biodiversity by sampling the make and type of vehicles in the parking lot. They will compare the "community" composition and diversity of vehicles in two different areas of the lot.

For this activity, students record data on vehicles in the school parking lot. They will be sampling vehicle **make (Honda, Ford), style (SUV, Sedan)** to get an idea of how diverse the vehicles are at the school. Once the students have recorded these data, they will use tables and graphs to see difference in "species" richness in parking lots.

GRADE LEVEL:
7th

OBJECTIVES: Students will:

- Estimate "biodiversity" by sampling an area

NEXT GENERATION SCIENCE STANDARDS:

This activity supports the following Performance Expectations:

MS-LS2-4. Construct an argument supported by evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-5. Evaluate competing solutions for maintaining biodiversity and ecosystem services.

This activity is aligned with the three-dimensional learning model of NGSS.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Planning and Carrying Out Investigations Analyzing and Interpreting Data	LS2.C Ecosystem dynamics, functioning, and resilience LS4.D Biodiversity and humans	Patterns Cause and Effect

COMMON CORE STATE STANDARDS:

English Language Arts

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6.8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 6-8 texts and topics*.

Mathematics
7.RP.A.2. Recognize and represent proportional relationships between quantities.
7.SP.A.1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

BEST PAIRED WITH AMPLIFY:
Populations and Resources Unit

MATERIALS:
- Parking Lot Diversity Student Handout [1 per student]
- Vehicle Identification Key [1 per group of 3]

BACKGROUND:
Scientists are often interested in the diversity of living things, which is called biodiversity. Biodiversity is the existence of a wide variety of plants and animals in an environment. We can see that diversity is everywhere. No matter where you look, you will find it. Animals, plants, landscapes, people, clothing, jewelry, computers and cell phones are all examples of things that have diversity.

TIPS FOR ENTIRE CLASS PARTICIPATION:
- Divide the parking lot into areas and have each group of students record data from one area.
- Teams of three work well (one data recorder, one observer for vehicle make, one observer for vehicle type).

PROCEDURES:

1. Discuss biodiversity and how scientists measure it.

2. Discuss some of the different locations within the parking lot that your students might be interested in comparing (e.g., teacher's lot, administration spaces, close to school entrance vs. further away).

3. Review the Vehicle Identification Key. We will be recording data on the vehicle companies (Make) and type of vehicle. Have students make a hypothesis on page 1 of their worksheet.

4. Break students into groups of three and give each group a worksheet. Explain to students that they do not need to get close to the vehicles to identify them.

My Observations of Parking Lot Diversity Data Sheet

Vehicle	Make	Type
1	Volkswagen	SUV
2	Nissan	Sedan
3	Nissan	Sedan
4	Mercury	SUV
5	Buick	Sedan
6	Chevrolet	Truck
7	Nissan	Sedan
8	Dodge	Van
9	BMW	Sedan
10	Dodge	Van

Figure 1. Student Data Sheet Example

5. Take students outside to the parking lot. Depending on the school's parking arrangement, some may be able to do this exercise without even stepping foot in the parking lot. In other schools, you may need to walk down the center of the drivable part of the lot.

6. Each group will write down the make and type of ten vehicles using the Vehicle Identification Key. See Figure 1 for an example of what students may write.

7. Back in the classroom, summarize the entire class's data on the class data table. See Figure 2.

Class Vehicle Make Data Sheet

	Parking Lot Location #1 – Back Lot					Parking Lot Location #2 – Front Lot				
Make	Group 1	Group 2	Group 3	Group 4	TOTAL	Group 5	Group 6	Group 7	Group 8	TOTAL
Acura			1		1				1	1
BMW	1				1					0
Buick	1		3		4	1		2		3
Cadillac					0					0
Chevrolet	1		2		3		1		2	3
Dodge	2		1		3	1	1		2	4
Ford		3	1		4	2	3		1	6
GMC		1			1	2		1		3
Honda			3		3				3	3
Hyundai		2		2	4				1	1
Jeep		2		3	5		2			2
Kia				1	1			1		1
Lincoln					0					0
Mercedes					0	1				1
Mercury	1			2	3			3		3
Mitsubishi				1	1					0
Nissan	3				3			2		2
Pontiac					0		1			1
Toyota				1	1	3				3
Subaru					0		1			1
Volkswagen	1	1			2		1			1
Other		1			1			1		1

Class Vehicle Type Data Sheet

	Parking Lot Location #1 – Back Lot					Parking Lot Location #2 – Front Lot				
Type	Group 1	Group 2	Group 3	Group 4	TOTAL	Group 5	Group 6	Group 7	Group 8	TOTAL
Motorcycle		1			1					0
Sedan	5	2	5	1	13	6	3	6	2	17
Sport		1		2	3	2		1	1	4
SUV	2		3	2	7	1	2	3	4	10
Truck	1	1	2	1	5	1	3		1	4
Van	2	2		3	7		1		2	3
Wagon		1		1	2		1			1
Other		1			1					0

Figure 2. Class Data Sheet Examples

8. Graph the make and type. See Figure 3 for an example of how students may make their graph.

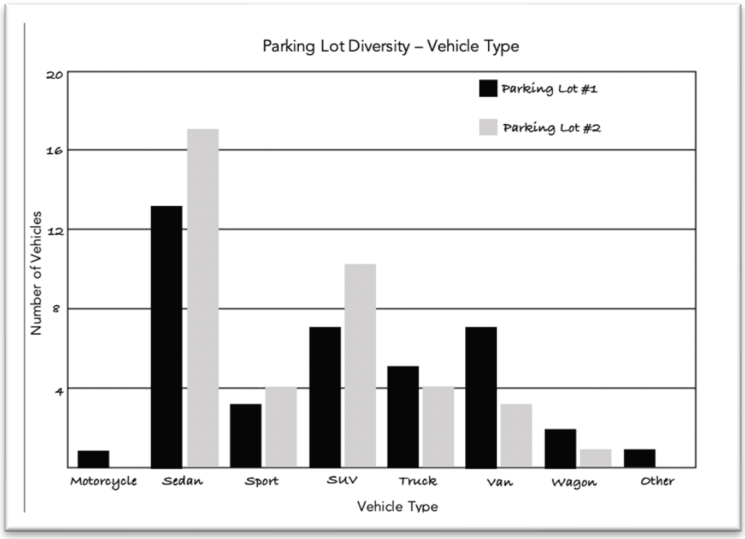

Figure 3. Student Graph Example

CONCLUSIONS:

Allow students to draw conclusions from the data sheets and graph. Students should answer the following:

- Which makes were not represented in the parking lot? Why?
- What is the most common type of vehicle in your parking lot?
- What might have happened over the last three years that might influence the make and type of vehicles you see in your parking lot?
- Would you expect these (large events) to happen in nature as well?
- Did the makes and types vary between different groups' data? Why might this have happened?
- How does each car fill a specific niche in the vehicular world?

- What animal could you relate to the most expensive cars in the lot?
- Discuss the sample size of this investigation. Did we count all of the vehicles in the parking lot? Is the number counted enough to make a generalization about the entire population of vehicles?

EXTENSION:

Have students use a computer to look at www.kbb.com (or other similar sites) for car prices and compare the average vehicle price in different areas of the parking lot.