The Bare Necessities of Life: Food, Water, Shelter, Space
Environmental Education Lesson Plan

Purpose/Rationale:

The purpose of this lesson is to enable students to envision and understand how living organisms are interrelated with the components of their habitat.

Through the Engage activity, "Habitat Lap Sit," students will identify the components of a habitat that are essential to life (food, water, space, shelter), and they will recognize how change or loss of any of these components significantly affects life in the habitat.

Through the "Oh Deer!" activity, students will further explore the essential components of a habitat, gain an understanding of the relationship between habitat resources and population size, and explore the concept of competition as it relates to their deer habitat.

Standards:

Virginia SOLs – Life Science

LS.4 The student will investigate and understand that the basic needs of organisms must be met in order to carry out life processes. Key concepts include:
b) animal needs (food water, gases, shelter, space); and
c) factors that influence life processes

LS.8 The student will investigate and understand that interactions exist among members of a population. Key concepts include
a) competition, cooperation, social hierarchy, territorial imperative; and
b) influence of behavior on a population

LS.11 The students will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time (daily, seasonal, and long term). Key concepts include
b) factors that increase or decrease population size

Virginia SOLs – Math 7

7.17 The student, given a problem situation, will collect, analyze, display, and interpret data, using a variety of graphical methods, including
b) line plots;

7.18 The student will make inferences, conjectures**,** and predictions based on analysis of a set of data.

National Science Education Standards: Content Standards for Life Science

- ✧ Regulation and Behavior
  - o All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
- ✧ Populations and Ecosystems
  - o A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.
  - o The number of organisms an ecosystem can support depends on the resources available and abiotic actors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factor, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

Materials and Resources:

** This activity requires an outdoor playing field, or an indoor area large enough to allow for running.

Colored index cards/construction paper squares for designating "food," "water," "space," and "shelter" roles

Tape or rope to mark edges of playing field

Clip board, paper, and pencil to record population sizes during each round

Overhead projector or chalkboard

Activity sheet

Graph paper, pencils

Safety and Management:

This activity requires an area large enough for running.

The teacher should make sure that all students are aware that they must be gentle with one another throughout this activity. Pushing, shoving, and excessive force will not be tolerated. In addition, the teacher should be sure to have a first aid kit handy in case of injury during this active simulation.

Procedures:

Engage: Habitat Lap Sit (15 minutes)

1. Have students go to designated outdoor playing field or indoor area large enough for activity.

2. Have students form a circle, standing shoulder to shoulder.

3. Ask students to list the components of a habitat that are the basic needs of life (food, water, shelter, space).

4. Going around the circle, assign each student the role of one of the basic needs. Start with the first student saying "food," the next saying "water," the third saying "shelter," and the fourth saying "space." Continue around the circle until each student has the role of a habitat component.

5. Ask the students to turn toward their right, and take one step towards the center of the circle. They should be standing close together.

6. Ask everyone to listen carefully. Students should place their hands on the shoulders of the person in front of them. At the count of three, ask the students to sit down slowly on the knees of the person behind them, keeping their own knees together to support the person in front of them.

7. As the students are sitting say, "Food, water, shelter, and space in the proper arrangement are needed to have a suitable habitat."

8. The students at this point may either fall or sit down.

9. Explain to students how food, water, shelter, and space are interconnected and necessary for an animal's survival.

10. Let the students form their Lap-Sit Circle again. This time, ask them to hold their lab-sit posture. State: "It's a drought year; the water supply is reduced because of drought

conditions," and have the students representing water leave the lap-sit circle. The circle should collapse or be disrupted.

11. Relate this event to a real habitat. Discuss the significance of this component in relation to the habitat. Ask students what would happen if a different component of the habitat were removed.

Explore: Oh Deer! (20 minutes)

1. Review the essential components of a habitat with students. All components must be in a suitable arrangement for a population to reach its maximum size.

2. Have students count off by fours. Have all the "ones" line up on one side of the playing field, and have the rest of the students line up on the other side. The playing field should be set up with two parallel lines marked on the ground 10 to 20 yards apart. Students should be lined up along these two lines, with opposite sides facing each other.

3. All the "ones" are "deer." The rest of the students are components of the habitat. All deer need a good habitat to survive. For each round, each deer must choose which component of the habitat they will be searching for (food, water, shelter, or space) by selecting an index card color coded and labeled for that component. For example, blue cards will represent water, green cards represent shelter, yellow cards represent space, and red cards represent food. Deer cannot change which habitat component they are searching for during the round, but they may select a new component before the next round.

4. All students numbered "two," "three," or "four" become components of the habitat. For each round, these students choose which components of the habitat they will be by selecting an index card coded for that component. The "habitat components" and the "deer" should be standing with their backs facing the other line when choosing which habitat component they will be/will be searching for.

5. The activity starts with all players lined up behind their respective lines (deer on one side, habitat components on the other), with their backs facing one another.

6. Have all students to choose their habitat component cards (deer deciding what they are looking for, habitat components deciding what they are).

7. When students are ready, say "Oh, Deer!" Deer and habitat components turn to face one another, holding out their cards where they can be clearly seen.

8. When deer see the habitat component they are searching for, they should run to it. As the deer reaches its necessary habitat component, he takes the "food," "water," "shelter," or "space" back to the deer side of the line. The habitat components remain in place until captured by a deer. Habitat components are captured when touched gently on the shoulder by a deer.

9. Capturing a component of the habitat represents the deer successfully meeting its needs, and successfully reproducing as a result of meeting its need. The captured habitat component becomes a deer for the next round.

10. Any deer that fails to find its habitat component "dies," and moves to the habitat component line of the playing field. This deer becomes a habitat component for the next

round, signifying how more food, water, shelter, and space is available to the deer remaining alive.

11. If no deer needs a particular habitat component during a round, the habitat component remains on the habitat line for the next round. This habitat component can change which component it is for the next round.

12. The teacher (or a designated student) should record the number of deer at the beginning of the activity and at the end of each round.

13. Continue the activity for approximately 10 rounds.

14. At the end of the 10 rounds, return to the classroom to discuss the activity.

Explain (10 minutes)

1. Have students talk about what they experienced and saw.
   ~During round one, there were a small number of deer with plenty of resources. Therefore, the population increased.
   ~After a few rounds, the deer population became too large to be supported by the habitat components (the deer exceeded their carrying capacity), and the deer began to die of starvation, thirst, or lack of shelter and space.

2. Have students create a chart of the data collected during the activity. Students should record the number of deer at the beginning of the activity and at the end of each round. Each round represents one year of time.

3. Discuss the activity: What is realistic and unrealistic about this simulation?

Elaborate (30 minutes - to be completed as homework, and discussed the following day)

1. Have students construct a graph from the deer population data. Students should be sure to include a title and axis labels on their graph. This graph should serve as a visual reminder their experience during the activity: the deer population fluctuated over a period of years. This process is natural as long as the factors that limit the population do not become excessive to the point where the animals cannot successfully reproduce.

2. Have students draw conclusions from their graphs about the relationship between habitat resources and deer population size.

3. Have students predict what would happen to the deer population if a) there was a drought, b) part of the habitat was cleared for urban development?, and c) there were unlimited supplies of all habitat resources to meet the needs of the deer.

4. Have students relate the concept of "competition" to the "Oh, Deer!" simulation.

Note: Questions for the Elaborate section can be found on "The Bare Necessities of Life: Food, Water, Shelter, Space Activity Sheet."

Additional Extensions:
If time permits, the class could perform a variation of "Oh, Deer" that introduces a predator into the simulation. In this case, the teacher would select a student to be the he predator (a mountain lion or wolf). This predator would skip or hop to their prey as they are searching for their habitat component. Each predator can capture one deer. When a deer is captured by a predator, it would then be escorted to the predator den. This "eaten" deer becomes a predator for the next round. Any predator that fails to capture a deer "dies" and becomes part of the habitat for the next round; they become available to surviving deer as water, food, shelter, or space. During each round, the teacher should keep track of the number of predators and deer. This data can be incorporated into graphs and used to explore the dynamic relationship between predator and prey.

Evaluate
Students will proved the following evidence for understanding the basic needs of life:

Performance Criteria	Evidence	Points of Rating*
Students should be able to calculate percentages from data provided.	Correct calculation of percentages on activity sheet	
Students should be able to represent data as a ratio.	Correct ratios on the activity sheet	
Students should be able to draw conclusions about resource availability and population size from their graph.	Completion of Question 4 on activity sheet.	
Students should demonstrate the ability to apply the "Oh, Deer!" experience to new situations.	Completion of Question 5 on activity sheet.	
Students should be able to relate the concept of competition to their experience with "Oh, Deer!"	Completion of Question 6 on activity sheet.	

*3 = completes activity and explanation without mistakes
2 = completes activity and explanation with minor mistakes
1 = completes activity but offers incomplete explanation
0 = does not complete activity or explanation

***This activity was adapted from *Project Wild: K-12 Curriculum & Activity Guide*

The Bare Necessities of Life: Food, Water, Shelter, Space
Activity Sheet

1. Fill in the data chart to the right with the data collected during the "Oh, Deer!" activity.

2. On graph paper, make a double line graph from your data.

3. What components of a habitat are necessary for life?

Year	Number of Deer	Amount of Resources

4. Looking at your graph, you should notice that your deer population is <u>dynamic</u> (it changes in size over time).

a) Explain how your deer population changes over time.

b) How does the amount of resources in your habitat affect your deer population?

5. What would happen to our deer population if:

a) there was a drought?

b) part of the habitat was cleared for urban development?

c) there were unlimited supplies of all habitat resources to meet the needs of the deer?

6. Individual organisms of a population interact with one another in a variety of ways. One type of interaction is competition, which occurs when members of a population compete for the basic needs of life.

a) How did you feel as you competed with the other "deer" for the habitat resources?

b) How did this competition affect our deer population?

c) What types of things might deer compete for in nature?

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Example of Data Chart and Graph

This is an example of the data that could be collected from a class of 22 students.

Data Chart:

Year	Number of Deer	Amount of Resources
1	6	16
2	12	10
3	20	2
4	4	18
5	8	14
6	16	6
7	12	10
8	20	2
9	4	18
10	8	14
11	16	6
12	12	10
13	20	2
14	4	18
15	8	14

Graph: