“Oh Deer”

Modified from: Project WILD

Overview & Objectives

Students will become different components of an ecosystem and learn about habitat interactions in this kinesthetic learning activity. By graphing the results of this game, students can discuss topics in population dynamics, limiting factors, and carrying capacity. Students will understand animals' basic needs for survival: food, water, shelter, and space. Students will learn that limiting factors such as lack of resources or diseases naturally regulate animal populations. Students will understand that some population fluctuations are part of natural cycles as ecological systems undergo constant change.

Materials

• Chalk board or dry erase board

• Chalk or dry erase markers

Next Generation Science Standards:

Cross-cutting concepts: Patterns; Cause & Effect; Stability & Change

Science & Engineering Practices: Constructing Explanations; Engaging in argument from evidence

Disciplinary Core Ideas: LS2: Ecosystems: interactions, energy & dynamics

Vocabulary

• carrying capacity: the maximum population size of the species that the environment can sustain, given the food, habitat, water and other necessities available in the environment

• limiting factors: a factor that controls an organism’s population, size, or distribution

• habitat: the natural environment in which an organism lives

Background

Carrying capacity refers to the dynamic balance between the availability of habitat components and the number of animals the habitat can support. A variety of factors related to carrying capacity affect the ability of wildlife to successfully reproduce and to maintain their populations over time. The most fundamental of life's necessities for any animal are food, water, shelter, and space in a suitable arrangement. Without these essential components, animals cannot survive. However, some naturally-caused and culturally-induced limiting factors serve to prevent wildlife populations from reproducing in numbers greater than their habitat can support. Disease, predator/prey relationships, varying impacts of weather conditions from season to season (e.g., early freezing, heavy snows, flooding, drought), accidents, environmental pollution and habitat destruction and degradation are among these factors. An excess of such limiting factors leads to threatening, endangering and eliminating whole species of animals.

This activity illustrates that:

- good habitat is the key to wildlife survival
- a population will continue to increase in size until some limiting factors are imposed
- limiting factors contribute to fluctuations in wildlife populations
- nature is never in "balance," but constantly is changing

Wildlife populations are not static. They continuously fluctuate in response to a variety of stimulating and limiting factors. We tend to speak of limiting factors as applying to a single species, although one factor may affect many species. Carrying capacity limitations can result in competition between and among domestic animals, wildlife, and humans.

Natural limiting factors, or those modeled after factors in natural systems, tend to maintain populations of species at levels within predictable ranges. This kind of "balance in nature" is not static but is more like a teeter-totter than a balance. Some species fluctuate or cycle annually. Quail, for example, may start with a population of 100 pairs in early spring, grow to a population of 1,200 birds by late spring and decline slowly to a winter population of 100 pairs again. This cycle appears to be almost totally controlled by the habitat components of food, water, shelter, and space, which are also limiting factors. Habitat components are the most fundamental and the most critical of limiting factors in most natural settings.

This activity is a simple but powerful way for students to grasp some basic concepts: first, that everything in natural systems is interrelated; second, that populations of organisms are continuously affected by elements of their environment; and third that populations of animals continually are changing in a process of maintaining dynamic equilibrium in natural systems.

Preparation

Set up boundaries by marking out two parallel lines 10 - 20 yards apart on the floor or ground.

Procedure

1. Tell students they will be participating in an activity that emphasizes the most essential things animals need in order to survive. Review the essential components of habitat with the students: food, water, shelter, and space in a suitable arrangement. This activity emphasizes three of those habitat components—food, water and shelter—but the students should not forget the importance of the animals having sufficient space in which to live, and that all the components must be in a suitable arrangement for wildlife populations to reach their maximum size.

2. Ask the students to count off in fours. Have all the "ones" go to one area; all "twos," "threes," and "fours" go together to another area. Mark two parallel lines on the ground or floor 10 to 20 yards apart. Have the "ones" line up behind one line; the rest of the students line up behind the other line, facing the ones.

3. The "ones" become "deer." All deer need good habitat in order to survive. Again, ask the students what the essential components of habitat are: food, water, shelter, and space in a suitable arrangement. For the purposes of this activity, assume that the deer have enough space in which to live. The deer (the "ones") need to find food, water, and shelter in order to survive. When a deer is looking for food, it should clamp its "hooves" over its stomach. When it is looking for water, it puts its "hooves" over its mouth. When it is looking for shelter, it holds its "hooves" together over its head. A deer can choose to look for any one of its needs during each round or segment of the activity; the deer cannot, however, change what it is looking for (e.g., when it sees what is available during that round). It can change what it is looking for in the next round, if it survives.

4. The "twos," "threes" and "fours" are food, water and shelter—components of habitat. Each student is allowed to choose at the beginning of each round which component he or she will be during that round. The students depict which component they are in the same way the deer show what they are looking for; that is, hands on stomach for food, etc.

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

6. Begin the first round by asking all of the students to make their signs—each deer deciding what it is looking for, each habitat component deciding what it is. Give the students a few moments to put their hands in place—over stomachs, mouths or over their heads. (The two lines of students normally will display a lot of variety—with some students portraying water, some food, and some shelter. As the activity proceeds, sometimes the students confer with each other and all make the same sign. That's okay, although don't encourage it. For example, all the students in habitat might decide to be shelter. That could represent a drought year with no available food or water.)

NOTE: Switching symbols in the middle of a round can be avoided by having stacks of three different tokens, or pieces of colored paper, to represent food, water, and shelter at both the habitat and deer ends of the field. At the start of each round, players choose one of the symbols before turning around to face the other group.

7. When the students are ready, say: "Oh Deer!" Each deer and each habitat component turn to face the opposite group, continuing to hold their signs clearly.

8. When deer see the habitat component they need, they are to run to it. Each deer must hold the sign of what it is looking for until getting to the habitat component student with the same sign. Each deer that reaches its necessary habitat component takes the "food", "water", or "shelter" back to the deer side of the line. "Capturing" a component represents the deer successfully meeting its needs and successfully reproducing as a result. Any deer that fails to find its food, water or shelter dies and becomes part of the habitat. That is, any deer that died will be a habitat component in the next round and so is available as food, water, or shelter to the deer that are still alive.

NOTE: When more than one deer reaches a habitat component, the student who arrives there first survives. Habitat components stay in place until a deer chooses them. If no deer needs a particular habitat component during a round, the habitat component just stays where it is in the habitat. The habitat component can, however, change which component it is from round to round.

9. Record the number of deer at the beginning of the activity and at the end of each round. Continue the activity for approximately 15 rounds.

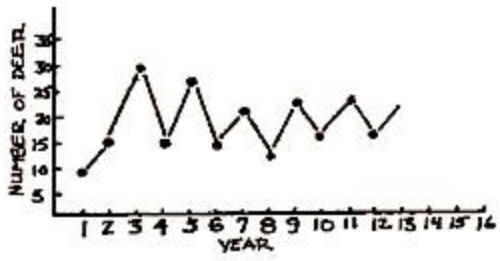
Review & Summarize

1. At the end of the 15 rounds, gather the students together to discuss the activity. Encourage them to talk about what they experienced and saw. For example, they saw a small herd of deer (seven students in a class size of 28) begin by finding more than enough of its habitat needs. However, because the population of deer expanded over two to three rounds of the activity until it exceeded the carrying capacity of the habitat, there was not sufficient food, water, and shelter for all the members of the herd. At that point, deer

starved or died of thirst or lack of shelter, and they returned as part of the habitat. Such things happen in nature also.

NOTE: In real life, large mammal populations might also experience higher infant mortality and lower reproductive rates.

2. Using an overhead projector, a flip chart pad, or an available chalkboard, post the data recorded during the activity. The number of deer at the beginning of the activity and at the end of each round represents the number of deer in a series of years. That is, the beginning of the activity is year one; each round is an additional year. Deer can be posted by fives for convenience. For example: The students will see this visual reminder of what they experienced 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. The wildlife populations will tend to peak, decline and rebuild; peak, decline, and rebuild—as long as there is good habitat and sufficient numbers of animals to reproduce successfully.



3. What is realistic and unrealistic about this simulation? (Deer that don't survive do become recycled as nutrients but it is not instantaneous. Deer need all habitat components to survive. Poor habitat usually results in a weakened individual that succumbs to disease, etc., not instant death.) What are other factors that might affect the deer population? (Examples include disease, dramatic weather changes, habitat destruction, elimination or introduction of predators, pollution, the introduction of competing species, etc.)

4. In discussion, ask the students to summarize some of the things they learned from this activity.

- What do animals need to survive?
- How do these components influence carrying capacity?
- What are some "limiting factors" that affect the survival of animals?
- How do factors limiting carrying capacity affect the health, numbers, and distribution of animals?
- How do these factors affect competition within a species?
- Why is good habitat important for animals?
- Are wildlife populations static, or do they tend to fluctuate as part of an overall "balance" of nature? Is nature ever really in "balance" or are ecological systems involved in a process of constant change?

Variations

1. After the students have played several rounds of "Oh Deer!", introduce a predator such as a mountain lion or wolf into the simulation. The predator starts in a designated "predator den" area off to the side. The predator has to skip or hop. This impediment reduces the possibility of violent collisions between deer and predators. The predators can tag deer only when they are going towards the habitat and are between the habitat and deer lines. Once a deer is tagged, the predator escorts the deer back to the predator den. The time it takes to escort the deer simulates the time it takes to eat. The "eaten" deer is now a predator. Predators that fail to tag someone die and become habitat. That is, in the next round the predators that died join the habitat line. They will become available to surviving deer as food, water, or shelter. During each round, keep track of the number of predators as well as the number of deer. If there is a student who cannot run due to a disability, illness, etc. have her or him toss a Nerf ball from the sidelines at the running deer, role-playing a car or a hunter. Any deer that get hit by the Nerf ball become a resource for the next round Incorporate these data into the graphs.

2. Instead of drawing the line graph for students as described in Step 11, have the students create their own graphs. Provide them with the years and numbers of deer.

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