A Habitat is Home

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Program Purpose:
The purpose of this program is to introduce students to the components of habitat and the limiting factors that influence the carrying capacity of populations.

Length of Program:
1½ - 2 hours

Age:
Grades 2nd – 8th
* The first three activities are appropriate for younger students; the fourth for students 4th grade and above*

Maximum Number of Participants:
25

Objectives:
After completion of all activities, students will be able to:

- Define habitat and identify its four components: food, water, shelter and space.
- Define the terms population, carrying capacity and limiting factor.
- Describe the dynamic nature of populations.
- Explain how limiting factors, predation and natural or human caused disturbances can combine to determine the carrying capacity of a population in a particular environment.
- Describe how both the quantity and quality of habitat determine the survival of individuals in populations.

Wisconsin Standards:
A.8.4 Use critical-thinking strategies to interpret and analyze gathered information
A.8.6 Use models and explanations to predict actions and events in the natural world
F.8.2 Show how organisms have adapted structures to match their functions, providing means of encouraging individual and group survival within specific environments
F.8.5 Show how different structures both reproduce and pass on characteristics of their group
F.8.8 Show through investigations how organisms both depend on and contribute to the balance or imbalance of populations and/or ecosystems, which in turn contribute to the total system of life on the planet
F.8.9 Explain how some of the changes on the earth are contributing to changes in the balance of life and affecting the survival or population growth of certain species

Preparation:
Before the class arrives:

- Obtain the "A Habitat is Home" kit and large dry erase board from the storage room.

Basic Outline:
I. Introduction *(10 minutes)*
II. "A Habitat is Home" song *(5 minutes)*
III. "Habitat Lap Sit" *(20 minutes)*
IV. "Oh Deer!" *(40 minutes)*
V. "How Many Bears Can Live In This Forest?" *(30 minutes)*
VI. Conclusion *(15 minutes)*

Materials:
Large dry erase board and several colored markers
25 envelopes
Five colors of 2" X 2" construction paper
25 pencils

Introduction:
Introduce yourself and the class. Explain that this class will focus on the concept of habitat. The students will learn the four components of habitat and how the presence or absence of these components can lead to changes in populations in nature.

Ask the students to define "habitat."

- *A **habitat** is the natural home of a plant or animal.*

Ask the students what is included in a plant or animal's habitat. All habitats must contain four elements to support life: food, water, shelter and space. Ask students to give examples of the four components for a given animal, such as deer or rabbits, and for a given plant, such as a white pine tree or raspberry shrub.

A Habitat is Home:
To help the students remember the four components, teach them the following song, sung to the tune of "The Farmer in the Dell." Tell the students they will need to remember the song for the next activity.

"A habitat is home,
A habitat is home.
Food, water, shelter, space
A habitat is home."

"Habitat Lap Sit":
This activity, adapted from Project WILD, demonstrates how all four components of habitat must be present in order to support life. If any components are missing, the

habitat will not sustain a species. Students will each become components of habitat and form a lap sit circle, demonstrating how each component of habitat contributes to supporting the survival of a species. The habitat lap sit circle is complete when the students can sing "A Habitat is Home" without anyone falling. After successfully completing the lap sit circle, give examples of scenarios where habitat components could be missing and pull out students representing those components. Watch what happens to the lap sit circle when these components are missing. See Appendix 1 for a complete description of the "Habitat Lap Sit" activity.

"**Oh Deer!":**
This activity builds upon the last by demonstrating how the absence of one or more components of habitat can cause population fluctuations in a herd of deer. For a complete description of "Oh Deer," see Appendix 2. Ask the students to define the term population, as it refers to wildlife.

- *A **population** is a group of individual plants or animals living in one area.*

Ask the students what happens to a population of animals or plants if some of the necessary components of habitat are missing. The missing component of habitat is called a "limiting factor."

- *A **limiting factor** is something that restricts how large a plant or animal's population can become by its absence.*

A limiting factor usually provides a "ceiling" (or highest number) that a population cannot rise above. Any component of habitat can become a limiting factor.
In the next activity, some students will represent the four components of habitat and use hand signals to designate which component they are. One quarter of the class will become deer; the rest will be habitat components. The deer must collect components of habitat. If they are successful, the 'habitat' students become deer. Meanwhile, one student will graph the deer population after each round.

After several rounds, introduce a predator; for example, a wolf, to prey on the deer. Record the wolf population on the same graph as the deer using a different marker. After about ten rounds, introduce natural or human caused disasters that eliminate certain components of habitat. For example, call the habitat students together and say that this year a terrible drought has occurred – no one can represent water as a habitat component. Or, perhaps a dam was built on a stream, flooding a large wooded area; now all students will represent the water component of habitat. Graph the results for both the deer and wolf populations.

After fourteen rounds, call the students together to examine the population graph. Use the following questions to help the students process the graphical data:

1) Over time, what was happening to the population of deer?
2) What happened to the population of deer when a predator was introduced?
3) How is the wolf population graph similar to and different from the deer population graph?
4) What effect did the natural and human caused disasters have on the population of deer?

Introduce the term carrying capacity to the students.

- *The **carrying capacity** is the number of plants or animals that a given habitat can support indefinitely.*

Ask the students to look at the graph and guess the carrying capacities of the habitat at different times. How many deer (on average) could the habitat support before the wolf was introduced? After? How many deer could the disturbed habitat support?

"How Many Bears Can Live In This Forest?":
This final activity demonstrates how both the quality and the quantity of habitat determine the carrying capacity of a habitat at a given time. If a habitat has a large supply of low quality food for a particular animal, a large amount of land may still be required to support even a small population of that animal. In addition, individual animals within a population have different needs. Some animals may be injured or have young to support, increasing the amount of habitat necessary to meet their needs. For a complete description of this activity, see Appendix 3.

In this activity, all students will become bears. Designate two students to be injured (hopping on one leg), and one student as a mother with cubs. Using envelopes to represent their "dens," students will collect scattered pieces of colored construction paper, each with a different letter and number. Each color of construction paper represents a different type of food. Students should try to collect as varied a diet as possible, bringing each individual piece of paper back to their dens for storage.

When all colored squares have been collected, students should calculate how many pounds of food they successfully collected, and compare it to the amount a typical bear would require for ten days (80 lbs.) Did the students survive? Have the students then calculate the percentage of each food type in their diets. Did the students have high or low quality diets? Have the students add up how many total pounds of food were in their habitat, and divide that number by 80 lbs. to find the carrying capacity of their habitat. How many bears could this habitat support indefinitely?

Ask the students what this activity taught them about the importance of quality of habitat for survival.

Conclusion:
Review with the students the definitions of the four vocabulary words, and the four components of habitat. Ask the students to describe populations in nature. Ask the students to describe how limiting factors, predation and natural or human caused disturbances can combine to determine the carrying capacity of a population in a particular environment. Ask what effect the quality of habitat has on the survival of individuals within a population.

References:
"Habitat Lap Sit", "Oh Deer!" and "How Many Bears Can Live In This Forest," *Project WILD K-12 Activity Guide,* Council for Environmental Education, 1992.

The Illustrated Dictionary of Ecology and Plant Life, Merilyn Holme, ed. 1993, ISBN 1-85737-002-3.