

3. HABITATS ON THE EDGE

(2) Habitats in a Hoop



Studying small sample areas can help students understand the **biodiversity** within different **habitats** at Bottomless Lakes State Park. (Field Trip / 60 min)

Connecting with Science Standards			
Strand/Category	Grade	Standard(s)	Benchmark(s)
Scientific Thinking/ Practice	4/5	Scientific methods	Observation, interpretation, investigation
		Scientific process	Communicating findings, graphic representation
Life Science	4/5	Form, structures, habitat	Components of food webs, habitat, ecosystems

Goal: Students will study and record **data** and observations within a sample area of a Hula Hoop®, determining which habitat contains the highest number of living things.

Objectives:

- Perform **random sampling measurements**
- Define and identify **consumers, producers** and **decomposers**
- Record data, map area and write/draw observations
- Calculate biodiversity index for each sample area

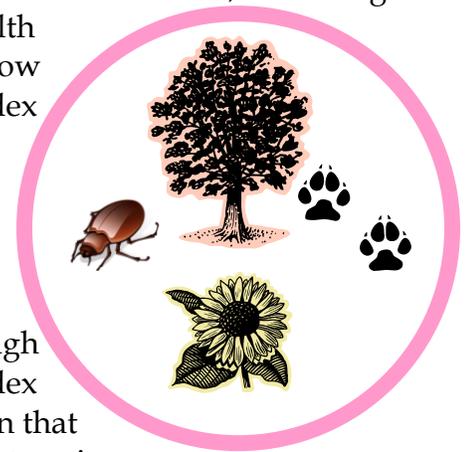
Materials:

- Hula Hoops® – one for every 3-4 students
- Clipboards
- Pencils
- Hand lenses
- Plant/animal identification cards
- Data recording and observation sheets
- Calculators

Background

Ecologists have developed methods to monitor the health of an environment by measuring its biodiversity. **Biodiversity** is a measurement of the number of different **species** of plants and animals that live in a particular habitat. Usually, the more varied the species of **consumers, producers** and **decomposers** that exist in an area, the healthier the **ecosystem**. Likewise, fewer species in a certain ecosystem may indicate harsher conditions.

Many different random sampling techniques and tools exist to estimate numbers of plant and animal species living in an ecosystem. Once data are collected, a **biodiversity index** is calculated, indicating the relative health of a habitat. A low biodiversity index indicates fewer varieties of plants or animals living in a particular ecosystem. A high biodiversity index is usually a sign that an ecosystem is teeming with a wide variety of animal and plant life and that the environment itself, such as soil, water and air, are relatively clean and healthy.



HABITATS ON THE EDGE

Hula Hoop Habitats



Another important factor in the study of biodiversity is the presence of **keystone species**. Keystone species are plants or animals that have been found to create a mini ecosystem within a larger habitat.

For this inquiry-based activity, students will randomly sample (study, observe, and report) the **producers**, **consumers** and **decomposers** within 2-3 different vegetative communities at Bottomless Lakes. **Producers** make their own food. **Consumers** eat the foods produced. **Decomposers** recycle nutrients back into the ecosystem.

Do we need to look at this whole area to get an idea of what is here? No. Scientists like to take smaller samples rather than look at a very large area in great detail. For example, you can eat a few potato chips and have a pretty good idea of what the rest of the chips in the bag are like. The staff at Bottomless Lakes can assist you with determining the best location for this activity.

Study Areas Along Wetland Trail:

- cattail marsh
- saltgrass marsh
- saltgrass wet meadow

Study Areas Along Bluff Trail:

- iodine bush flats
- alkali sacaton flats
- saltcedar thicket
- uplands/*grama* grass environs



Study Areas Along Bitter Lakes Trail

HABITATS ON THE EDGE

Habitats in a Hoop



Procedure:

1. Divide students into groups of 3 or 4.
2. Pass out one set of materials per group.
3. After choosing the habitat area of interest, (wetland trail, bluff trail, or both) have groups spread out – they will need plenty of space.
4. One student from each group will close their eyes and gently *toss* the hoop. Remind them this is *not* an Olympic event!
5. As a group, students will observe, study and record everything that's inside the hoop – *no matter where it lands*. Remind them why it is important to conduct *random sampling*.
6. Using their plant/ animal identification cards, students will work as a team to identify and record what's within the sample area of the hoop. Students should note how many species they find, and how many
7. Once plants and animals have been identified with the sample area, have students compute the biodiversity index for that sample area by following the instructions on the Biodiversity Worksheet, found in this section.
8. After completing the data collection form for the first study area, students will move to a second area, repeating steps 1-7.
9. If time permits, students may sample a third area, repeating steps 1-7
10. Gather class together and ask each group to report on the sample area that had the most biodiversity, and any keystone species they observed.
11. Based on all group's reports, ask class to choose the sample area with the highest biodiversity.
12. Ask class why they think that area has the most biodiversity. Have them consider such factors as water availability, exposure to sun and wind, and soil quality.

HABITATS ON THE EDGE/ Habitats in a Hoop

Vocabulary

Biodiversity: the variation of life forms within a given ecosystem, biome, or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems. The biodiversity found on Earth today consists of many millions of distinct biological species, which is the product of nearly 3.5 billion years of evolution.

Biodiversity Index: a formula scientists use to describe the amount of species diversity in a given area.

Consumers: organisms that cannot make their own food. They obtain nutrition by eating other animals and plants.

Data: refers to a collection of facts usually collected as the result of experience, observation or experiment, or processes.

Decomposers: an organism, often a bacterium or fungus, that feeds on and breaks down dead plant or animal matter, thus making organic nutrients available to the ecosystem.

Ecologists: scientists who study the relation between organisms and their environment and examines the effects of environmental conditions on plants and animals.

Ecosystem: a natural unit consisting of all plants, animals and micro-organisms in an area functioning together with all of the non-living physical factors of the environment.

Habitat: an ecological or environmental area that is inhabited by a particular animal or plant species. It is the natural environment in which an organism lives, or the physical environment that surrounds a species population.

Keystone species: a species that plays an important ecological role in determining the overall structure and dynamic relationships within a biotic community. A keystone species presence is essential to the integrity and stability of a particular ecosystem.

Producers: organism that produce their own food. Producers are fundamental to the food chains of all plant ecosystems. They take energy from the environment (in the form of sunlight or inorganic chemicals) and use it to create carbon-based organic molecules.

Random sampling measurements: the process of collecting, analyzing and measuring only a small representative portion of a larger group. Each item must have the same likelihood of being selected.

Species: a group of organisms having many characteristics in common and ranking below a genus. Organisms within a species reproduce with others of the same species and produce fertile offspring.



Habitats in a Hoop Data Collection Biodiversity Survey



Team/Name _____ **Location** _____

Date _____ **Sample #** _____

Draw and write about everything that you see within your hoop habitat survey. Use field guides and/or identification cards to identify the different types of plants, animals, rocks, insects, soil and wildlife signs within your biodiversity survey.

