

WHAT LIMITS YOUR SPECIES?

Teacher's Guide

Subject: Life Science

Topic: Carrying Capacity and Limiting Factors

Summary:

Through the use of candy and observations, students will be able to accurately describe carrying capacity and identify specific limiting factors within local ecosystems and the impact these factors will have on identified species.

Objective(s):

After completing the field lab, students will be able to:

- 1) Understand and explain carrying capacity and limiting factors
- 2) Identify limiting factors within the local ecosystem
- 3) Analyze the presence of limiting factors and the impact to identified species.

Ecosystem(s):

Dependent upon the state park

Equipment:

Carrying capacity box worksheet, candy, chart paper, markers

Background:

- Vocabulary: native populations, carrying capacity, limiting factors, parasitism, predation, food, water, shelter, space, disease, habitat
- Reference Material: Project Wild – Oh Dear!

Procedure (Engage, Explore, Explain):

1) Introduce the concept of carrying capacity:

Carrying capacity refers to the size of a population that can live indefinitely in an environment without doing that environment any harm. This applies to plants, animals or people. If the carrying capacity of the environment is exceeded, organisms die and the environment may be permanently destroyed. Carrying capacity usually refers to a single species and its habitat.

- 2) Provide each student with a copy of the carrying capacity box and explain that the box is an example of an environment that an animal would use as its habitat.
- 3) Introduce one of three candies, i.e., M&M's, Tootsie Rolls and Peanut Butter Cup. Each candy will represent a species.
- 4) Ask each student to determine the carrying capacity for the identified box and specific candy.
- 5) Have students share the carrying capacity for the candy that they were assigned. Be aware that some students might have eaten some of their candy and this is a great way to introduce limiting factors for carrying capacity.
- 6) **Introduce the concept of limiting factors:**

Limiting factors are very closely tied to carrying capacity. Many kinds of animals can increase in numbers very quickly, and may temporarily exceed the carrying capacity of their habitat. This results in stress, starvation, disease, predation and parasites, poor reproductive success and damage to the habitat. For example, multiplying river otters can very quickly eat all the fish in a stream. With the fish gone, food becomes the limiting factor and the river otters may starve or move to another area. The stream now has a reduced carrying capacity for river otters until the fish population grows back again.

- 7) Discuss with your students that limiting factors are food, water and shelter. Predators (someone who ate the candy) and man can also impact, as a limiting factor, the carrying capacity of an organism. If food is gone, the carrying capacity (the quality of the environment) is not going to be affected since the population will go down. But if all of the factors are available, the carrying capacity will increase since there are all resources available for every species.
- 8) Assign each person the following animals to correlate with the candy that they chose. Those with M&M's will be investigating the limiting factors of a raccoon, Tootsie Rolls will investigate the yellow rat snake and the Peanut Butter Cup will investigate the alligators.
- 9) Have students with like animals get into groups and discuss what the limiting factors for the group's animal could be. Provide chart paper to capture their thoughts.
- 10) Have each group report out its ideas.
- 11) Explore the park with your students looking for the presence of food, water and shelter for the assigned animal.
- 12) Debrief, with your students, the presence of limiting factors to their assigned species.. Display that information on chart paper.

Sunshine State Standards:
Science: SC.7.L.17.3, SC.7.L.17.2
Language Arts: LA.7.4.2.2, LA.7.5.1.1, LA.7.5.2.1
Social Studies: SS.7.G.2.3

Student Data Sheet

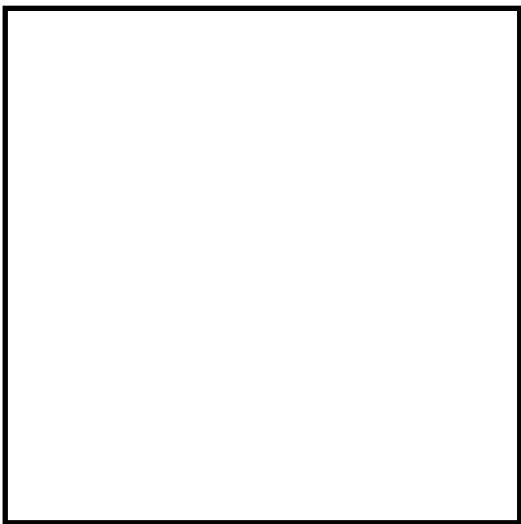
Candy Capacity Box

Full Name: _____

Date: _____

School (teacher): _____

Time: _____



Assessment

- 1) List and describe three limiting factors that were observed at the state park.

- 2) Explain how humans can create a limiting factor that could impact a species.

- 3) How can a state park biologist remove limiting factors to increase a species population? Why might that be important?

- 4) Describe the process of population growth of a species and how that growth is impacted by limiting factors within the habitat.

Portfolio Journal

Portfolio Journal Prompt:

As we studied the carrying capacity of the ecosystem at the state park, we learned that limiting factors can cause a species to search for a new habitat or begin to die. Think about the limiting factors to humans within your local community. Explain how availability of food, water, and shelter affect where past and/or present communities develop. Identify one additional “limiting factor” for humans, and explain how that impacts where people live.