

Oh Sea Lions! [Grades 6-8]

Georgia Standards of Excellence Addressed:

S7L4. Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments.

a. Construct and explanation to describe the patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of the ecosystem.

Enduring Understandings:

🔍 Limiting factors such as the predation, resource availability and competition impact California sea lion populations.

Objectives:

🔍 Students will demonstrate how California sea lion populations continue to increase in size until some limiting factor inhibits its growth, showing that nature is never in “balance,” but is constantly changing.

Time Frame:

🔍 45-60 minutes

Vocabulary:

- 🔍 Habitat
- 🔍 Population
- 🔍 Limiting factor
- 🔍 Predator
- 🔍 Prey
- 🔍 Competition
- 🔍 Domoic acid
- 🔍 Carrying Capacity

Materials:

- 🔍 Large area where students can run
- 🔍 Flip chart or dry erase board
- 🔍 Markers for recording and graphing data
- 🔍 6-10 nerf balls

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 species 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.

Wildlife populations continuously fluctuate in response to a variety of stimulating and **limiting factors**. We tend to speak of limiting factors as those resources applying to a single species, although one factor may affect many species. Natural limiting factors, or those modeled after factors in natural systems, tend to maintain populations of species at levels within predictable ranges.

Carrying capacity limitations can result in **competition** among domestic animals, wildlife, and humans. Disease, **predator** and **prey** relationships, varying impacts of weather conditions from season to season, accidents, environmental pollution, and habitat destruction and degradation are among these factors. An excess of such limiting factors can lead to threatening, endangering and eliminating a whole species of animals.

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.

In this activity, we will examine the essential components of a sea lion habitat. The California sea lion is a type of pinniped that lives in cool waters off the rocky coast of Western North America and are known for their intelligence and liveliness as well as their noisy barking. Sea lions require both open ocean and land components for their survival. The land component is important for breeding, giving births and serving as nursery for young pups.

Sea lions congregate in large groups on land (called colonies) and smaller groups in the water (called rafts). Breeding areas are called rookeries. Sea lions are carnivores that eat fish, squid, octopuses, crabs, clams and lobsters. They don't chew their food, but rather swallow it in large chunks. They have a very high metabolism, and must eat a lot. Sea lions are hunted by orcas and large sharks.

Currently, sea lions are facing several challenges in the ocean. Unusually warm waters along the coast and overfishing by humans is making it harder for sea lions to find food. Nursing mothers are having to swim farther away to forage for food and sometimes this causes them to abandon their pups in search of sustenance making malnutrition leading cause of stranding's by sea lions in 2014 according to The Marine Mammal Center in Sausalito, California.

Procedure:

1. Identify the four components of habitat: **food, water, shelter, space**. For aquatic animals like sea lions, assume that an abundant supply of clean water is available to support a thriving population.
2. Demonstrate the three symbols for: **food** (both hands together over stomach); **shelter** (both hands together over the head); **space** (both arms extended out to overhead in V shape).
3. Divide the class into four groups. One group will be the sea lions and the other three groups of students will be habitats.
4. Make two parallel lines 10-20 yards apart. The "habitat" group of students should line up on one line and the "sea lion" students on the other line.
5. Have both lines of students turn so that they face away from the other line. Each "habitat" component (student) should make whatever habitat sign they wish and hold that sign throughout the round. Likewise, each "sea lion" should make a sign for what "habitat" it needs and hold that sign throughout the round.
6. When students are ready, at the count of three, have each line turn around clearly showing their habitat sign. When a sea lion sees the habitat they need, they should run to it while continuing to hold their sign. Sea lions that successfully reach their habitat counterpart first should take their habitat partner back to the sea lion line. Both students will become sea lions for the next round. (This represents sea lions that have successfully reproduced because they met their needs of survival.) Sea lions that fail to find food, shelter or space die and become habitat for the next round. Any habitat students remaining will remain habitat for the next round.
7. Before the next round, the teacher should count and record the number of sea lions. In this simulation, each round represents one year. Continue the activity for 10 rounds, repeating Steps 5-7.
8. Next, pull 3-4 students to become predators, orcas and large sharks. During each round they will hop across the field and "eat" a "sea lion" by tagging. Once eaten, the student will become a habitat for the next round. Continue the activity for 5 rounds.
9. Now pull 2-3 students to become fishermen to show competition for fish resources. Fishermen will throw nerf balls (2-3 per student) at sea lions to "snag" the food (fish) source away. If a sea lion is hit, they will become habitat for the next round. Continue the activity for 5 rounds.
10. At the end of the activity, the number of sea lions per round (year) should be graphed with years on the x-axis and population size on the y-axis. Ask students to name three components of habitat and to define a limiting factor. Allow students to study the graph and explain what factors may have caused the population size to increase or decrease from year to year. Ask students
 - a. What will happen to the sea lions if there are more fishermen fishing? *Sea lions would have to compete with the fisherman for fish and if too many fish are harvested, it would force the sea lions to travel farther way for food, move and/or starve.*
 - b. What happens if other pinnipeds like northern elephant seals or harbor seals move into the sea lion habitat? *There would be additional competition for food*

resources and sea lion populations might decrease depending on the numbers of animals that move in the space and what they eat. They may be able to mutually exist if their diets are based on different fish.

- c. Wrap up the lesson with open discussion with students about managing a wildlife population such as the California sea lion. What might a wildlife manager do if they saw the population in trouble?

Assessment:

- ◆ Have students conduct a written reflection of the activity. What are two facts they learned about sea lions and how humans are impacting them? What might they be able to do to protect sea lion populations?

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