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Biology: _____
Date: _____

Unit II
Ecology
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Reindeer on St. Matthew Island

Essential Question: *What are the factors that affect the size of a population?*

Overview:

As you look more closely at land the organisms that live on it, you will notice how interdependent life is. Resources like food and energy are limited and many organisms are in competition for these resources. In this activity, you will examine factors that affect the size of a population.

Procedure:

Read the attached article about a reindeer population on St. Matthew Island. When finished, answer the analysis questions.

Analysis Questions:

1. What are two factors in the rapid increase of the reindeer population on St. Matthew Island?
2. What are the factors that account for the reindeer population crash?
3. Some native animals on the island feed on plants and some birds use the island vegetation to build their nests. What can you infer about the likely impact of the reindeer on other species?
4. What effects did the biologists fear might occur from introducing predators of reindeer to the island? Do you think their fear was justified? Why or why not?
5. Based on what you read in the text, define “*carrying capacity*.”
6. Did the reindeer population exceed the carrying capacity of the island? Use evidence to support your answer.
7. What would you predict might happen to the reindeer population after 1975? Explain your answer.
8. Answer the essential question: *What are the factors that affect the size of a population?*

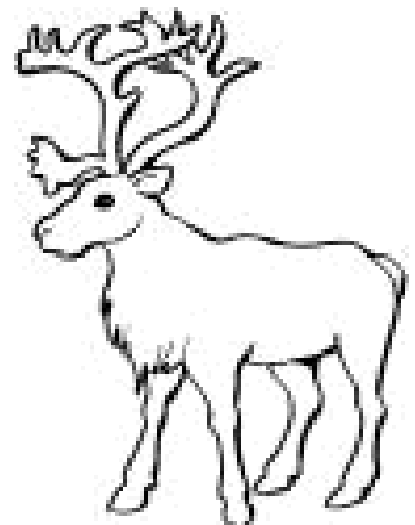
Carrying Capacity and the Reindeer of St. Matthew Island

St. Matthew Island is located in the Bering Sea off the western coast of Alaska. It is 128 square miles of low growing tundra grasses, with a few dwarf willow trees. High winds and fog are common and can occur at any time of year. The sub-Arctic island gets between 10 and 17 inches of rain and snow each year. Many years ago, the U.S. Coast Guard maintained a station on the island. That station was abandoned in 1944 leaving the island to its resident arctic foxes, singing voles, and a wide variety of sea birds.



In 1944, wildlife biologists decided that the island could support a population of reindeer that was well adapted to the island's vegetation and climate. Reindeer were not native to the island and had never lived there. The biologists still believed that if the species was brought to the island to live, they would thrive. In 1944, 29 reindeer were introduced onto St. Matthew Island. The biologists believed that the *carrying capacity* of the island could easily support a stable population of 1600-2300 reindeer.

Carrying capacity is the number of individuals in a population that can be supported in a given area within natural resource limits, without degrading the natural environment for present and future generations. There are many factors that must be considered when determining carrying capacity for a population. These factors include: the abundance of food and water, the availability of shelter, the availability of areas for giving birth to young, and the presence and kind of predators. Predators are animals that hunt and eat other animals, thus controlling their population. Carrying capacity also considers the presence of other animals that might compete with a particular species for available resources.

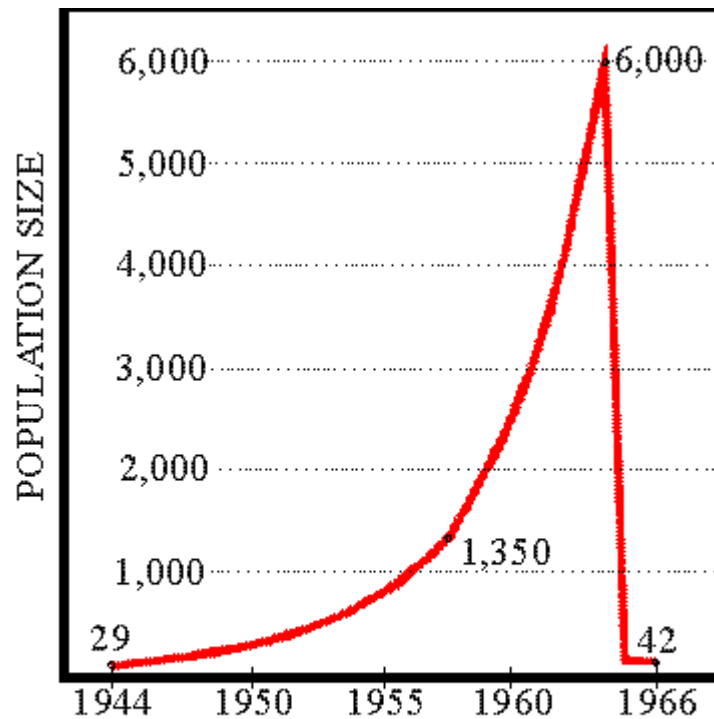


Reindeer Are Introduced to St. Matthew Island

At first, the new reindeer thrived on St. Matthew Island. High-quality food was plentiful. There were no predators that hunted them. By 1957, the reindeer population had climbed to 1350 animals. The animals were healthy with an average body weight 24% higher than mainland reindeer.

By 1963, the lack of controls on the reindeer population on the island allowed their population to rise to 6000. Between 1963 and 1966, the continually growing population of reindeer exhausted the island's food resources. Nearly all of them died of starvation. The population crashed, leaving only 42 reindeer alive by 1966. The graph below reveals what happened to the reindeer population on the island between their introduction in 1944, their crash in 1966, and their slow recovery.

With so few reindeer left alive, the island's vegetation slowly began to recover. Sub-Arctic plants usually take much longer to grow than vegetation in warmer climates. Over several years, the reindeer population increased slowly. By 1975, there were 68 reindeer on the island. As the population grew, biologists considered introducing predators to the island to keep the reindeer population under control. The biologists decided not to do this, however. They feared the effects predators might have on other, native animal species on the island.



Assumed population of the St. Matthew Island reindeer Herd. Actual counts are indicated on the population curve.