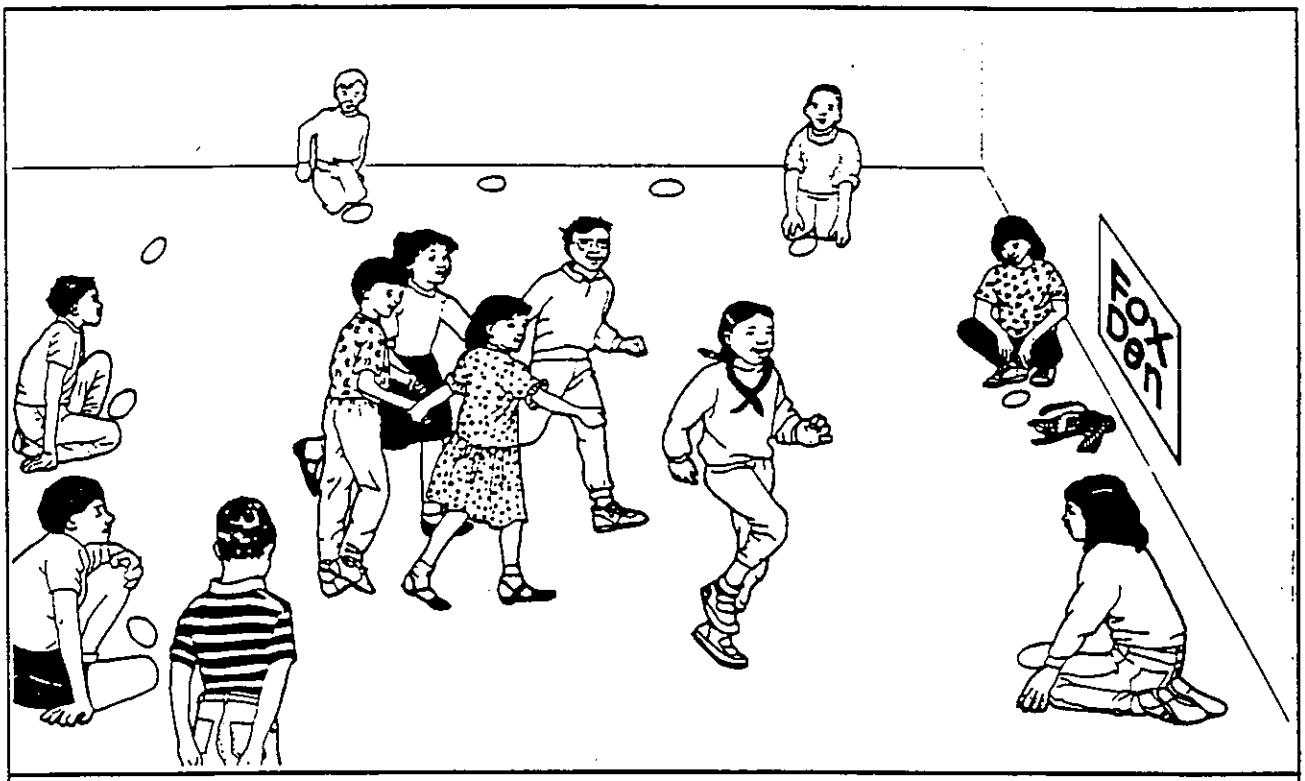
FOXES AND KITTIWAKES



OBJECTIVE:
Students will gain an understanding of seabird **predator/prey relationships**, population growth and limits, and the utility of colonization through a highly interactive, capture-the-flag style game.

BACKGROUND:
While seabirds are on the ocean, they are the **predator** hunting for **prey** (small fishes and other tiny marine life) to eat or to carry back to feed their chick. When seabirds come onto land, they cease being predators and become potential prey for land animals such as foxes and rats, and birds that hunt other birds – falcons, jaegers, ravens, eagles, and some gulls.

How can seabirds protect themselves? One **adaptation** is to nest in huge communities with thousands of other seabirds so a hungry predator might eat all it wants long before reaching your nest. All those neighbors set up an alarm too, so no predator can sneak into the colony and catch you off guard. Kittiwakes and gulls will even try to attack the predator in flights of dive bombing or **mobbing**.

Another adaptation is to hide. Some seabirds nest underground in burrows or in cracks and crevices between rocks. Some choose nest sites on sheer rock cliffs, inaccessible to most predators. However, rats can go almost everywhere and foxes too have few barriers, making them both the most feared predators on seabirds.

MATERIALS:
- seabird eggs (crumpled newspaper, foam balls, or strips of cloth), one for each student
- strips of cloth to mark predators, about ten each of two different colors - one color (such as red) for juvenile predators, and another color (blue) for adult predators.

PROCEDURE:
1. Play in a gym or all-purpose room. Choose a local seabird (such as kittiwakes)

and a local predator of seabirds (such as foxes) to be represented in this activity. To begin, all students will be kittiwakes (or other seabird you have chosen). Pass out one egg to each student. You (the instructor) will be the adult fox (or other local predator). Place the fox markers at one location in the room which will be the fox den site.

2. Explain that the object of the game is for the kittiwakes to have more eggs than the fox at the end of a two minute round. The kittiwakes may lay their egg wherever they wish, but once their egg is laid it cannot be moved. The fox can take only unguarded eggs. The fox can also take kittiwakes by tagging them. Once a fox tags a kittiwake it must willingly go with the fox to the den. The fox must take the kittiwake to the den before returning to its nest site for the egg. The captured kittiwake now becomes a juvenile fox and puts on a red scarf. The juvenile fox can capture only unattended eggs. Once a juvenile fox captures four eggs it becomes an adult fox and puts on a blue scarf. It can now capture kittiwakes.

3. Kittiwakes have only limited defense. If four or more kittiwakes hold hands and encircle a fox, the fox must return to its den before hunting again. A fox may not touch the banded kittiwakes unless the number of kittiwakes holding hands becomes less than four. In that case a fox may only capture one kittiwake at a time.

4. Begin the game by telling the kittiwakes to go find a place to lay their egg using a broad sweep of your arm which suggests nesting throughout the gym.

5. At the end of the first two minute round count how many eggs were captured by the fox, and how many kittiwakes survived. (If the kittiwake nest sites were scattered, most eggs and kittiwakes were probably easily taken.) Discuss the results. Was it easy for the fox to take eggs and kittiwakes? Why? How might the kittiwakes defend themselves better? Encourage the students to come up with strategies for defense and safety such as nesting closely together in a colony.

6. Play another round, allowing the kittiwakes to nest together in a colony. At the end of the round, discuss the differences between the two rounds. Were more kittiwakes and eggs able to survive? Discuss actual examples of colonial nesting in seabirds. What other nesting habits protect seabirds from predation? (Nesting on sheer cliffs, on islands, and in deep burrows.) What were the limits to fox population growth?

EXTENSIONS:

1. When on a field trip to a seabird colony, look for predators or signs of predators (scat, den sites, broken egg shells, parts of birds such as wings and feathers).

2. At a seabird colony, conduct a study on the rate of predation over a period of several days or weeks. Choose and mark with stakes a section along the edge of the colony or the top of the cliff 100 feet or so in length. At regular intervals (every day or once a week), collect all broken egg shells found in your study plot. If you notice another area near the colony where predators spend a lot of time (such as a roost of ravens or gulls, or a fox den), include this place in your study. Count and record the number of shells, and sort by size and color if desired. Can you determine the type of predator leaving egg shells in your plot? Look for clues such as fox scat, gull "pellets", black raven feathers, etc. Did the number of shells collected vary a lot during your study? Why?