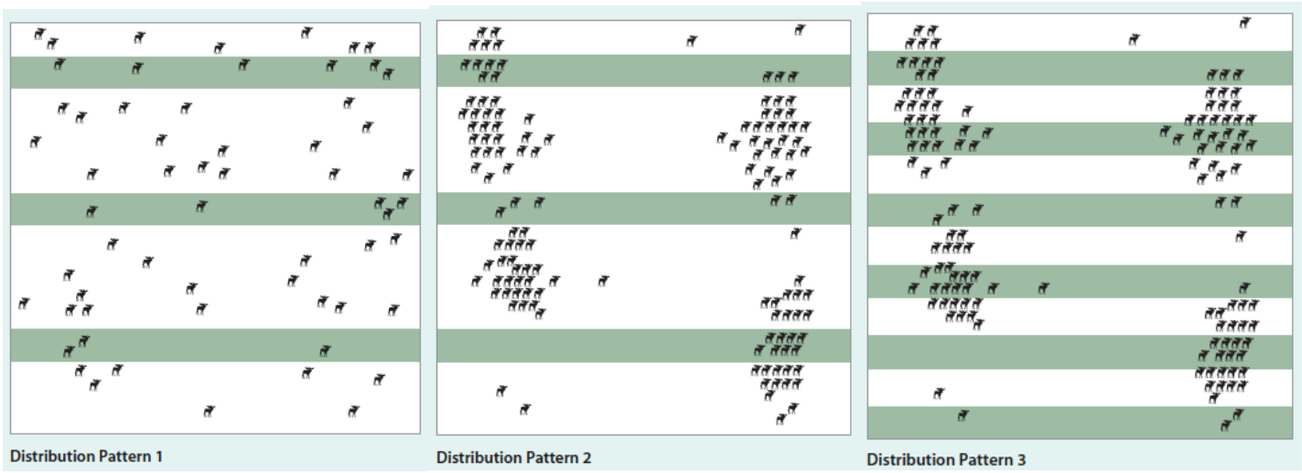
Moose (*Alces alces*) tend to be solitary. During the winter, however, moose may congregate in small groups near food and shelter. In summer, individual bull moose and mothers with their calves may be distributed randomly throughout their habitat. The typical distribution pattern of moose in one habitat compared to another gives scientists clues about the behaviour and ecology of the species. It also helps scientists choose an accurate sampling method for estimating population density. In this activity, you will see how transects (long, narrow areas of land used for ecological study) might be used to sample different moose populations.



Distribution Pattern 1 Distribution Pattern 2 Distribution Pattern 3

1. Examine the three diagrams of hypothetical moose populations. What distribution pattern is shown in each? **Uniform, Cluster, Random**(3 Marks)

Distribution Pattern 1 _____
Distribution Pattern 2 _____
Distribution Pattern 3 _____

2. The shaded parts of the diagrams represent the transects that were used to sample each population. Calculate the area per transect. (Each transect is 1km wide and 10km long)

The area of each transect is _____ x _____ = _____ km^2 (1 Mark)

3. For each hypothetical population, count the moose within each transect. (top to bottom) (4 Marks)

Distribution Pattern 1: Transect 1: _____ Transect 2:_____ Transect 3: _____

Distribution Pattern 2: Transect 1: _____ Transect 2:_____ Transect 3: _____

Distribution Pattern 3: Transect 1: _____ Transect 2:_____ Transect 3: _____
Transect 4: _____ Transect 5:_____ Transect 6: _____

4. For each hypothetical population, calculate the average number of moose per transect. (3 Marks)

Distribution Pattern 1: $\frac{+ \quad + \quad}{3} = \_\_\_\_$

Distribution Pattern 2: $\frac{+ \quad + \quad}{3} = \_\_\_\_$

Distribution Pattern 3: $\frac{+ \quad + \quad + \quad + \quad + \quad}{6} = \_\_\_\_$

5. Calculate the average density of each hypothetical moose population using the average from the transects (3 Marks)

Distribution Pattern 1: $\frac{moose}{km2} = \_\_\_\_\_ moose/km2$

Distribution Pattern 2: $\frac{moose}{km2} = \_\_\_\_\_ moose/km2$

Distribution Pattern 3: $\frac{moose}{km2} = \_\_\_\_\_ moose/km2$

6. Calculate the total study area that is inhabited by one moose population. Estimate the total number of moose in each hypothetical population using your calculated average above. Each distribution pattern is 10km by 10km.

   Total Area of each distribution pattern is ____ x ____ = _____ km^2 (1 Mark)

   Estimated Moose Populations: (3 Marks)

   Distribution Pattern 1: _____ moose/km^2 x _____ km^2 = _____ moose
   Distribution Pattern 2: _____ moose/km^2 x _____ km^2 = _____ moose
   Distribution Pattern 3: _____ moose/km^2 x _____ km^2 = _____ moose

Analysis

7. The actual numbers of moose in the three populations are 60, 133, and 133, respectively. Calculate the percent discrepancy of your three estimates to see how close your estimate was (3 Marks)

   Percent Discrepancy = $\frac{Estimated\ value - actual\ value}{actual\ value}\ x\ 100\%$

Distribution Pattern 1	**Distribution Pattern 2**	**Distribution Pattern 3**

8. Was there a significant difference (more than 10%) in your estimate and the actual size of the first population? Why do you think this was? (1 Mark)

   _____
   _____
   _____

9. Was there a significant difference (more than 10%) in your estimates and the actual sizes of the second and third populations? Why do you think this was? (1 Mark)

   _____
   _____
   _____

10. How would you design a sampling experiment on a real population of wild moose? (**Note:** In real life, the time and expenses involved usually restrict the proportion sampled to between 10 and 20 percent of the total area of interest.) (2 Marks)

    _____
    _____
    _____
    _____
    _____
    _____