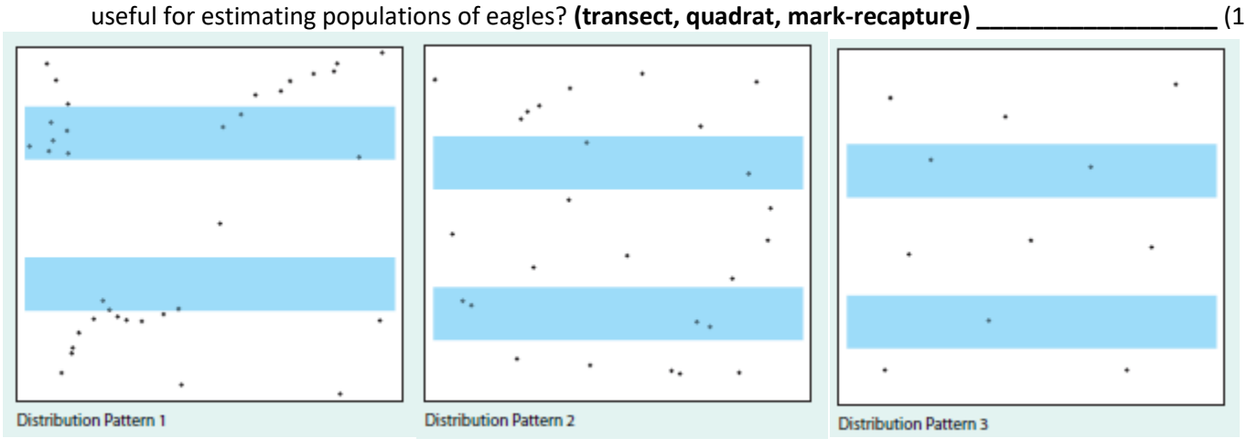
The birds at the top of a food chain include the bald eagle *(Haliaeetus leucocephalus)* and peregrine falcon *(Falco peregrinus anatum/tundrius)*. These birds of prey experienced a decline in their populations due in large part to the widespread use of chlorinated hydrocarbon pesticides, such as **DDT**. Both species have made impressive comebacks and have been removed from the endangered list in parts of North America within the last decade.

Procedure

1. Examine the three diagrams. Each dot represents one **pair** of eagles. Which method do you think would be most useful for estimating populations of eagles? **(transect, quadrat, mark-recapture)** _____ (1 Mark)



why? (1 Mark)

_____

_____

2. Examine the three diagrams of eagles that were found. Classify them as clumped, uniform, or random.
   Distribution Pattern 1 _____ (1 Mark)

   Distribution Pattern 2 _____ (1 Mark)

   Distribution Pattern 3 _____ (1 Mark)

3. What might cause each of these distributions for a population of bald eagles? (1 Mark)

   _____

   _____

4. The shaded lines represent the transects that were used to sample the population. **Assume a scale of 1 cm = 1 km** and calculate the area of each transect. **Each square is 5 cm by 5 cm. Each transect is 1 cm wide**

   Transect area = 1cm x 5cm = _____ cm^2 = _____ km^2 (1 Mark)

5. Calculate the hypothetical population density for each **transect** by dividing the number of eagles in the transect by the area of the transect. (3 Marks)

   Distribution Pattern 1: Transect 1 = Population Density = $\frac{pairs\ of\ eagles}{km2}$ = _____ pairs of eagles/km^2

   Distribution Pattern 1: Transect 2 = Population Density = $\frac{pairs\ of\ eagles}{km2}$ = _____ pairs of eagles/km^2

   Distribution Pattern 2: Transect 1 = Population Density = $\frac{pairs\ of\ eagles}{km2}$ = _____ pairs of eagles/km^2

   Distribution Pattern 2: Transect 2 = Population Density = $\frac{pairs\ of\ eagles}{km2}$ = _____ pairs of eagles/km^2

   Distribution Pattern 3: Transect 1 = Population Density = $\frac{pairs\ of\ eagles}{km2}$ = _____ pairs of eagles/km^2

   Distribution Pattern 3: Transect 2 = Population Density = $\frac{pairs\ of\ eagles}{km2}$ = _____ pairs of eagles/km^2

6. Calculate the total area inhabited by each population of eagles (the area of the box). Using ratios, predict the number of pairs of eagles that would be found in each area.

   Area of the box is 5cm x 5cm = _____ cm^2 = _____ km^2 (1 Mark) (3 Marks)

   Distribution Pattern 1: Transect 1 = 25 km^2 x _____ pairs of eagles/km^2 = _____

   Distribution Pattern 1: Transect 2 = 25 km^2 x _____ pairs of eagles/km^2 = _____

   Distribution Pattern 2: Transect 1 = 25 km^2 x _____ pairs of eagles/km^2 = _____

Distribution Pattern 2: Transect 2 = 25 km^2 x _____ pairs of eagles/km^2 = _____

Distribution Pattern 3: Transect 1 = 25 km^2 x _____ pairs of eagles/km^2 = _____

Distribution Pattern 3: Transect 2 = 25 km^2 x _____ pairs of eagles/km^2 = _____

7. Count the actual number of pairs of eagles present for each area. (3 Marks)

   Distribution Pattern 1 = _____

   Distribution Pattern 2 = _____

   Distribution Pattern 3 = _____

Analysis

8. Which **transect** gave the closest estimate to the actual number of pairs of eagles present? (3 Mark)

   Distribution Pattern 1 = _____

   Distribution Pattern 2 = _____

   Distribution Pattern 3 = _____

9. Why do you think there were differences between your estimates and the numbers for each population? (2 Marks)

   _____
   _____
   _____
   _____

10. As these birds are recolonizing their old territories, people are also reintroducing them. There is concern that an introduced population of eagles may deplete the resources in its home range. Which **distribution pattern** do you think would give the most accurate assessment of a sustainable maximum population?

    _____ (1 Mark)

11. Why do you think the above distribution pattern would give the best estimate? (2 Marks)

    _____
    _____
    _____
    _____