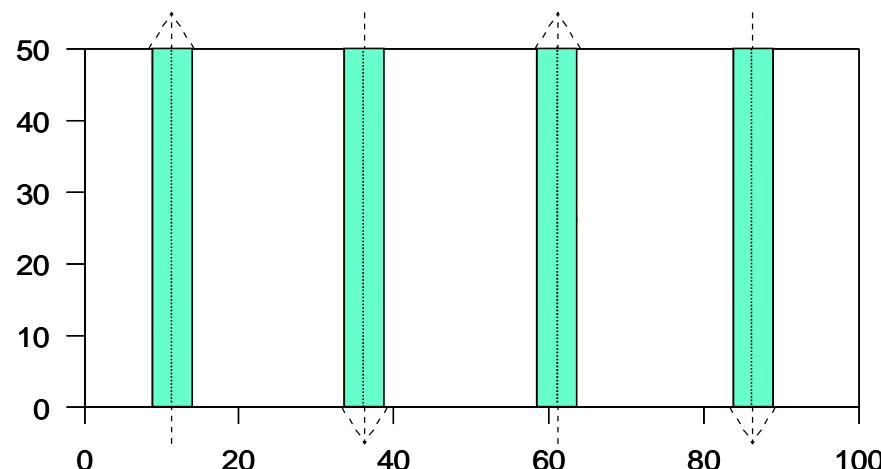


# Types of distance sampling

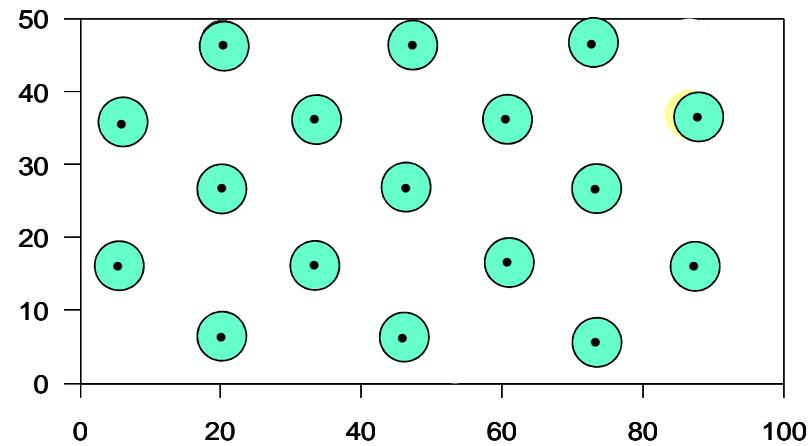
(not exhaustive!)

# Type of sample Line vs. Point

Line transect



Point transect  
(Variable circular plot)



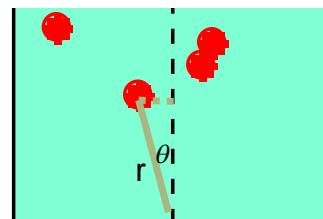
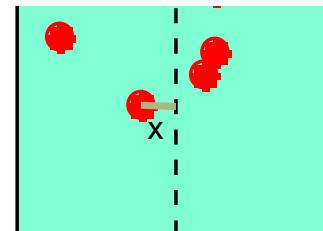
# Type of distance measurement

## 1. Radial vs perpendicular

For line transects, can either measure  
perpendicular distance from line to object

radial distance and angle

$$x = r \sin(\theta)$$



For point transects  
measure radial distance from point to object



# Type of distance measurement

## 2. Exact vs Grouped

Exact distance recorded to each object detected



Distances recorded in intervals



Photo: Rich Guenzel

# Type of object

## 1. Individuals vs Clusters



Photo: Ron Marlow

Each object detected is a single individual

Each object detected is a cluster of individuals  
- will need to estimate expected cluster size



Photo: Thomas Norris

# Type of Object

## 2. Direct vs Indirect



Objects are animals (or plants) of interest ...



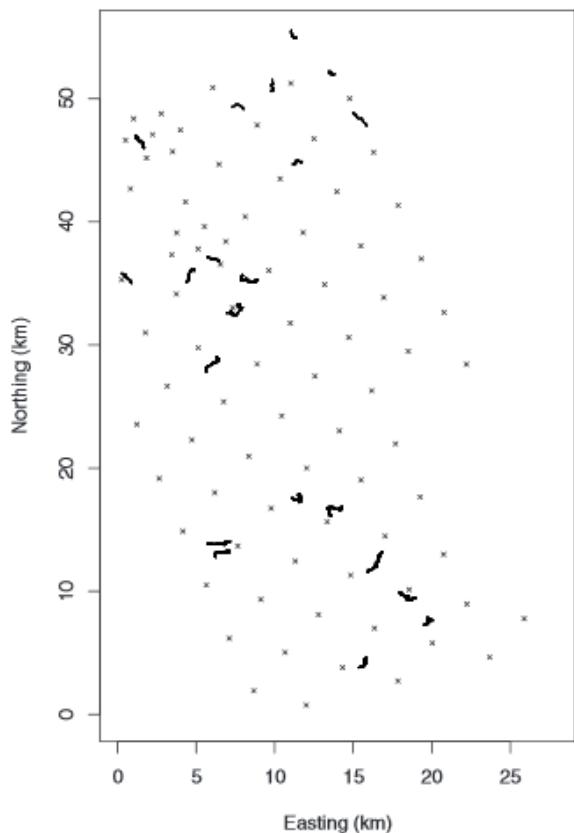
... or something they produce  
(an “indirect survey”)



Another example is a cue count

# Method of detection

## Active vs Passive



Observers actively search for animals and record distances



Photo: Ullas Karanth

Animals are trapped and generate their own distances (“passive distance sampling”)



Photo: Steve Dawson



University of  
St Andrews

# Recap of main ideas so far

Distance sampling is an extension of plot sampling

In plot sampling, we see everything in the covered region

$$\hat{N} = \frac{n}{\cancel{a/A}} = \frac{nA}{a} = \frac{nA}{2wL}$$
$$\hat{D} = \frac{\hat{N}}{A} = \frac{n}{2wL}$$

strip transects

In distance sampling, we do not see everything, and we estimate the proportion detected,  $\hat{P}_a$

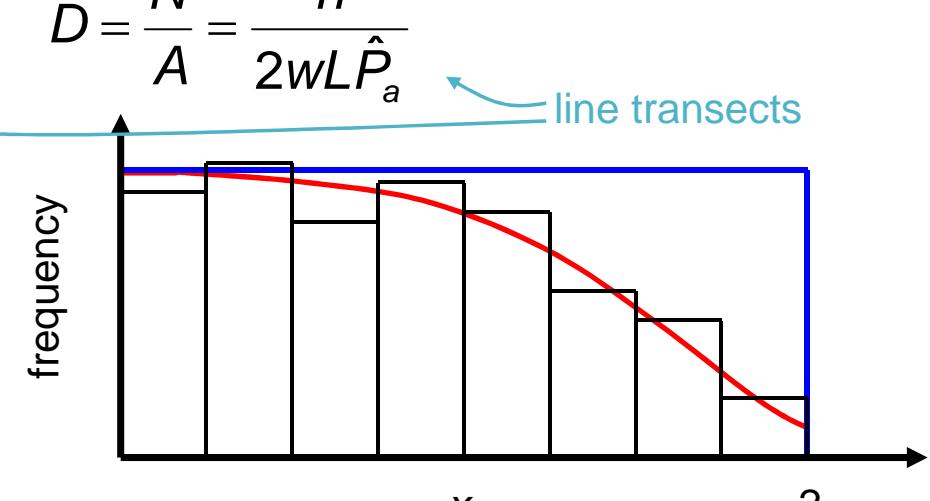
$$\hat{N} = \frac{n}{\cancel{a/A}} = \frac{nA}{a\hat{P}_a} = \frac{nA}{2wL\hat{P}_a}$$
$$\hat{D} = \frac{\hat{N}}{A} = \frac{n}{2wL\hat{P}_a}$$

line transects

- How do we estimate  $P_a$ ?

$$\hat{P}_a = \frac{\text{area under curve}}{\text{area under rectangle}}$$

line transects



# Which method when?

## Strip transects

- Populations that occur in large, loose clusters (e.g. walruses)
- Stationary objects, at high density, and easily detected

## Line transects

- Sparingly distributed populations for which sampling needs to be efficient (e.g. whales, deer)
- Populations that occur in well-defined clusters, and at low or medium cluster density (e.g. dolphin or fish schools)
- Populations that are detected through a flushing response (e.g. grouse, hares)

## Point transects

- Populations at high density, especially if surveys are multi-species (e.g. songbirds)
- Populations that occur in patchy habitat
- Populations that occur in difficult terrain, or on land where access to walk predetermined lines is problematic (e.g. bird populations in rain forest or on arable farmland)