

Double observer sampling



Double observer sampling method

- Two independent observers conduct a point count simultaneously.
- Following each count observers compare detections to determine the complete detection history.



Double observer sampling method

n_i = number of individuals counted by observer i

m_i = number of individuals counted by both observers.

p_i = detection probability for observer i .

Detection Probability Estimates:

$$\hat{p}_1 = \frac{m}{n_1}$$

$$\hat{p}_2 = \frac{m}{n_2}$$

Lincoln-Peterson Estimate:

$$\hat{N} = \frac{n_1 n_2}{m}$$

What if $m=0$...?

Double observer sampling method

n_i = number of individuals counted by observer i

m_i = number of individuals counted by both observers.

p_i = detection probability for observer i .

Chapmann Modification (for small sample sizes:

$$\hat{N} = \frac{(n_1 + 1)(n_2 + 1)}{m + 1} - 1$$

Variance Estimate:

$$\text{Var}(\hat{N}) = \frac{(n_1 + 1)(n_2 + 1)(n_1 - m)(n_2 - m)}{(m + 1)^2(m + 2)}$$

Double observer sampling method

Primary Assumptions:

1. The population is closed.
2. There are no matching errors.
3. The observers are independent.



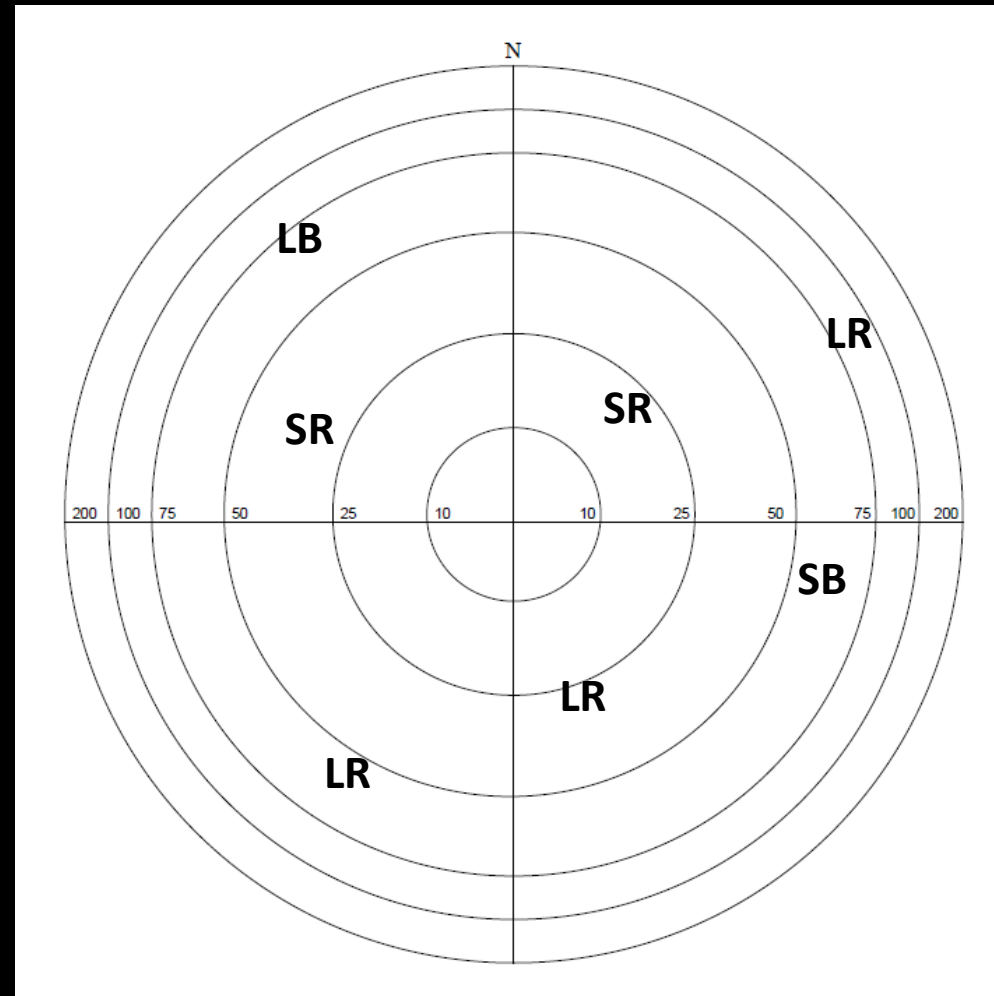
Sampling Lab on Jan 21st

- Pairs of observers scan for colored targets representing different bird species (10 minutes)
- Map the location of each target on your datasheet
- Compare datasheets with your partner after the count period
- For each “species” record the number of individuals seen by each observer and the number seen in common



Sampling Lab on Jan 21st

- Pairs of observers scan for colored targets representing different bird species
- Map the location of each target on your datasheet
- Compare datasheets with your partner after the count period
- For each “species” record the number of individuals seen by each observer and the number seen in common



Bring printed datasheet to the lab. You can download the pdf of datasheet from “detectability write-up” page.

Sampling Lab on Jan 21st

- Each team should enter data into a spreadsheet (Fill out 24 values)
- Email Jin your data by the end of the day and Jin will compile them and post it on the website
- Use provided Lincoln-Peterson equations (Chapman's modification) and estimate population size and calculate detection probabilities.
- We will provide “Double Observer Field Exercise Keys” that shows the actual distribution of targets (true population size) on the website.

Species	Habitat	n1	n2	m2
SR	Open	3	2	2
LR	Open	5	4	4
SB	Open	3	5	2
LB	Open	4	5	4
SR	Closed	3	3	2
LR	Closed	4	3	3
SB	Closed	1	3	1
LB	Closed	2	3	2

Write up should include:

- A summary of your results (population estimates and detection probability for each species in two habitats).
- A comparison of your results to the true results, as well as to other members of your class. You could also compare this year's data to 2009's 2010's, 2012's, 2014's, or 2016's data.
- A discussion of the factors that affected your ability to detect "birds" on visual point counts (such as distance, color, size, observers, vegetation, weather, etc.).
- Your thoughts about other factors that may affect detection probabilities on real point counts.

Species	Habitat	n1	n2	m2
SR	Open	3	2	2
LR	Open	5	4	4
SB	Open	3	5	2
LB	Open	4	5	4
SR	Closed	3	3	2
LR	Closed	4	3	3
SB	Closed	1	3	1
LB	Closed	2	3	2