Statistical models for the BIRDIE pipeline

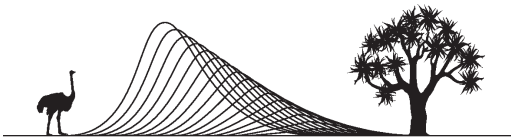
JRS Biodiversity Series

Francisco Cervantes Peralta and Res Altwegg

7/07/2021

Overview

- example of a two-column slide



http://www.seec.uct.ac.za/

@SEEC_UCT

Occupancy: the proportion of sites occupied by a species

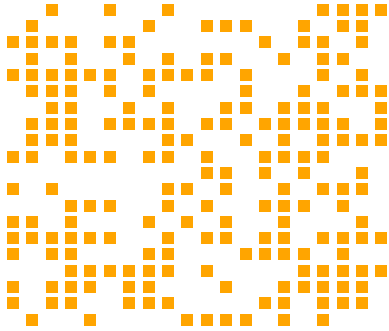
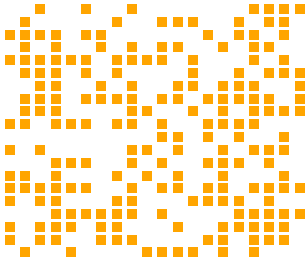


Figure 1: Some figure legend...

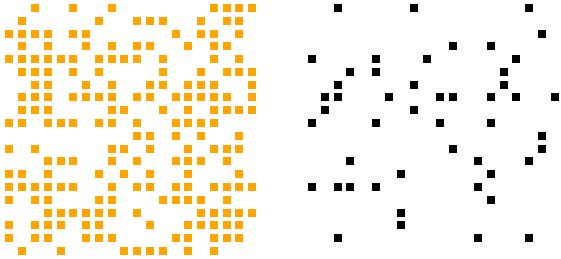
Occupancy: the proportion of sites occupied by a species}



- Occupancy: $\Psi = \frac{occupied}{total}$
- $logit(\Psi) = f(covariates)$

The species is not detected in all occupied cells

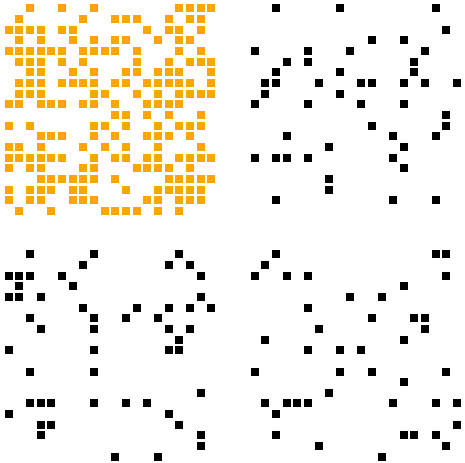
Detection probability $p < 1$



'Naive approach':

- $\Psi \times p = \frac{occupied}{total}$
- $logit(\Psi \times p) = f(covariates)$

The species is not detected in all occupied cells

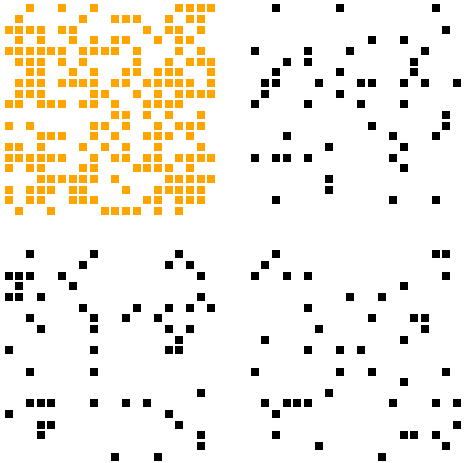


Repeated sampling

Assumptions:

- Closure (no colonisation or exctinction)
- No false detections

The species is not detected in all occupied cells



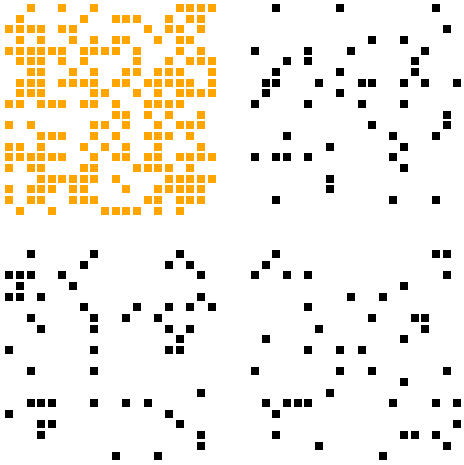
Survey histories:

1 = detected

0 = not detected

- (1,1) 000
- (1,3) 111
- (2,2) 001
- (1,6) 000

The species is not detected in all occupied cells}



Survey histories:

1 = detected

0 = not detected

- (1,1) 000
- (1,3) 111
- (2,2) 001
- **(1,6) 000**

How many occupied cells have no detections?

A model for the detections

- Ψ = probability of a cell to be occupied
- p = probability of detecting the species given that the cell is occupied
- K = number of visits to each site
- y_i = number of detections at site i

$$Pr(Y = y_i) = \Psi \binom{K}{y_i} p^{y_i} (1-p)^{K-y_i}, y_i > 0$$

$$= \Psi(1-p)^K + (1-\Psi), y_i = 0$$

Literature

- one paper
- another paper