Unmarked Tutorial

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Overview of Occupancy Framework

- Repeated measures sampling design

- J observations at M sampling units during T seasons

- Data can be counts of individuals

- MARK vs UNMARKED differ in that UNMARKED doesn't require any individual tagging or recognition

Hierarchical models

- Observations are generated by:
    - *State process*: determines the abundance or occurrence at the site; models describe the abundance or occurrence at the site, but this can't be observed (latent variable)
    - *Detection process*: determines the observations conditional on the state process

Capabilities of UNMARKED

- Single season site occupancy models
    - Probability that a site is occupied (ψ)
    - Observations Y_{ij} is whether species was detected in site i at time j.
    - *Key assumption*: the state at site i remains constant throughout the season.
    - Adding in co-variates
        * $\text{logit}(\psi_i) = x_i^T(\beta)$: predicts the probability of occupancy based on predictor variables
        * $\text{logit}(p_{ij}) = v_{ij}^T(\alpha)$: predicts the probability of detection based on predictor variables
    - Function `occu`
- Multi-season site occupancy model
    - To understand the dynamics of occupancy over time
    - Estimate colonization (γ) and extinction (ϵ)