

*Potential monitoring parameters for the Pima
County Ecological Monitoring Program:
Assumptions and survey design*

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Parameters for Monitoring

Subject of our inference across time

- Two groups
 - Population
 - Community

Population Parameters

Examples

- Occupancy
- Abundance
- Demographics (mortality, survival)
- Diet
- Movement patterns (home range size)
- Gene frequencies

Community Parameters

Examples

- Richness
- Evenness
- Diversity
- Guild structure

Many are derived from population level

Typical Monitoring Parameters

- Occupancy (presence vs. absence)
 - Proportion of sites occupied by a species
- Abundance (or density)
 - Population size

Detectability

*“Probability of detecting an individual
provided it is present”*

Some individuals are missed

Lack of adjustment = biased estimates

Parameters vs. Indices

Unadjusted parameters are indices

- Presence vs. Undetected
 - Proportion of sites where detected

- Relative abundance
 - Total count

$$\hat{N} = \frac{C}{\hat{p}}$$

Monitoring Indices ☹️

Problems

- Changes in population size unknown
- Changes in detectability confounding
- Comparisons among species not possible

Solutions?

- Standardize Survey Methods
 - Survey when detectability is high and constant
- Adjust for covariates of detectability
 - e.g. humidity, observers, vegetation

Faith, Prayer, Hope

Better Option 😊

Estimate and account for detectability

- Many methods available
 - Observational
 - Capture-recapture

Observational Methods

- Distance sampling
- Repeated sampling
- Marked subsets
- Temporal removal sampling

Capture-recapture

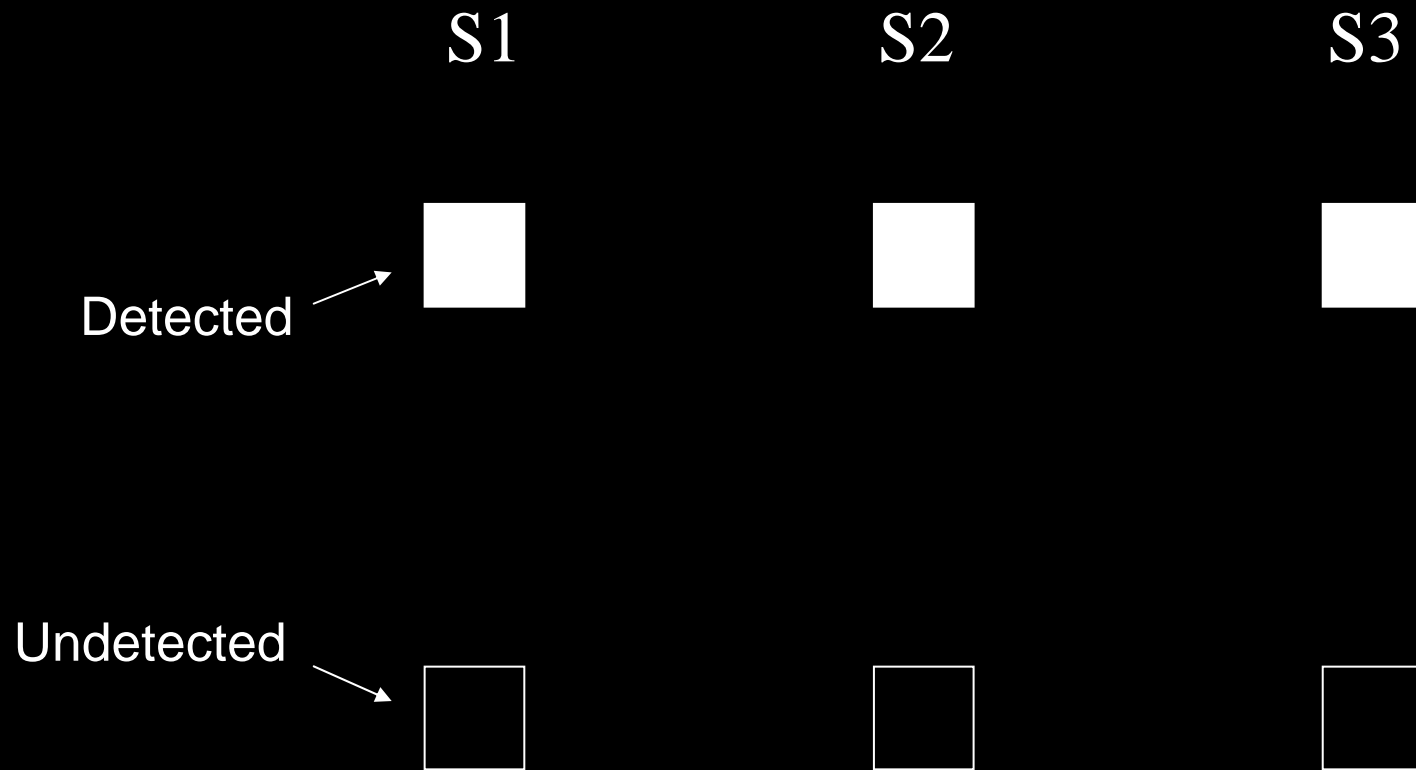
- Closed-population models
- Open-population models
- Removal models
- Trapping webs with distance sampling

Repeated Sampling

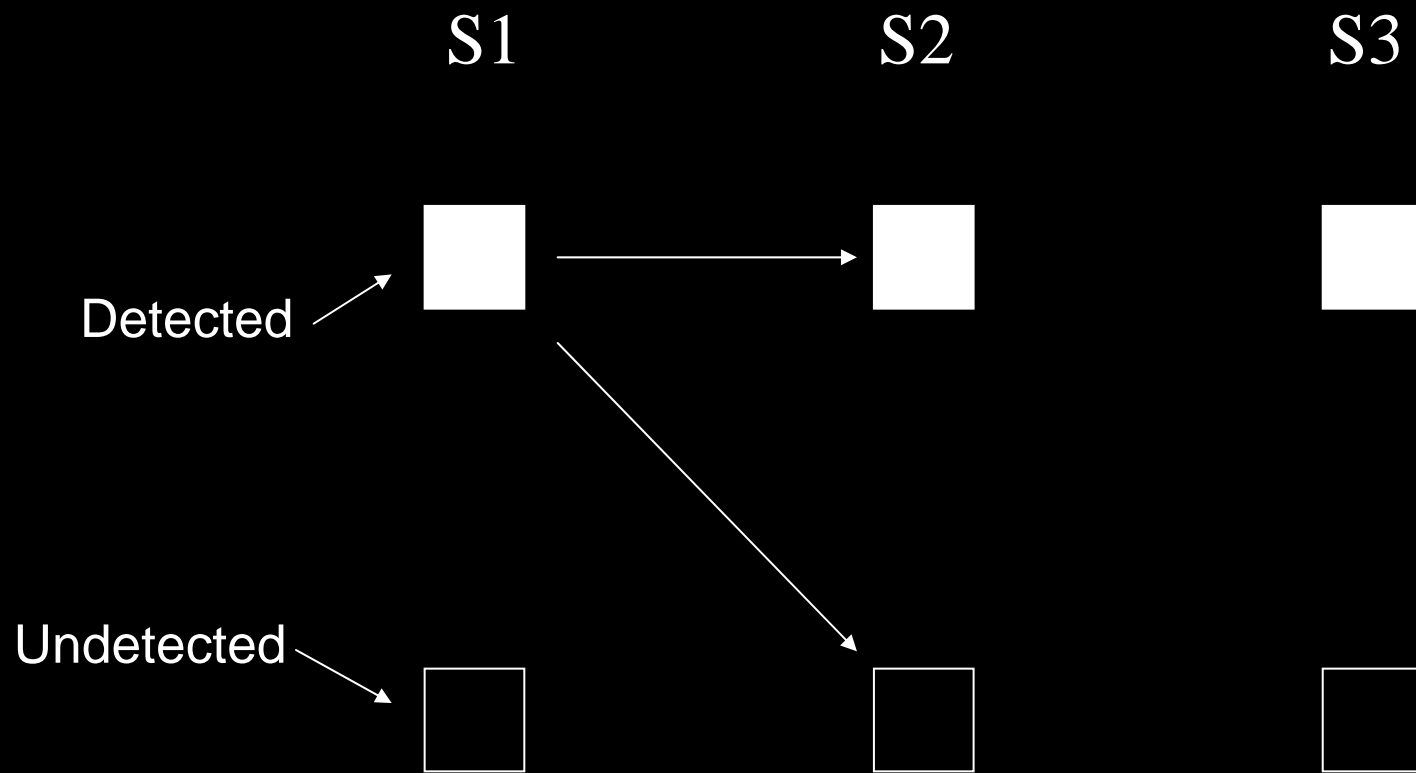
Parameter = Occupancy

- Multiple sites surveyed, each at several distinct occasions
- Species is detected or not detected on each occasion
- Covariates are measured

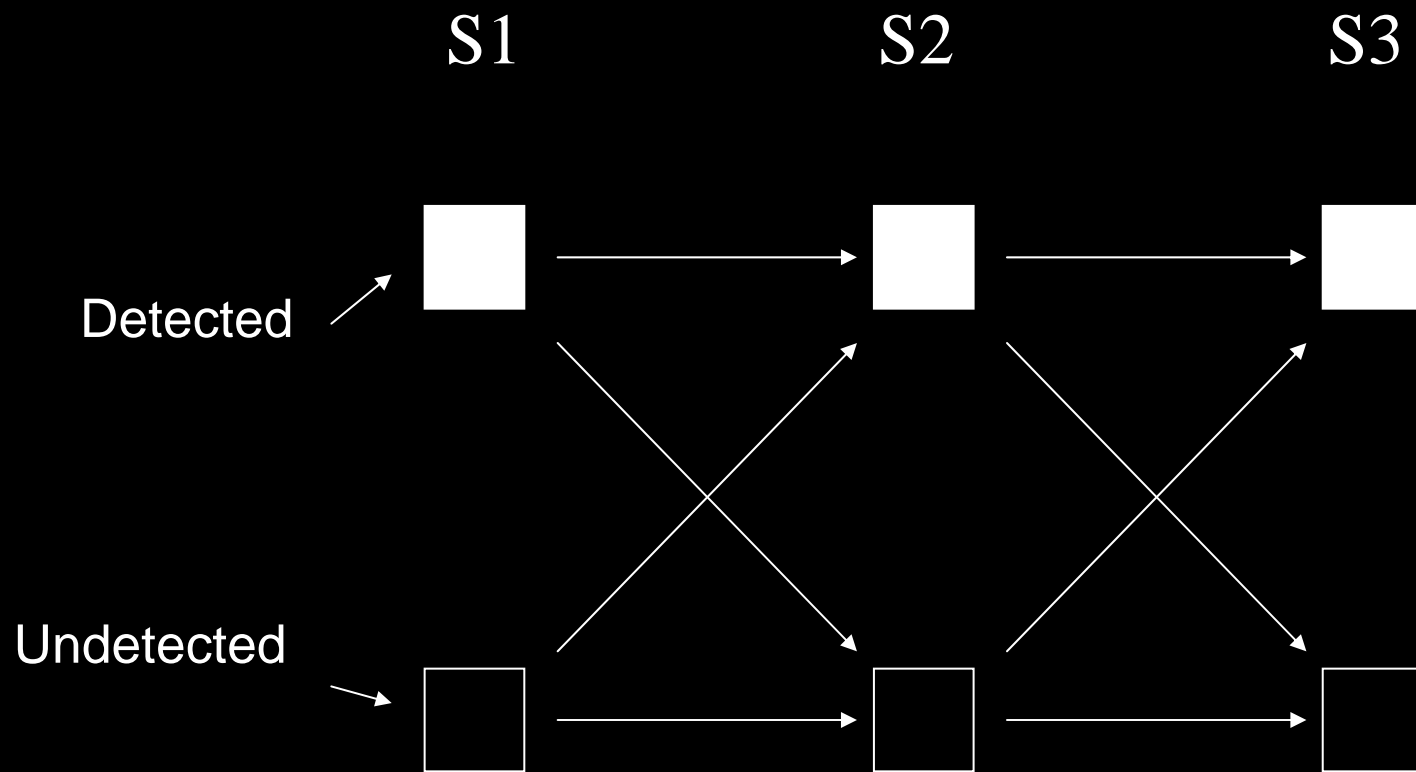
First Survey



Second Survey



Occupancy Dynamics



Occupancy Histories

Unit	Season			
	1	2	...	T
1	101	001	...	011
2	000	100	...	110
3	100	000	...	000
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