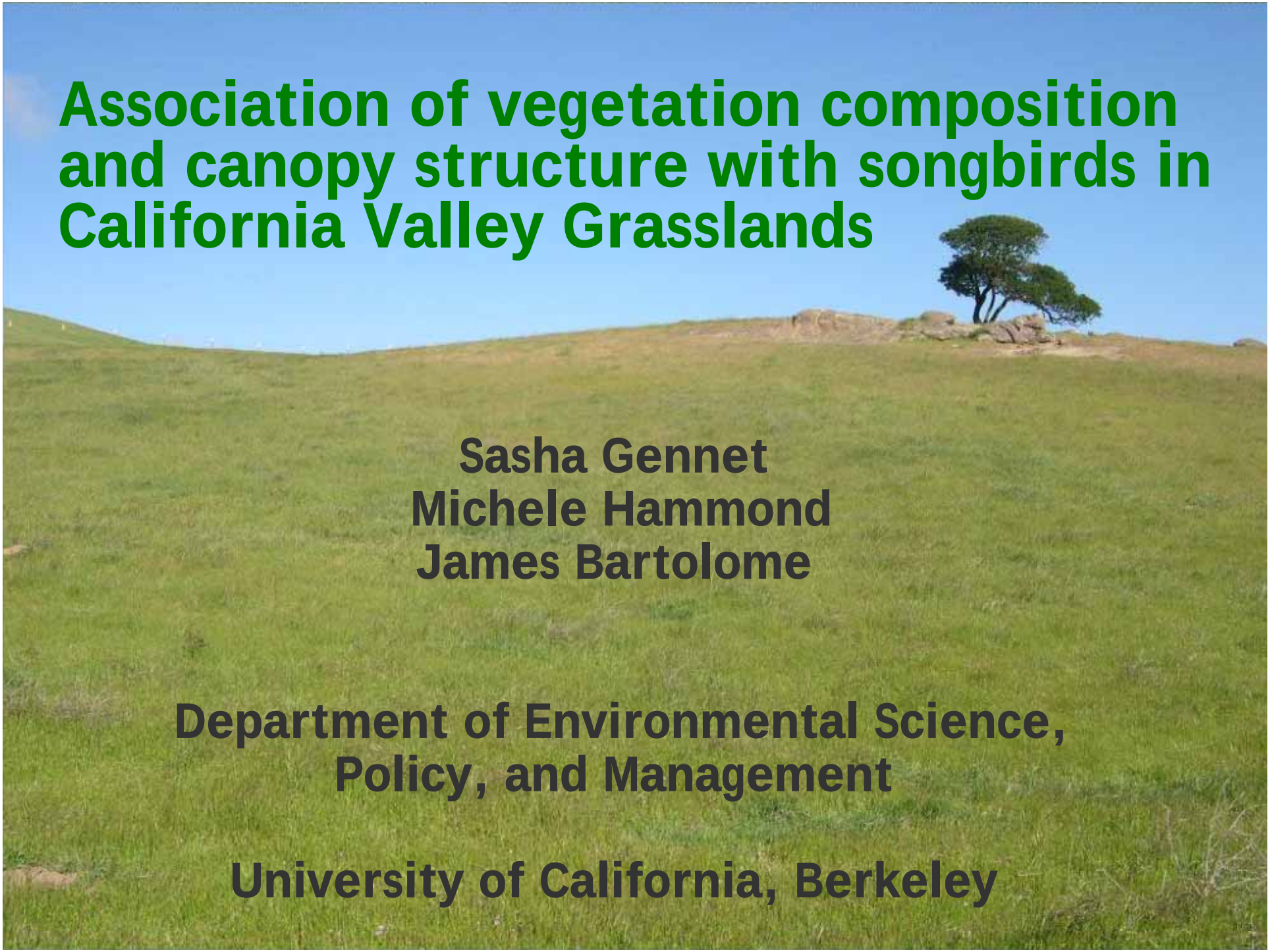
Association of vegetation composition and canopy structure with songbirds in California Valley Grasslands



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Outline

- Project overview
- Objectives
- Species life history
- Data collection methods
- Research questions
- Analysis methods
- Results
- Conclusions

Project Overview

- East Bay Regional Park District and UC Berkeley collaborative grasslands monitoring program
- Effects of management (grazing) on:
  - Plant community
  - Avian community
  - Small mammal community
- Environmental variables:
  - annual weather
  - soils
  - topography
  - landscape characteristics

Research Questions

Are grassland birds associated with:

- **structural complexity** of plant community?
- abundance of **native plants**?
- livestock **grazing**?
- specific, identifiable **plant communities** within the Valley Grassland matrix?

Project Area

- Mediterranean climate
- ~50 cm rainfall annually

Valley Grasslands of the East Bay: A changed ecosystem

Grassland-dependent songbirds

Grasshopper Sparrow

Savannah Sparrow

Horned Lark

Western Meadowlark

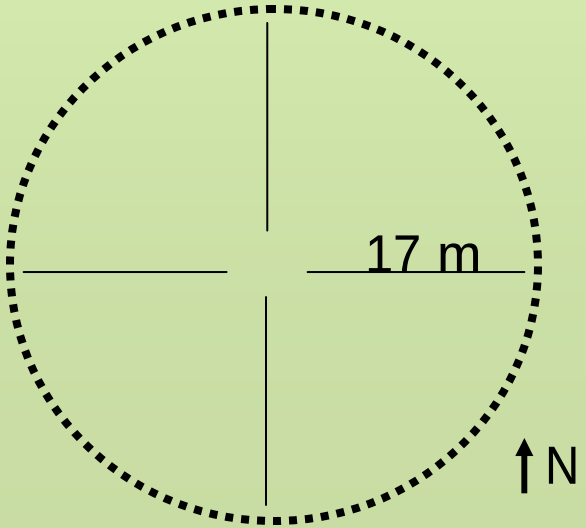
Data Collection Methods

Birds

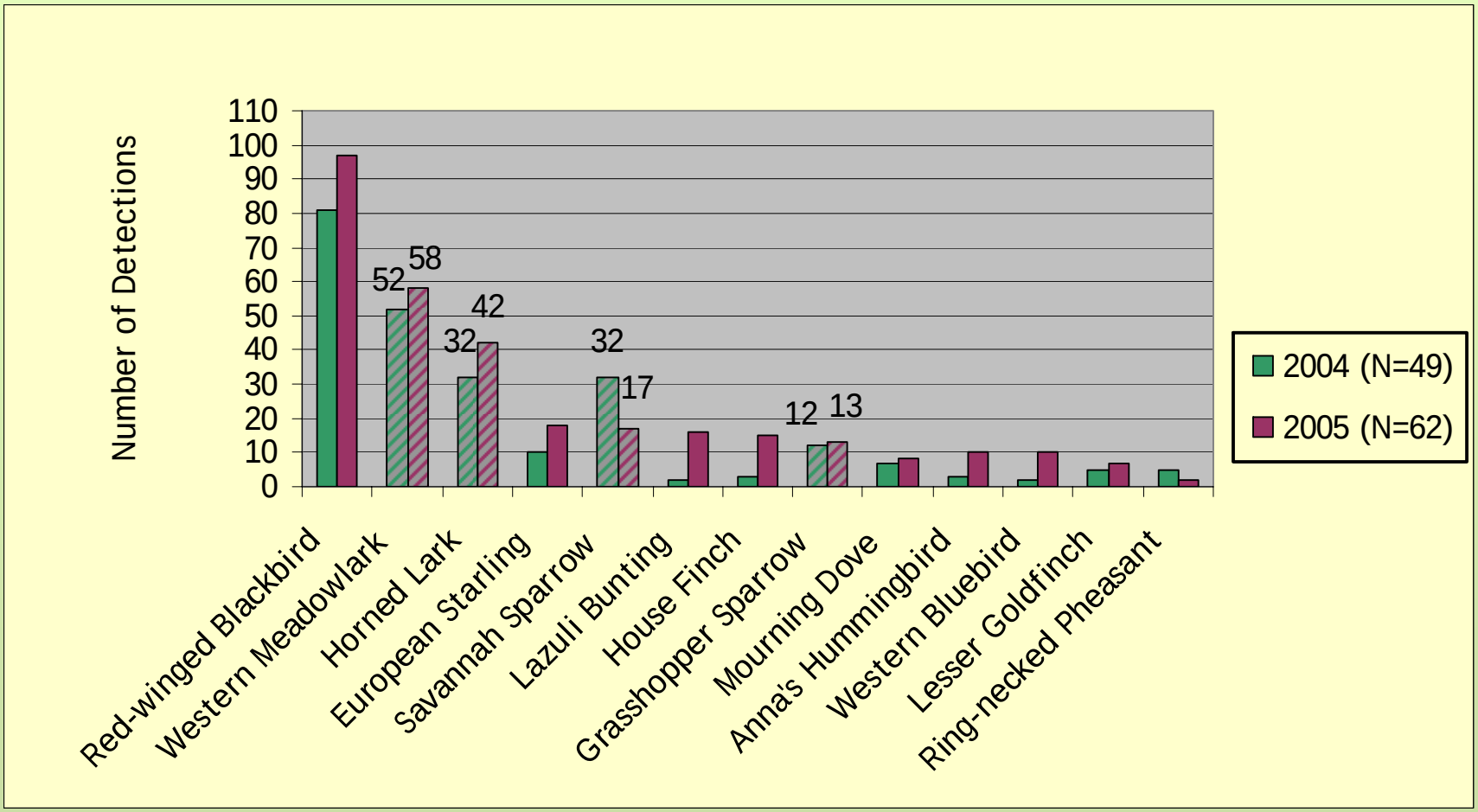
- Three, 10-minute point counts
- March 15-June 15
- variable-radius circular plot

Vegetation

- 36m diameter plots
- 4 line point transects
- 70 points per line
- Species and height data
- Litter and bare soil



EBRPD Grassland Bird Detections 2004-2005



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Data Analysis Methods I

Logistic regression

Response variable:
Bird presence/absence

All birds
Individual species (4)

Predictor variables in full model:

1. grazing (binary)
2. % native composition
3. CV% height (continuous)
4. % cover litter (continuous)
5. % cover bare ground or rock (continuous)
6. solar radiation (continuous)

Data Analysis Methods II

1.Classification of plant communities

- Cluster Analysis
- Indicator Species Analysis
- Multi-Response Permutation Procedure

2. Non-parametric multiple group comparison

- Kruskal-Wallis rank test

All birds

		2004	2005
Structure	CV% Height		
	% Litter		+
	% Bare ground		
	Solar radiation	+	
Native Species	% Native cover	-	+
Grazing	Grazed	+	+
Plant Composition	Community cluster		

+ positive coefficient
- negative coefficient

- Grassland-dependent passerines in Valley Grasslands of EBRPD, as an avifaunal guild, were not associated with structure or plant composition
- The guild was consistently associated with grazing, as expected

Western Meadowlarks

		2004	2005
Structure	CV% Height		+
	% Litter		
	% Bare ground		+
	Solar radiation	**+**	+
Native Species	% Native cover	**-**	+
Grazing	Grazed	**+**	
Plant Composition	Community cluster		

- No clear pattern: plausible, given this generalist's life history

Horned Larks

		2004	2005
Structure	CV% Height	+	+
	% Litter		-
	% Bare ground		
	Solar radiation		+
Native Species	% Native cover		+
Grazing	Grazed	perfect	perfect
Plant Composition	Community cluster	+	+

- Horned Larks appear to associate with community composition and canopy structure
- Only found in grazed plots

Savannah Sparrows

		2004	2005
Structure	CV% Height	**+**	
	% Litter		+
	% Bare ground	**+**	+
	Solar radiation		
Native Species	% Native cover		
Grazing	Grazed	**+**	(1)
Plant Composition	Community cluster	**+**	+

- Savannah Sparrows are strongly associated with community composition and various measures of canopy structure
- Associated primarily with grazed plots

Grasshopper Sparrows

		2004	2005
Structure	CV% Height		
	% Litter		
	% Bare ground		
	Solar Radiation		
Native Species	% Native cover		
Grazing	Grazed	perfect	perfect
Plant Composition	Community cluster		

- No ungrazed plots contained GRSP in 2004 or 2005
- Plots with >5% cover native species 8.6 times more likely to contain Grasshopper Sparrows
- Grazed plots are 9.4 times more likely to contain >5% cover
- Incomplete niche saturation

Key Findings

- Strong preferential use of grazed plots
- Patchy, sparse distribution; incomplete niche saturation
- Two of the three specialist birds are associated with plant community composition
- Inconsistent responses among the four bird species to predictor variables of structure, presence of native plants

Conclusions

- No indication from this analysis that ongoing livestock grazing in EBRPD grasslands is negatively impacting songbird populations

- Songbird species had variable associations with measurements of structure and species composition, suggesting mosaic landscape preferable for maintaining these species

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