

Wintering Bird Area Occupancy in a Mosaic of Harvested and Un-harvested Sugarcane Fields

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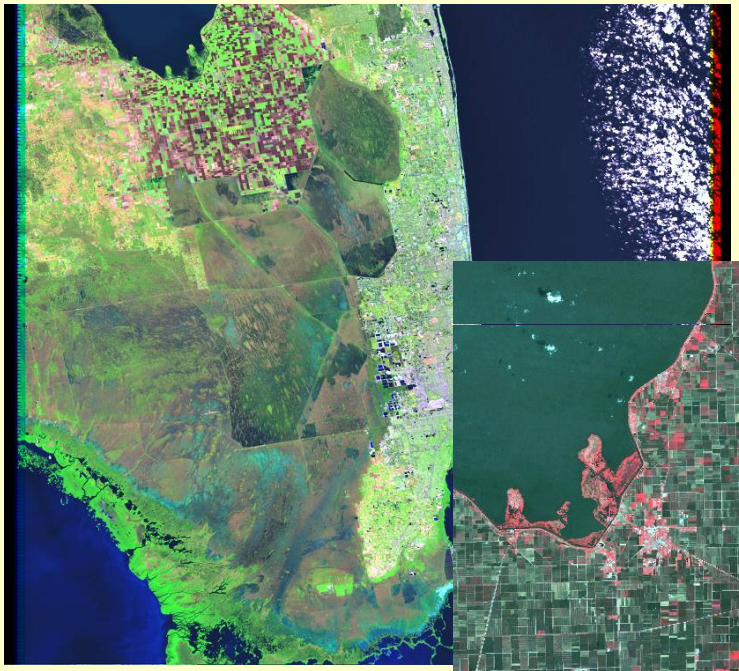
Everglades Agricultural Area



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Sugarcane Fields

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Edges

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What is the effect of landscape structural change on avian presence and abundance?

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Methods

- Winter/harvest surveys
- 245 sites – transects, points were 500 meters apart, centered on small unpaved roads along field edges, 6-19 points each
- 50 meter circle
- Visited 5 times each
- Single observer
- Pre-dawn for 3 – 4 hours
- By sight except for Common Yellowthroat and Red-winged Blackbirds
- Tall, medium and short cane

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- Sugarcane classification for models
  - Tall: un-harvested, ≥ 67% within circle
  - Short: newly harvested until canopy begins to close, ≥67%
  - Intermediate: between 34 and 66% short cane
- Edge
  - Short: < 30 cm
  - Tall: ≥ 30 cm
- Other crops rarely included beans, short corn or fallow land

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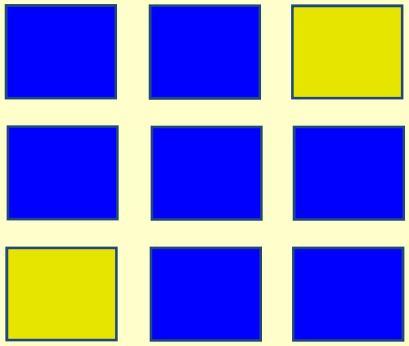

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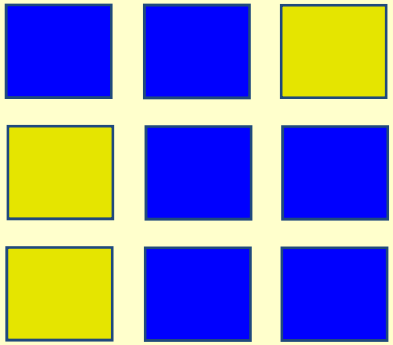

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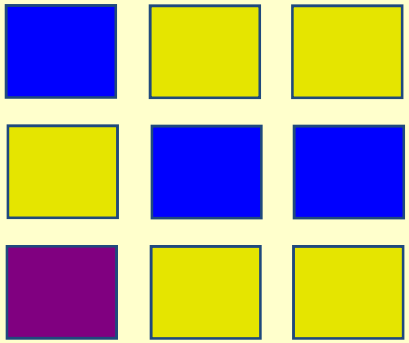

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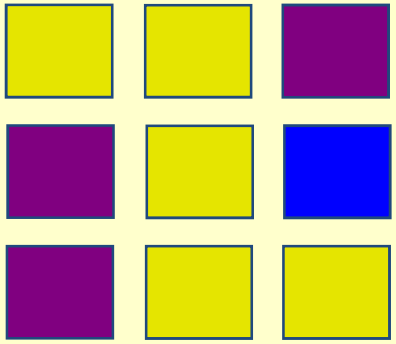

Tall

Short

Medium

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Occupancy Models

Normally mean abundance, λ, is constant within a site:

$$\lambda \times p_1 \times p_2 \times p_3 \ldots\ldots p_n$$

We let λ vary spatially and temporally with habitat

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Occupancy Models - Detection

$$p = \frac{e^{(\beta_0 + \beta_{Obs} X_{Obs} + \beta_T X_T)}}{1 + e^{(\beta_0 + \beta_{Obs} X_{Obs} + \beta_T X_T)}}$$

Obs = Observer, T = Time

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Likelihood – Royle 2004

$$\zeta(p, \lambda\{n_{it}\}) = \prod_{i=1}^{R} \left(\sum_{\max n_i}^{N} \left(\prod_{t=1}^{T} \mathrm{Bin}(n_{i\,t}; N_i, p) \right) f(N_i; \lambda) \right)$$

R = Sites

N = Maximum Abundance

T = visits

f = Poisson function of mean abundance, λ

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Results
Palm Warbler

Habitat	Occupancy (95% CI)	Abundance (95% CI)
TC, TE	1.00 (0.99 – 1.00)	18 (5 – 68)
TC, SE	1.00 (0.99 – 1.00)	17 (4 – 65)
IC, TE	1.00 (0.99 – 1.00)	18 (5 – 68)
IC, SE	1.00 (0.96 – 1.00)	12 (3 – 46)
SC, TE	1.00 (0.99 – 1.00)	16 (4 – 62)
SC, SE	1.00 (0.96 – 1.00)	12 (3 – 46)

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Results
Common Yellowthroat

Habitat	Occupancy (95% CI)	Abundance (95% CI)
TC, TE	0.99 (0.95 – 1.00)	5.3 (3.0 – 9.4)
TC, SE	0.98 (0.83 – 1.00)	3.8 (1.8 – 7.9)
IC, TE	0.97 (0.85 – 1.00)	3.4 (1.9 – 6.1)
IC, SE	0.78 (0.48 – 0.97)	1.5 (0.7 – 3.5)
SC, TE	0.81 (0.58 – 0.95)	1.6 (0.9 – 3.1)
SC, SE	0.44 (0.20 – 0.78)	0.6 (0.2 – 1.5)

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Results
Red-winged Blackbird

Habitat	Occupancy (95% CI)	Abundance (95% CI)
TC, TE	1.00 (1.00 – 1.00)	28 (7.2 – 106)
TC, SE	1.00 (0.98 – 1.00)	17 (4.1 – 71)
IC, TE	1.00 (1.00 – 1.00)	24 (6.1 – 94)
IC, SE	1.00 (0.98 – 1.00)	17 (4.2 – 69)
SC, TE	1.00 (0.78 – 1.00)	6 (1.5 – 23)
SC, SE	1.00 (0.97 – 1.00)	14 (3.4 – 57)

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- Palm Warbler (migrant) most widely detected, best model included effect of edge on abundance but not occupancy
- Common Yellowthroat best model included cane state and edge effect on abundance
- Red-winged Blackbird best model included cane state and edge effect on abundance

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Other Species

- EAA as winter habitat for songbirds – 22 species of passerines detected plus Killdeer, Mourning Dove and Common Ground Dove
- Edges important habitat components
- Extension of Royle (2004) model to estimate vegetation structure effect on avian populations

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Thank you

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