OCCUPANCY ESTIMATION ON WINTER GROUNDS: INTEGRATING PROCESS-OBSERVATION OCCUPANCY MODELS WITH AUTOMATED ACOUSTIC SAMPLING

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Conservation in agricultural landscapes

Figure 15. Example of 2005 Land Use Classification
(Kearney County, Nebraska)
Extend focus

Sherry-Holmes model from Faaborg et al. 2010
Winter habitat selection

Pete Marra at Smithsonian
Photo from D. Pancamo
Winter habitat selection

A. Oden and USFWS Mountain Prairie
Occupancy

Bried et al. 2011
Detection Probability

Quinn et al. 2011
Objective

- Determine the effectiveness of process-observation models and automated recording units (ARU) for sampling occupancy patterns and detection probability of winter birds in the Central Great Plains of North America.
Study Species

- Black-capped Chickadee (*Poecile atricapillus*)
Methods

- Sampling period
  - December-January
  - 2011-12
- 10 sites
Wildlife Acoustics Song Meter ARU
Vocalization data

- 10, 10 min sampling periods on the hour
- We reviewed the data with Song Scope
- Summed 10 count periods into a single count period
Methods

- Comparison to field sampling -
  - sorted out observations from the 1st and 15th of the month to represent four visits
- Process-Observation models (Royal 2004)
- Estimation of occupancy and detectability
Results - Occupancy

- The 4-day sampling data underestimated occupancy
- Could be done without models
- Cost of sampling
Results - Detection probability

- The 4-day sampling data overestimated detection probability
Discussion

![Graph: Effort Needed for Confidence in Detection](image)

- **x-axis:** Number of Visits
- **y-axis:** Probability of Detection
- **Legend:**
  - Initial Prob. of Detect.
  - 0.1
  - 0.2
  - 0.3
  - 0.4
  - 0.5
  - 0.6
  - 0.7
  - 0.8
  - 0.9
  - 1.0
Discussion

- Use of ARU’s allows for more frequent sampling across dispersed patches
- Improved accuracy of occupancy models
- More frequent sampling
  - Increases the likelihood of detecting species with low detection probability
  - Improves estimates of detection probability
- Field vs Lab (Celis-Murillo et al. 2009)
Opportunities and Challenges

- Time to find vocalizations (Hutto and Stutzman 2009)
  - Reduced by Song Scope
- Volume of data
- Other species and habitats
- Identification of individuals
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