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

John E. Quinn - Furman University
Amy Oden, James R. Brandle - University of Nebraska-Lincoln

FURMAN

UNIVERSITY OF Nebraska Lincoln
Pioneering new frontiers.

Conservation in agricultural landscapes

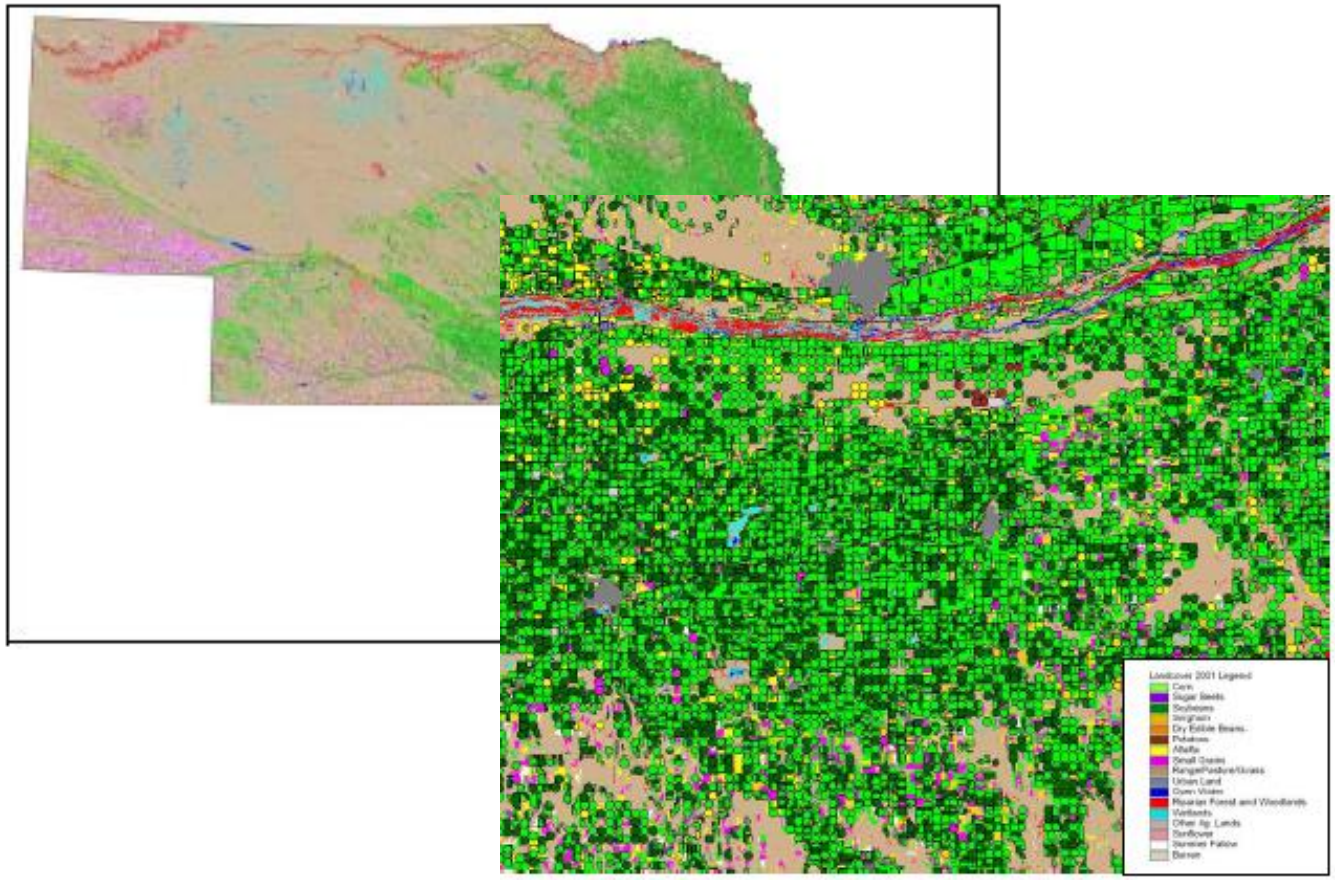
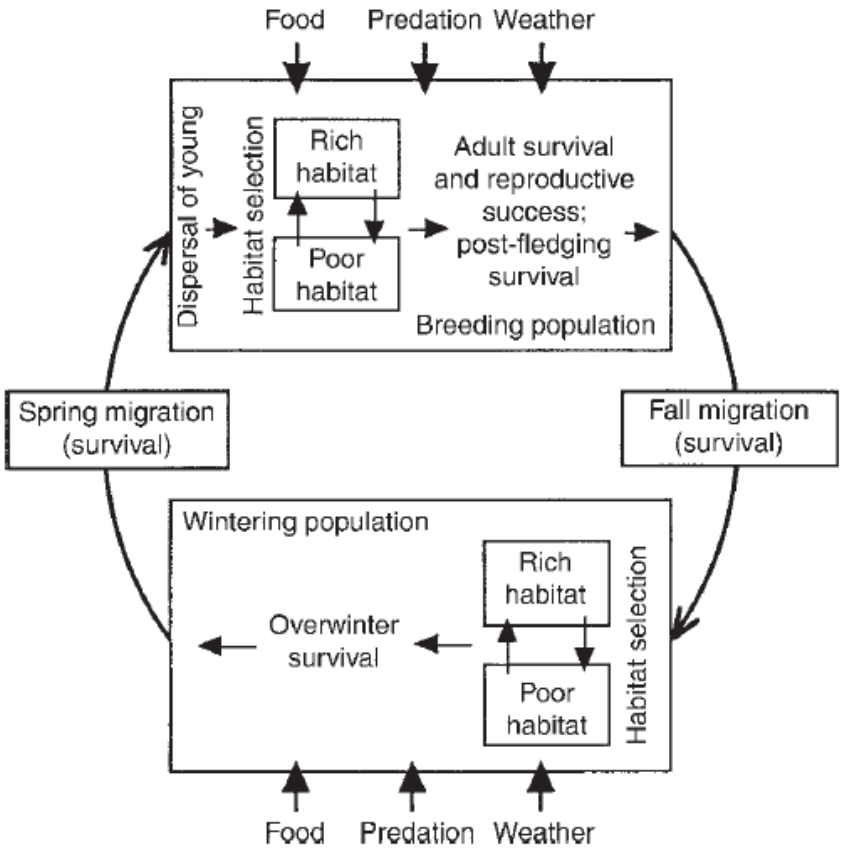
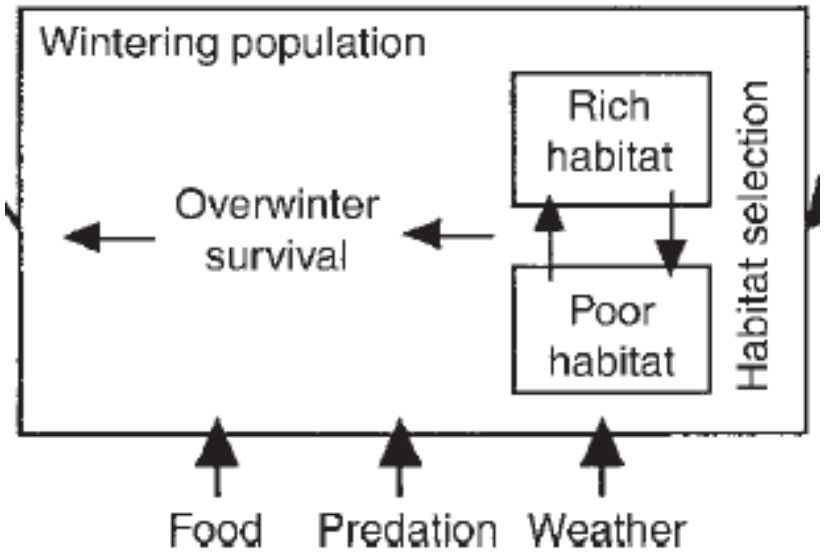


Figure 15. Example of 2005 Land Use Classification

(Kearney County, Nebraska)

Extend focus





Sherry-Holmes model from Faaborg et al. 2010

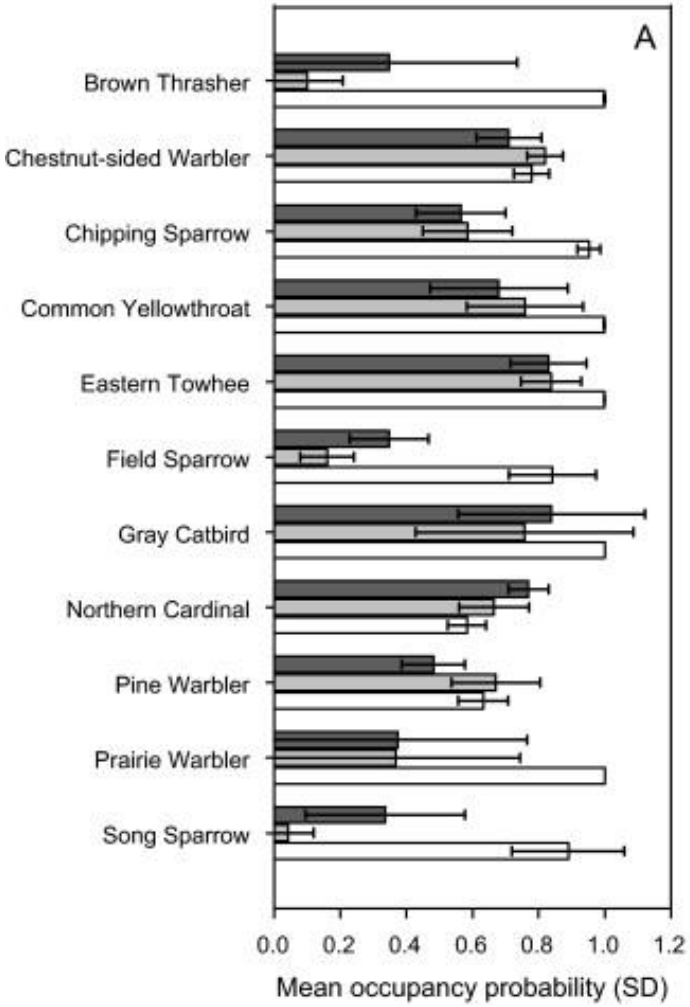
Winter habitat selection

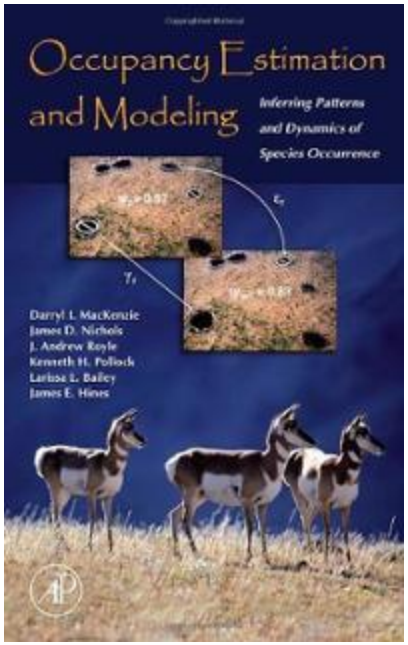
Pete Marra at Smithsonian
Photo from D. Pancamo

Winter habitat selection

A. Oden and USFWS Mountain Prairie

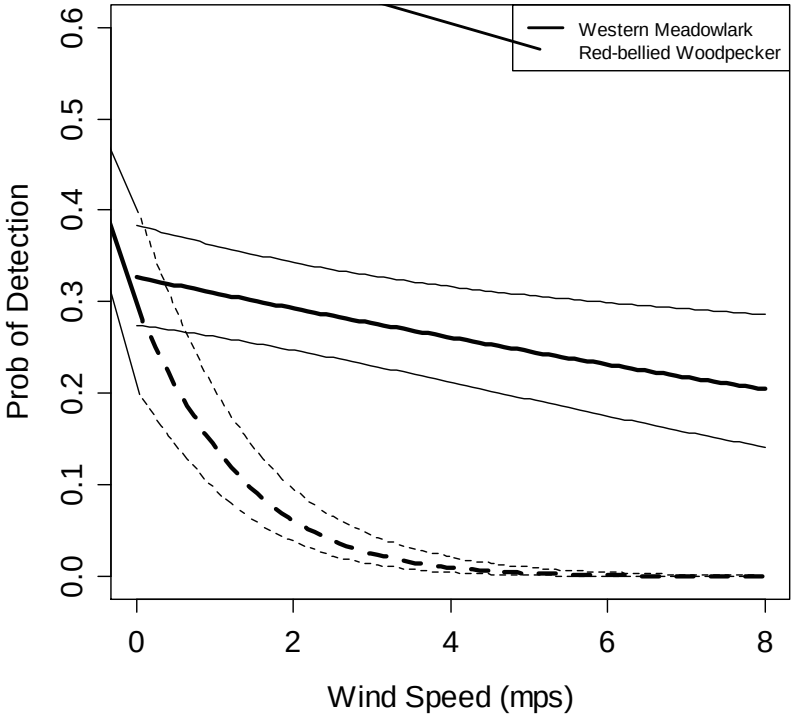
Occupancy





Bried et al. 2011

Detection Probability



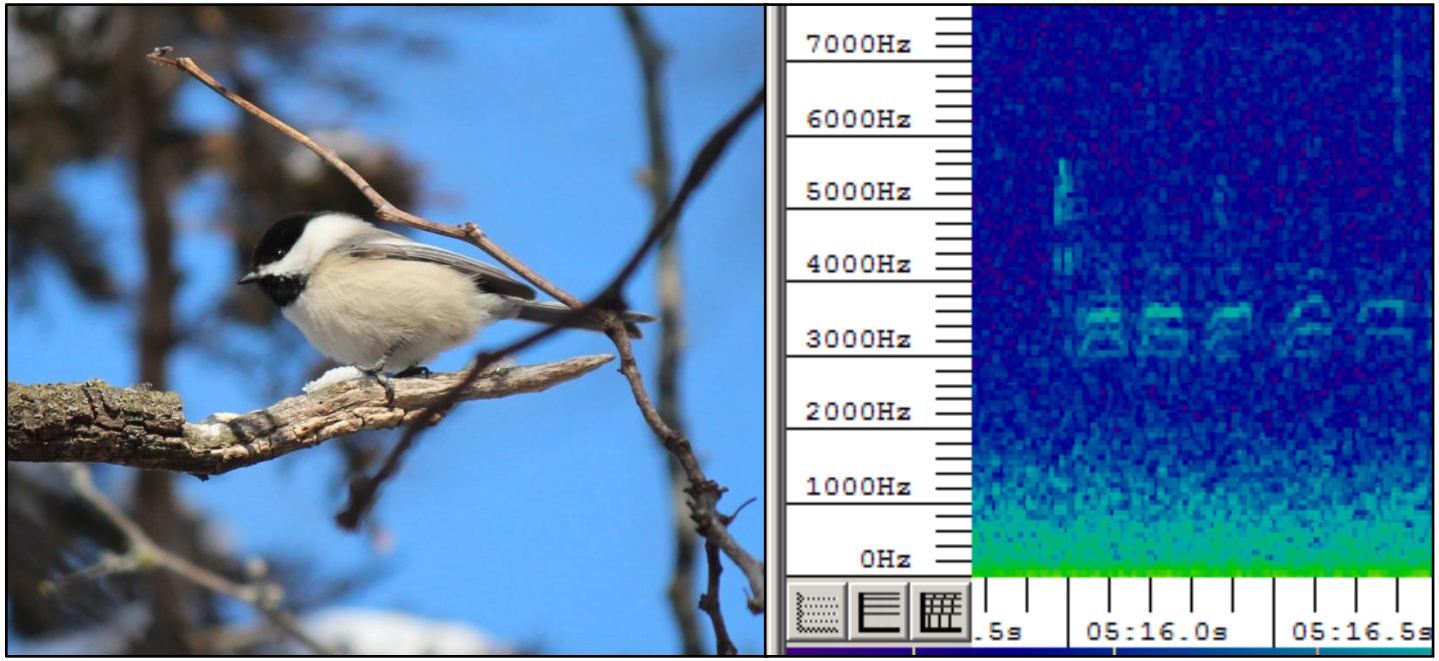
Quinn et al. 2011

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

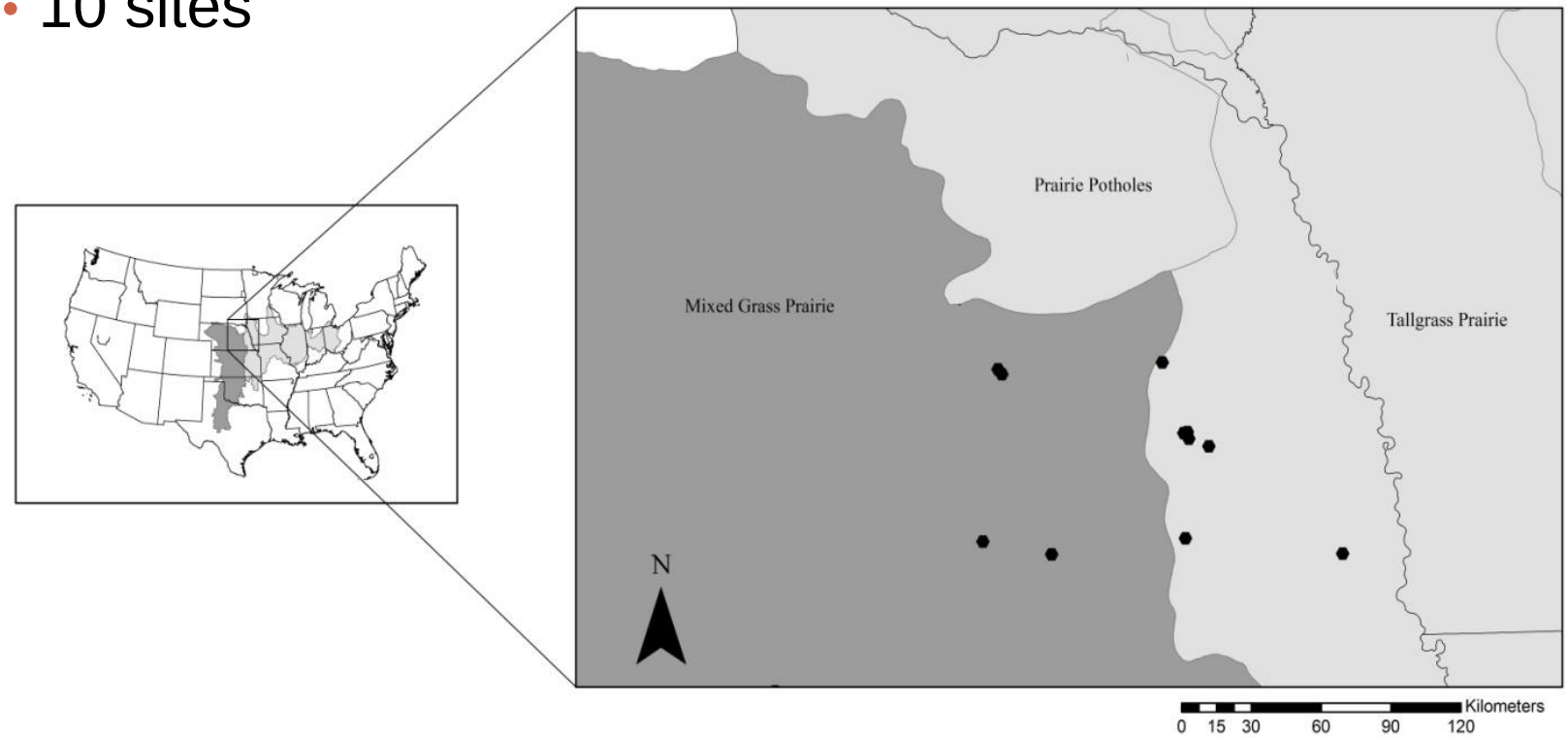
Study Species

- Black-capped Chickadee (*Poecile atricapillus*)



Methods

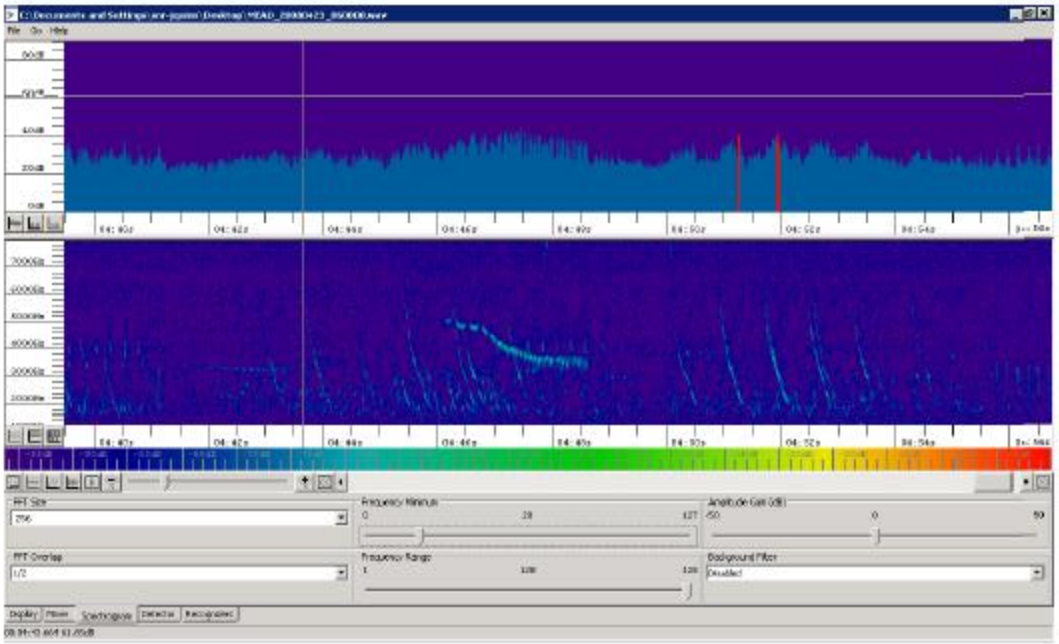
- Sampling period
  - December-January
  - 2011-12
- 10 sites



Wildlife Acoustics Song Meter ARU

Vocalization data

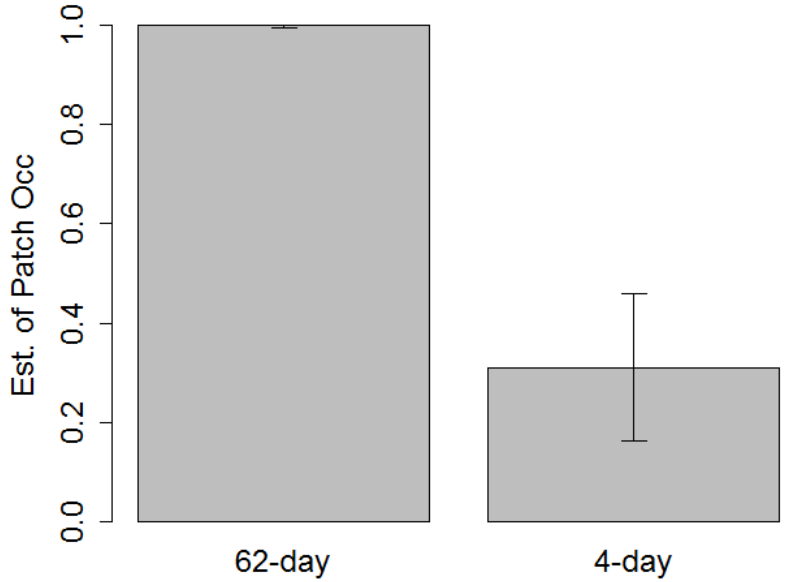
- 10, 10 min sampling periods on the hour
- We reviewed the data with Song Scope
- Summed 10 count periods into a single count period



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

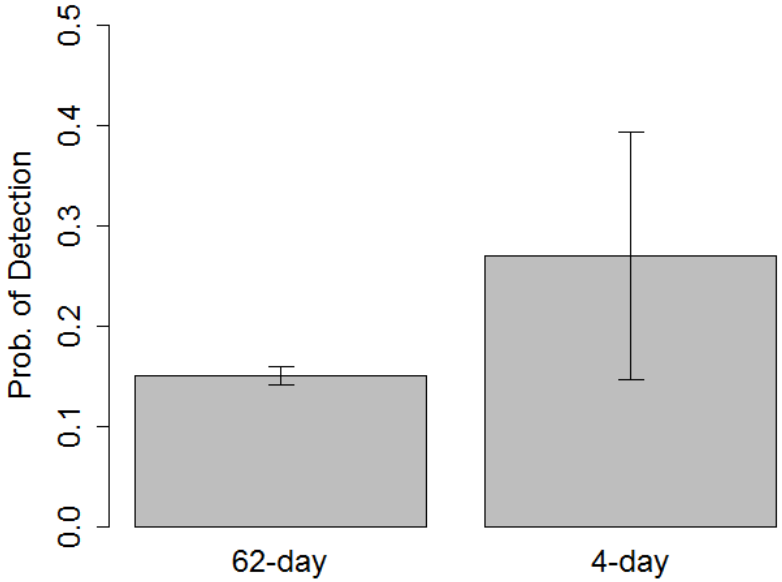
Results - Occupancy



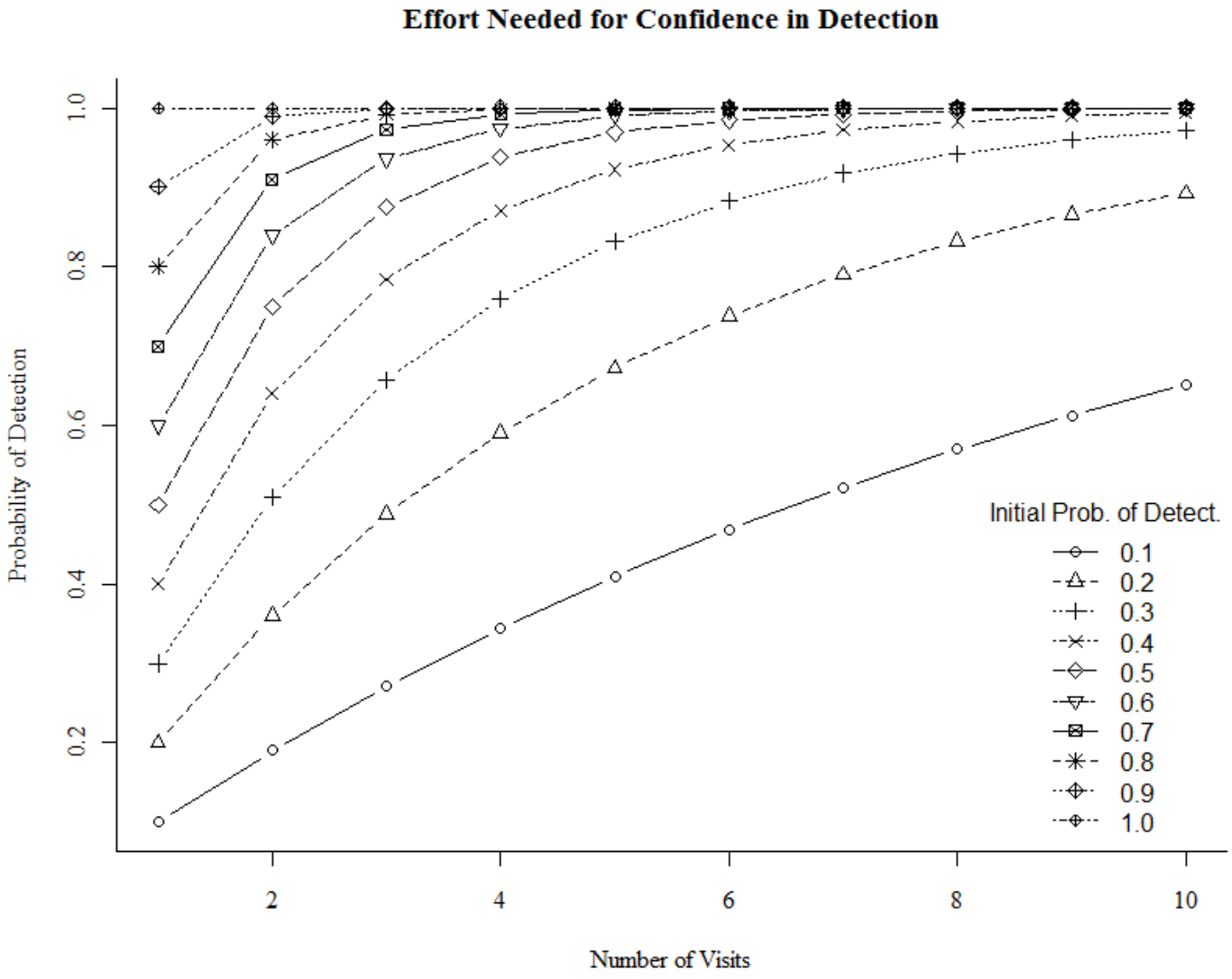
- The 4-day sampling data underestimated occupancy
- Could be done without models
- Cost of sampling

Results - Detection probability

- The 4-day sampling data overestimated detection probability



Discussion

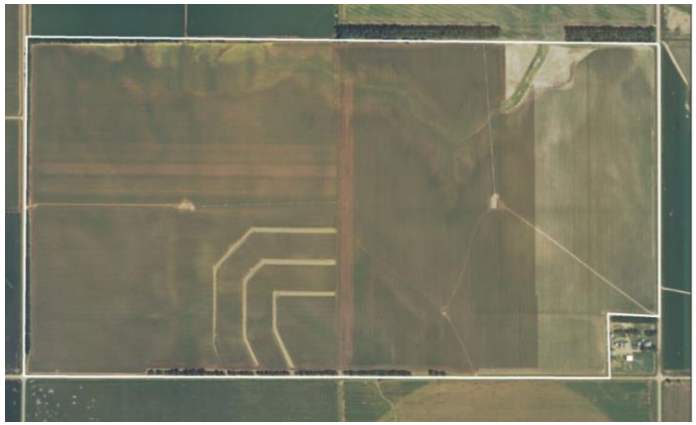

Effort Needed for Confidence in Detection
Probability of Detection
0.2
0.4
0.6
0.8
1.0
2
4
6
8
10
Number of Visits
Initial Prob. of Detect.
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0

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



USFWS Mountain Prairie

Acknowledgements

- **Funding**
  - USDA Integrated Organic Program, USDA McIntire-Stennis, UNL Center for Great Plains Studies, OCIA R&E, Wildlife Acoustics - Travel
- **Photos**
  - Unless otherwise noted L. Sarno, A. Oden