



Grasshopper sparrow

# Grassland bird abundances in landscapes with varying amounts of grassland and forest in south-west Wisconsin

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Female bobolink

## Purpose

To compare abundances of grassland obligate birds in landscapes with various amounts of forest and grassland to examine the relationship between landscape composition and birds.

## Study Area

Our study was conducted in south-west Wisconsin (Figure 1). The area is composed of a mixture of grassland (58%), rowcrop (21%), and deciduous forest (18%). Grasslands in the study area are composed mostly of hay, pasture, and Conservation Reserve Program (CRP) fields planted to smooth brome.

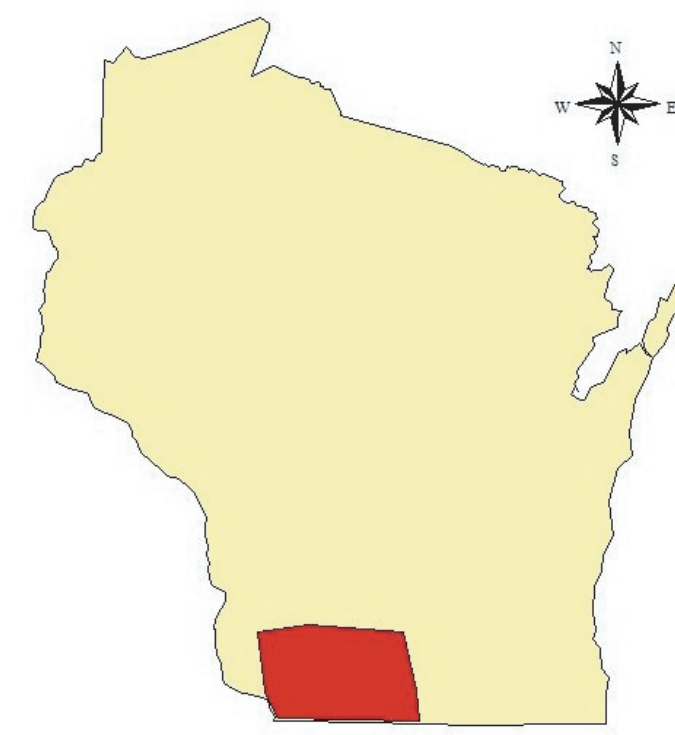


Figure 1. Study area (in red) in south-west Wisconsin.

## Landscape Selection

A grid of 800-ha cells was laid over the National Land Cover Dataset 1992. We then classified each cell into categories of grassland [low (30-45%), high (60-80%), super (>80%)] and forest [low (<10%), medium (10-20%), high (>20%)] amounts. Landscapes were then grouped into 6 categories (Figure 2):

- low grassland:high forest
- low grassland:low forest
- high grassland:high forest
- high grassland:medium forest
- high grassland:low forest
- super grassland

We then randomly selected 5 landscapes of each combination of grassland and forest classifications from the available cells. An error was made in classification of one landscape and thus there are 6 low grassland:high forest landscapes and 4 low grassland:low forest landscape.

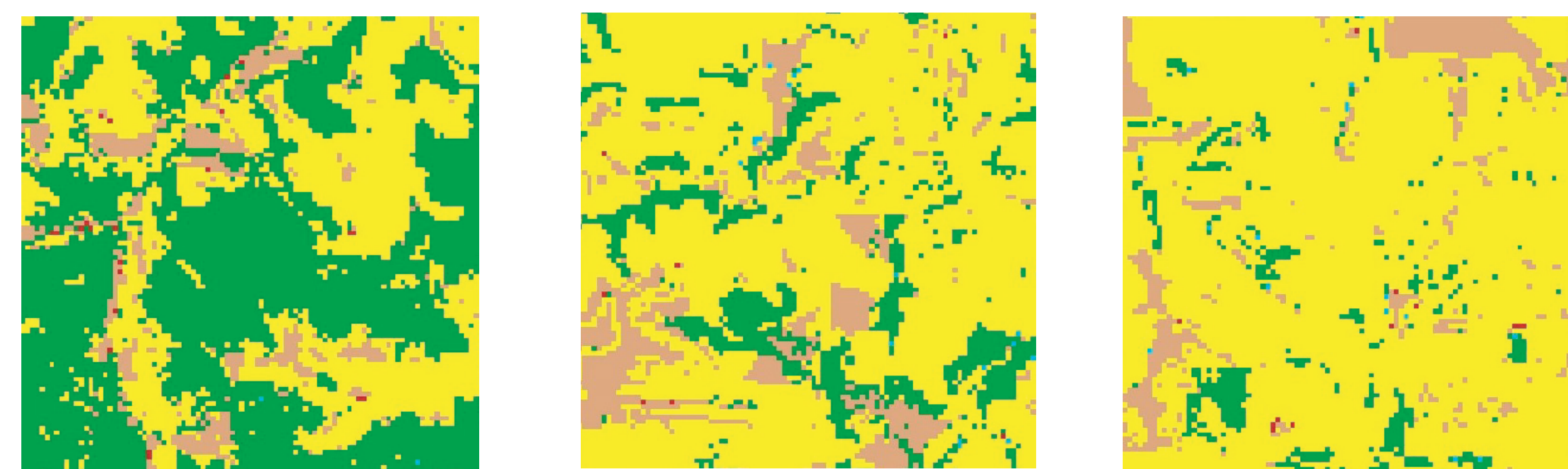


Figure 2. Example 800-ha landscapes with various amounts of grassland (yellow) and forest (green). Brown represents rowcrop.

## Bird Survey Routes

Road side surveys were conducted at three points 0.5 mile apart along secondary roads. All obligate grassland birds seen or heard within a 400-m radius during a 5-minute period at each stop were recorded. Each route was surveyed twice from May 24 to June 30 in 2003 and the number of birds seen per route averaged over the two surveys.



## Analysis

Akaike's Information Criteria for small sample size (AICc) was used to select the suite of linear regression models best explaining bird abundance for each species. The categories of grassland and forest for each 800-ha landscape were the independent variables and mean birds per route was the dependent variable.

The models used were:

- 1) abundance = grassland category
- 2) abundance = forest category
- 3) abundance = grassland category + forest category
- 4) abundance = grassland category + forest category + grassland category\*forest category (full)



## Results

Only one model was selected to explain dickcissel, horned lark, and upland sandpiper abundances. The 'grassland + forest' model was a candidate model for 6 of the 9 species, the 'grassland' and 'forest' models were candidates for 5 species each, and the full model was only selected for 3 species. For savannah sparrow and eastern meadowlark abundances were positively related to the amount of grassland (Figure 3). Dickcissel abundance was negatively correlated with the amount of forest in the landscape, but bobolink abundance was highest in the medium and high forest landscapes.

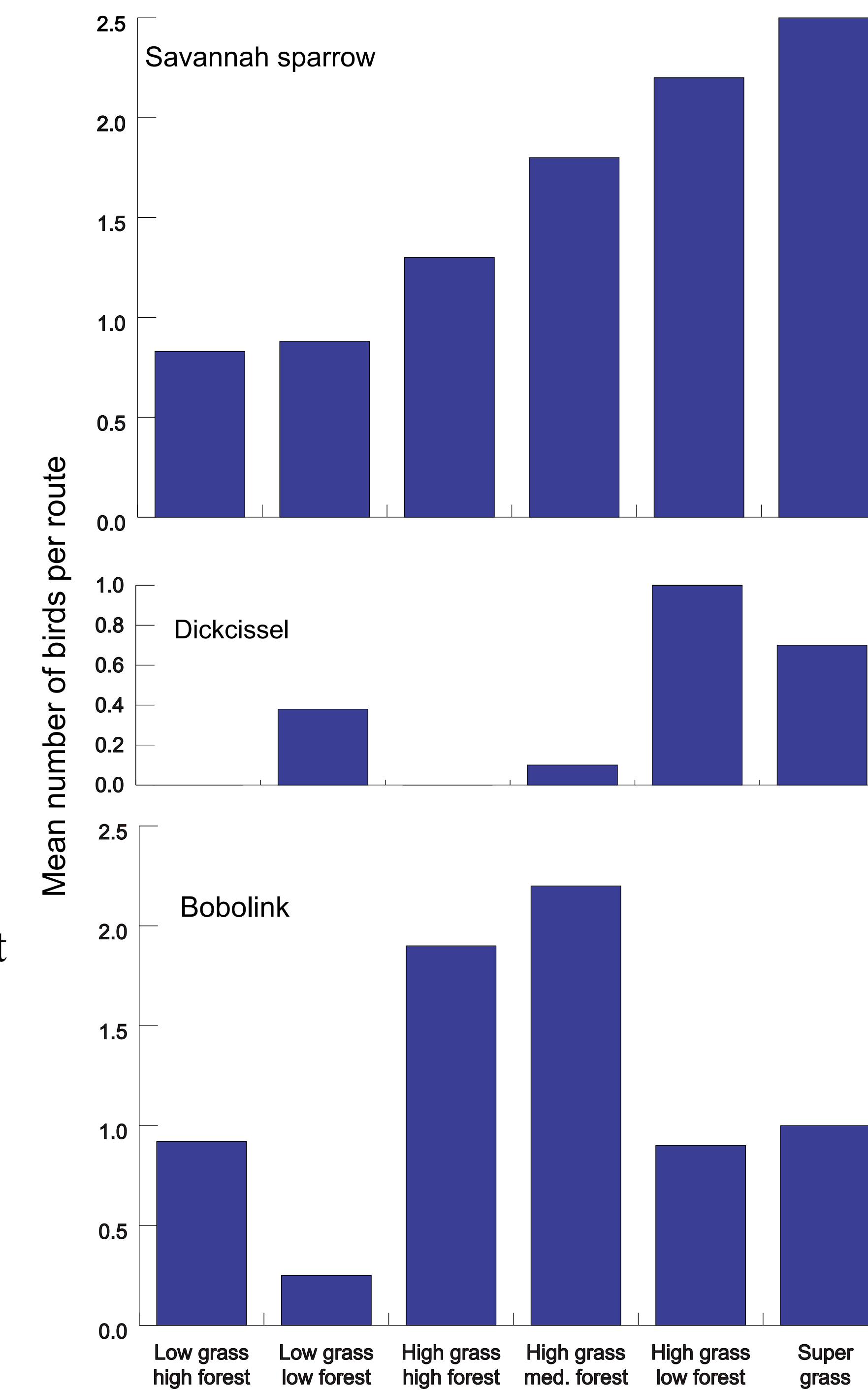


Figure 3. Mean number of birds per route for 3 species of grassland birds in landscapes with varying amounts of grassland and forest.

Table 1. Suite of best models to explain abundance of grassland birds in landscapes with various amounts of grassland and forest in south-west Wisconsin in 2003. Categories of amounts of grassland and forest defined previously were used as independent variables. Numbers in parentheses are total numbers of birds observed.

Species	K	AIC <sub>c</sub>	ΔAIC <sub>c</sub>	w <sub>i</sub>
<b>Bobolink (490)</b>				
Forest	3	36.36	0.00	0.55
Grassland + Forest	4	38.09	1.73	0.23
<b>Dickcissel (81)</b>				
Forest	3	-2.87	0.00	0.56
<b>Grasshopper sparrow (68)</b>				
Grassland	3	-13.03	0.00	0.32
Full	5	-12.57	0.46	0.26
Forest	3	-12.23	0.80	0.22
Grassland + Forest	4	-12.06	0.97	0.20
<b>Hensow's sparrow (12)</b>				
Forest	3	-81.48	0.00	0.49
Grassland	3	-80.55	0.93	0.31
<b>Eastern meadowlark (551)</b>				
Grassland	3	33.94	0.00	0.44
Grassland + Forest	4	34.53	0.60	0.33
Full	5	35.44	1.50	0.21
<b>Horned lark (208)</b>				
Grassland + Forest	4	-17.51	0.00	0.60
<b>Savannah sparrow (380)</b>				
Grassland	3	17.69	0.00	0.56
Grassland + Forest	4	19.60	1.91	0.21
<b>Sedge wren (42)</b>				
Grassland	3	-43.79	0.00	0.44
Forest	3	-43.11	0.68	0.32
Grassland + Forest	4	-42.06	1.73	0.19
<b>Upland sandpiper (15)</b>				
Full	5	-38.39	0.00	0.88

## Discussion

The general conclusions drawn for our preliminary data are that amounts of grassland and forest are both important in explaining abundances of grassland birds at a landscape level. Relationships to the amount of forest are not always negative, as seen by bobolink abundance. Future analysis will include model selection using landscape composition at multiple scales, amount of grassland along survey routes, and types of grassland along survey routes. Surveys also will be conducted in 2004 and 2005 to better estimate average abundances in the landscapes over time.

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