

Population Responses of Five Bird Species to 12 Years of Agri-environment Schemes in Northeastern Scotland



Gergana Daskalova, Ally Phillimore, Allan Perkins



Email: gndaskalova@gmail.com Twitter: [@gndaskalova](https://twitter.com/gndaskalova)

Farmland bird decline

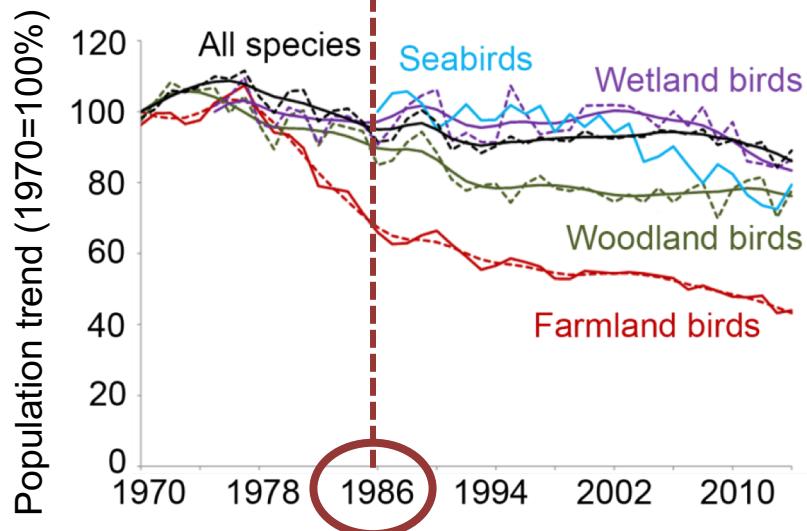
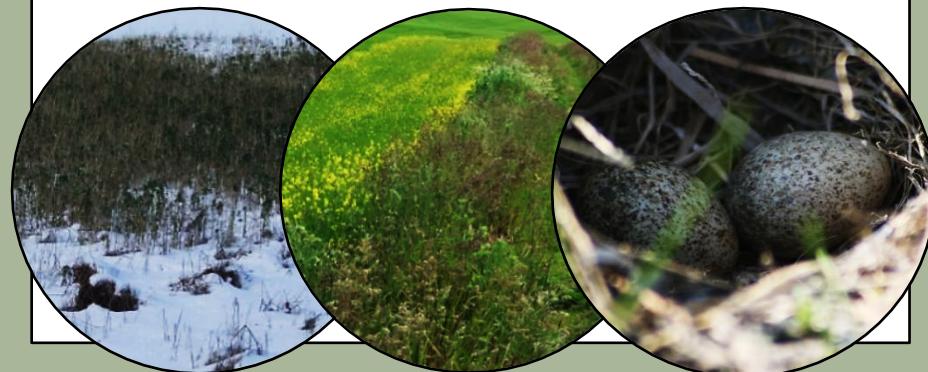


Figure 1. Farmland bird index (18 bird species).
Source: DEFRA

Agri-environment schemes (AES)

- Payments to farmers
- Promoting conservation
- Voluntary participation



Mixed results of AES evaluations

- AES effect differs across species' ranges
- Landscape influence



Regional studies to build up an understanding of overall AES benefit

Kleijn *et al.* 2006, Bright *et al.* 2015

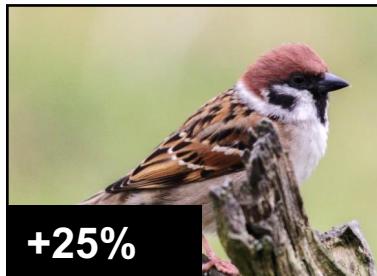
Research questions

1. What are the population trends of farmland birds in Northeastern Scotland between 2003 and 2015?
2. How do AES in low-intensity farmland affect bird abundance?

Methods – study species



Tree sparrow
(*Passer montanus*)



Perkins et al. 2011,
Perkins et al. 2017

Skylark
(*Alauda arvensis*)



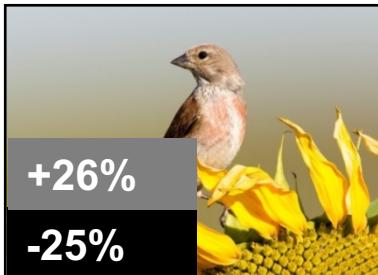
Scotland

UK

Source: BTO
1995-2014 BBS trends

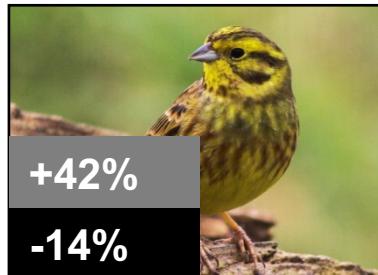
Linnet

(*Carduelis cannabina*)



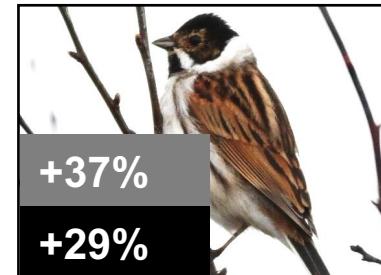
Yellowhammer

(*Emberiza citronella*)



Reed bunting

(*Emberiza schoeniclus*)



Methods – study sites

Control



AES

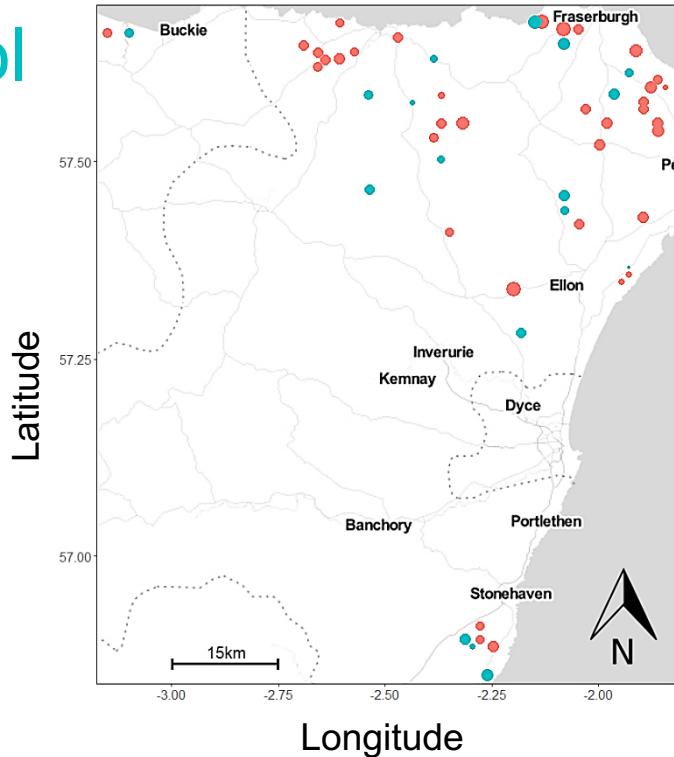


Figure 2. Map of study sites in 2015



- **53 farms**
- **43 AES and 26 control**
for at least 3 years

Methods - schemes

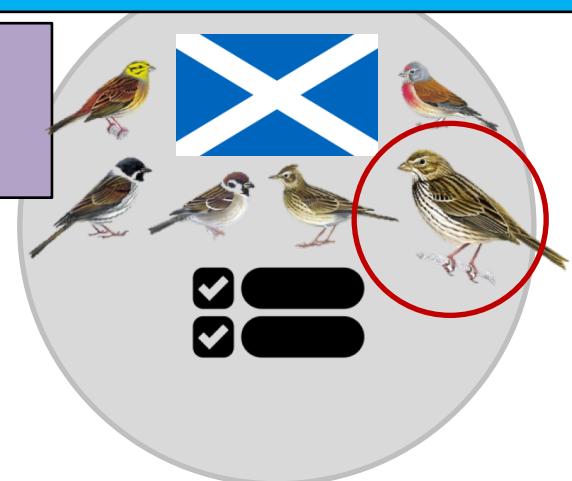
Farmland Bird Lifeline
2003-2015



Rural Stewardship
Scheme 2003-2008



Rural Priorities 2009-
2015



Methods – field surveys

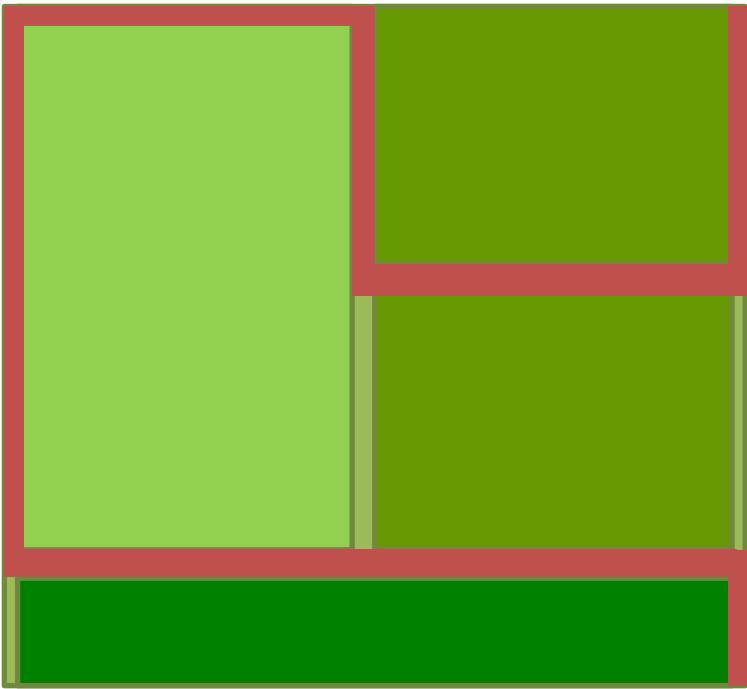


Figure 3. Survey route

Surveys in 2003, 2004,
2006, 2008, 2009 and 2015

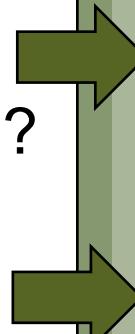


Scottish Natural Heritage
All of nature for all of Scotland

We thank fieldworkers Hywel Maggs, Amanda Biggins, Chris Bingham and Bertrand Couillens, and the landowners for their participation.

Research questions

1. What are the population trends of farmland birds in Northeastern Scotland between 2003 and 2015?
2. How do AES in low-intensity farmland affect bird abundance?

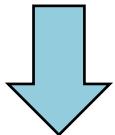


Statistical analysis

- Hierarchical Bayesian models
- Variables chosen a priori
Abundance:
 - Treatment type (AES vs. control)
 - Area
 - Longitude and latitude
 - Visits (2 or 3 per season)**Random effects: farm and year**

Results

1. What are the population trends of birds (2003-2015)?



No perceivable difference in population trends based on treatment type

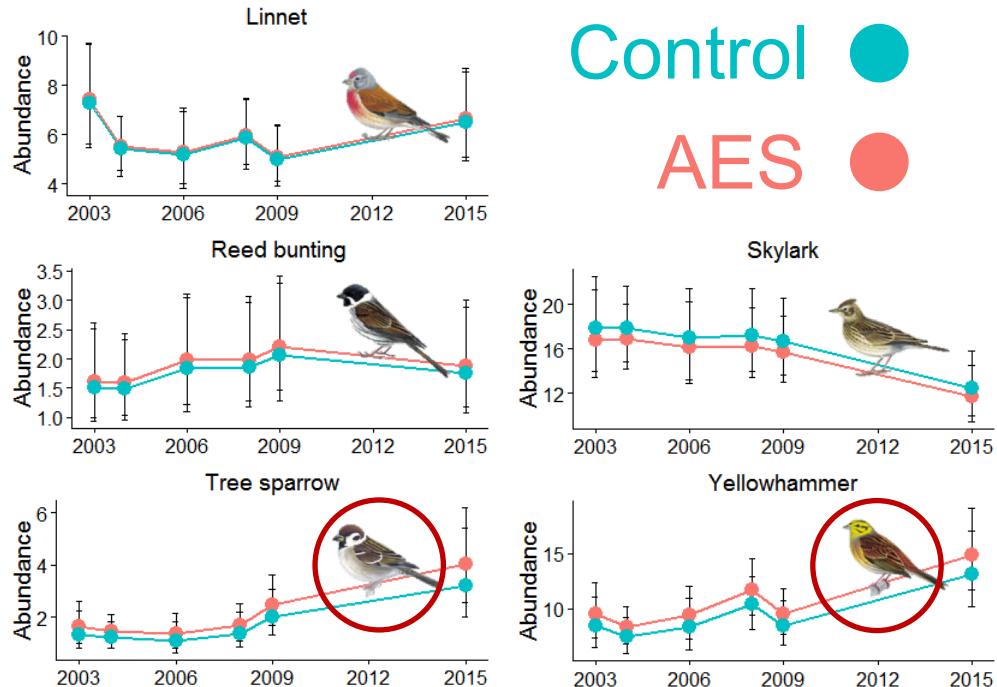
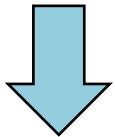


Figure 4. Bird population trends (2003-2015).
Error bars show 95% credible intervals.

Results

2. How do AES in low-intensity farmland affect birds?



No perceivable difference in breeding abundance based on treatment type

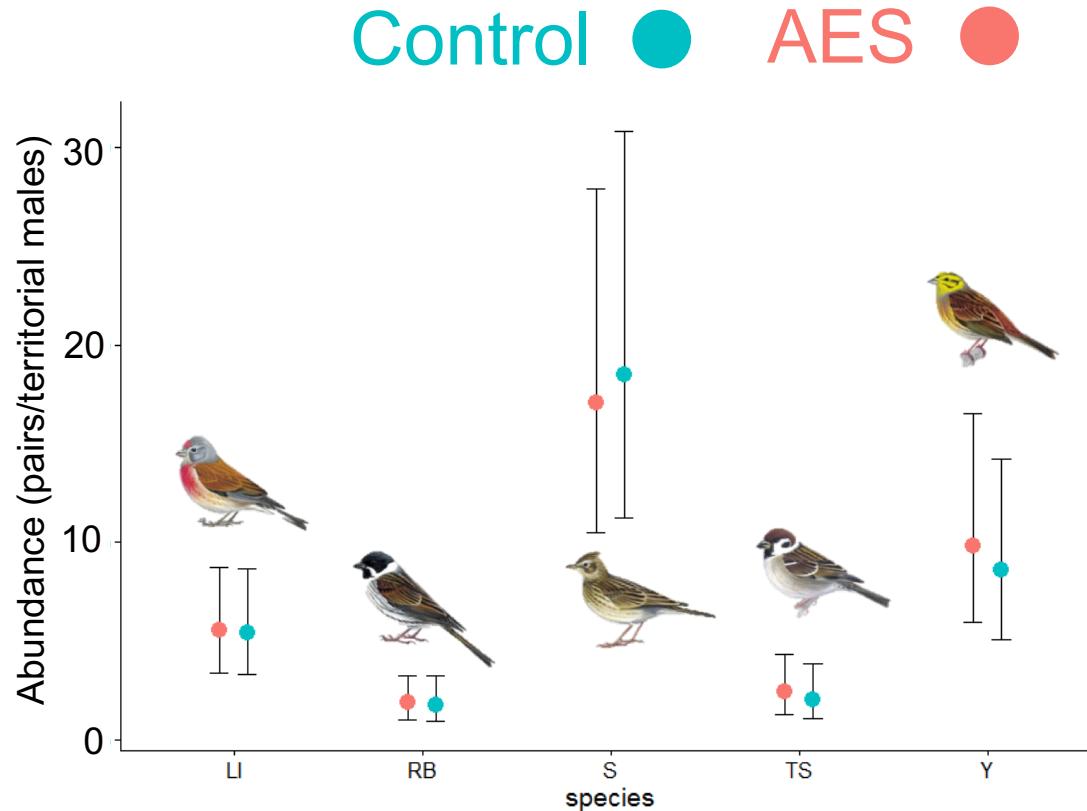


Figure 5. Model predictions for bird abundance.
Error bars show 95% credible intervals.

Discussion

1. Diverse farming landscapes in NE Scotland
2. Dispersal from AES farms into the wider landscapes
3. Variable AES implementation & farmer attitudes



Dispersal

- Source-sink dynamics
- Displacement due to rank
- Control birds benefitting from AES in winter

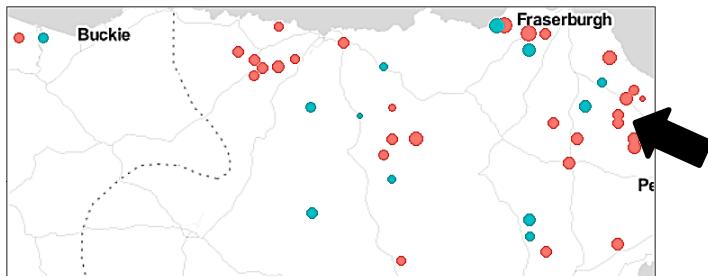


Figure 2. Map of study sites

● Control ● AES

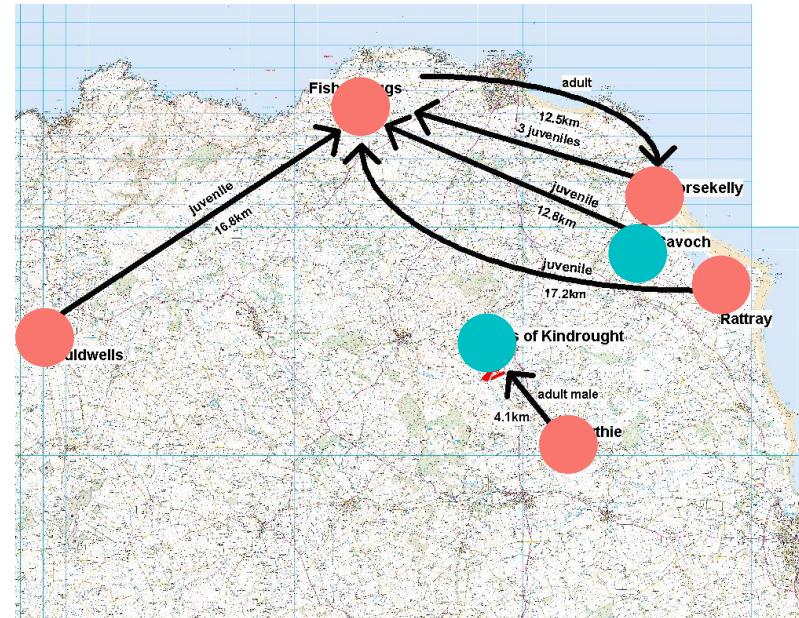


Figure 7. Corn bunting movement

Future directions

- **Spatial GLMMs** to examine how distance between farms influences similarities in abundance
- **Power analysis** to determine appropriate sample size to detect AES effects in low-intensity farmland

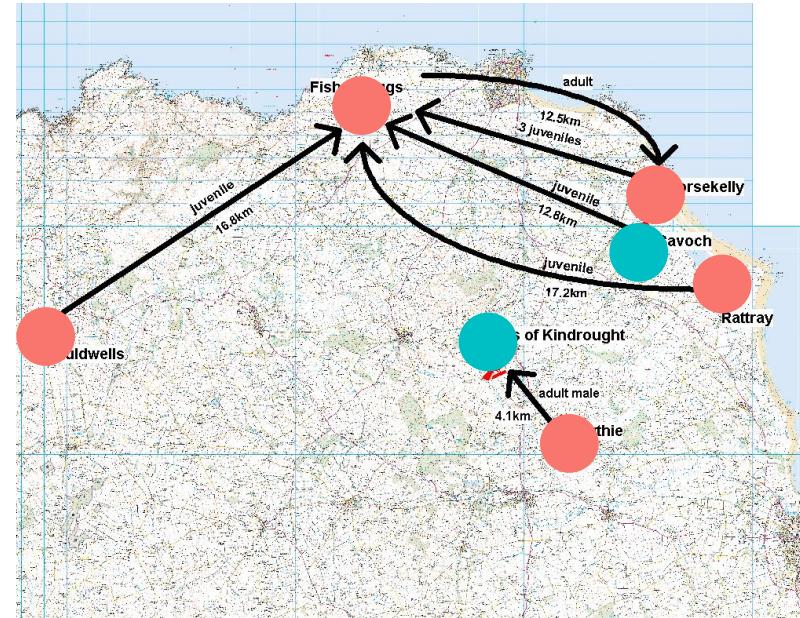


Figure 7. Corn bunting movement

Implications

Small improvement → big effect in
high-intensity landscapes

**Additionality of AES especially
important in low-intensity farmland**

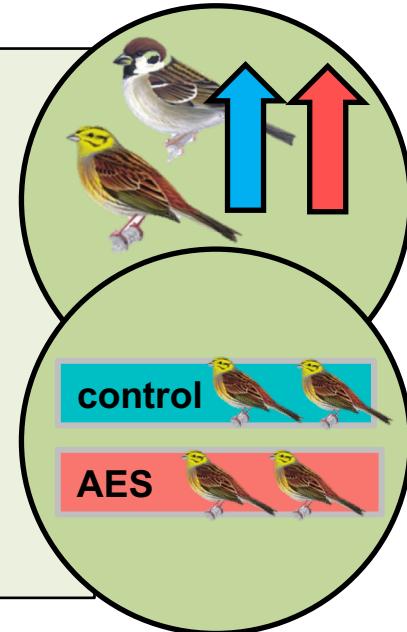
Small improvement → small effect
in low-intensity landscapes





Conclusions

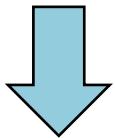
1. Two species increased in abundance
2. No significant variation in abundance based on treatment type
3. Lack of AES additionality in low-intensity farmland could be impeding conservation effectiveness



Email: gndaskalova@gmail.com Twitter: **@gndaskalova**
Photos by Gergana Daskalova & Allan Perkins

Results

2. How do AES in low-intensity farmland affect birds?



No perceivable difference in breeding abundance based on treatment type

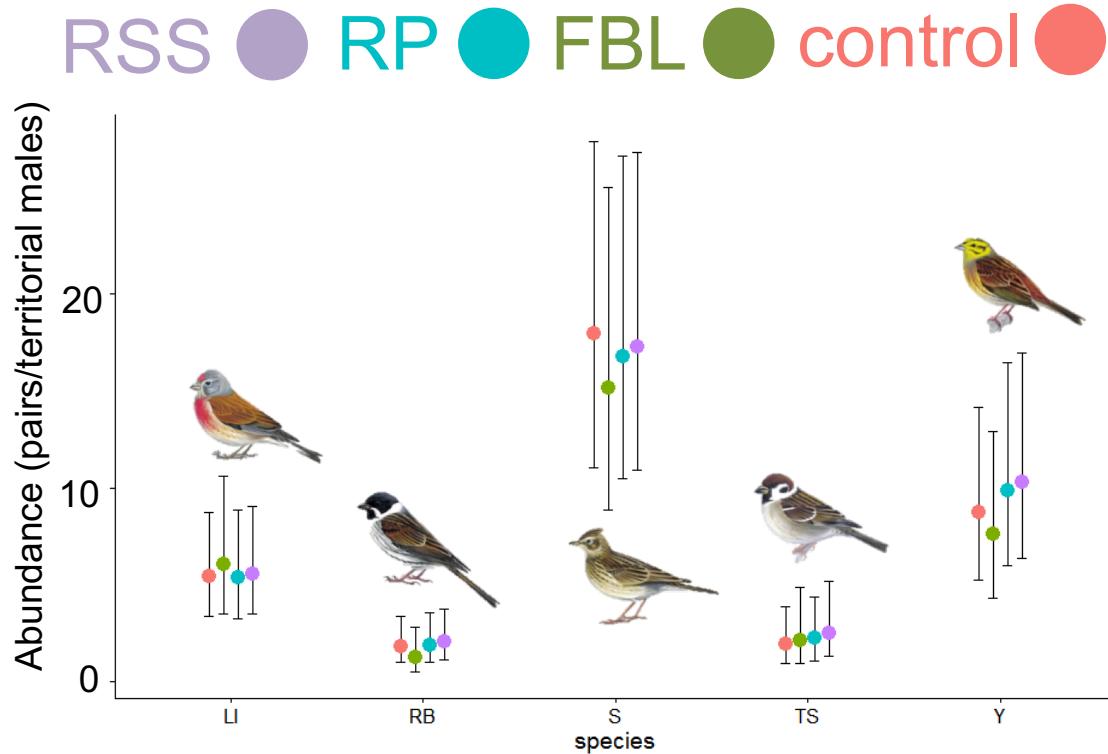


Figure 6. Model predictions for bird abundance.
Error bars show 95% credible intervals.