Peer Community In Ecology

The importance of managing linear features in agricultural landscapes for farmland birds

Ricardo Correia *based on peer reviews by* ***Matthew Grainger*** *and 1 anonymous reviewer*

Charlotte Perrot, Antoine Berceaux, Mathias Noel, Beatriz Arroyo, Leo Bacon (2023) Use of linear features by red-legged partridges in an intensive agricultural landscape: implications for landscape management in farmland. bioRxiv, ver. 2, peer-reviewed and recommended by Peer Community in Ecology. https://doi.org/10.1101/2023.07.27.550774

Submitted: 01 August 2023, Recommended: 23 January 2024

Cite this recommendation as:
Correia, R. (2024) The importance of managing linear features in agricultural landscapes for farmland birds. *Peer Community in Ecology*, 100580. 10.24072/pci.ecology.100580

Published: 23 January 2024

European farmland bird populations continue declining at an alarming rate, and some species require urgent action to avoid their demise (Silva et al. 2024). While factors such as climate change and urbanization also play an important role in driving the decline of farmland bird populations, its main driver seems to be linked with agricultural intensification (Rigal et al. 2023). Besides increased pesticide and fertilizer use, agricultural intensification often results in the homogenization of agricultural landscapes through the removal of seminatural linear features such as hedgerows, field margins, and grassy strips that can be beneficial for biodiversity. These features may be particularly important during the breeding season, when breeding farmland birds can benefit from patches of denser vegetation to conceal nests and improve breeding success. It is both important and timely to understand how landscape management can help to address the ongoing decline of farmland birds by identifying specific actions that can boost breeding success.

Perrot et al. 2023 contribute to this effort by exploring how red-legged partridges use linear features in an intensive agricultural landscape during the breeding season. Through a combination of targeted fieldwork and GPS tracking, the authors highlight patterns in home range size and habitat selection that provide insights for landscape management. Specifically, their results suggest that birds have smaller range sizes in the vicinity of traffic routes and seminatural features structured by both herbaceous and woody cover. Furthermore, they show that breeding birds tend to choose linear elements with herbaceous cover whereas non-breeders prefer linear elements with woody cover, underlining the importance of accounting for the needs of both breeding and non-breeding birds. In particular, the authors stress the importance of providing additional vegetation

elements such as hedges, grassy strips or embankments in order to increase landscape heterogeneity. These landscape elements are usually found in the vicinity of linear infrastructures such as roads and tracks, but it is important they are available also in separate areas to avoid the risk of bird collision and the authors provide specific recommendations towards this end. Overall, this is an important study with clear recommendations on how to improve landscape management for these farmland birds.

References:

Perrot, C., Séranne, L., Berceaux, A., Noel, M., Arroyo, B., & Bacon, L. (2023) "Use of linear features by red-legged partridges in an intensive agricultural landscape: implications for landscape management in farmland." bioRxiv, ver. 2 peer-reviewed and recommended by Peer Community in Ecology. https://doi.org/10.1101/2023.07.27.550774

Rigal, S., Dakos, V., Alonso, H., Auniņš, A., Benkő, Z., Brotons, L., ... & Devictor, V. (2023) "Farmland practices are driving bird population decline across Europe." Proceedings of the National Academy of Sciences 120.21: e2216573120. https://doi.org/10.1073/pnas.2216573120

Silva, J. P., Gameiro, J., Valerio, F., & Marques, A. T. (2024) "Portugal's farmland bird crisis requires action." Science 383.6679: 157-157. https://doi.org/10.1126/science.adn1390

Reviews

Evaluation round #1

DOI or URL of the preprint: https://doi.org/10.1101/2023.07.27.550774
Version of the preprint: 1

Authors' reply, 10 January 2024

Download author's reply

Decision by Ricardo Correia, posted 08 November 2023, validated 09 November 2023

Revision

Dear authors,

I have now received two reviews of your manuscript entitled "Use of linear features by red-legged partridges in an intensive agricultural landscape: implications for landscape management in farmland". Both reviewers find your manuscript interesting and well written, but identify aspects that should be addressed before the manuscript can be recommended. These include clarifying some of the methodological decisions adopted in the study, better highlighting some of the caveats of your analysis to the somewhat restricted sample size and better organizing the code that supports the analyses presented.

My overall assessment is that your manuscript certainly has merit and thus I would like to invite you to address the issues raised by the reviewers in a revised manuscript. Please submit a revised manuscript along with detailed responses to the reviewers for further assessment. I look forward to receiving and reading your revised manuscript in due time.

Kind regards,

Ricardo Correia

Reviewed by Matthew Grainger, 19 September 2023

General Comments

This is a well written and interesting manuscript. There are a few minor issues that need to be addressed. In addition, the R code needs to be better presented so that I (or anyone) can recreate the analysis.

Specific comments

Line 100 & Line 102: Be consistent – "Fig.1" or "fig.1"

Line 118: "...martens (Martes foina), Free-roaming dogs (Canis lupus familiaris) and common buzzards (Buteo buteo)."

Line 142: "as little as possible"

Line 146: Can the authors expand on how the birds from the wild were distinguished from the farmed birds.

Line 195: Using "Rules of thumb" in statistical modelling is likely to lead to disasters! Please assess overfitting of the models.

Line 252- 256: My Latin is not great... but I guess you had some problems with the LaTex template.

Line 127- 129: Do we need these abbreviations? It gets a little confusing.

Figure 2- What is the line on the plots here? Are these fitted lines from the model. The relationship between Road density and Home Range seems a little tenuous.

Table 1/ Table 2 – what was the global model fit?

Line 305 – how many of these were determined by the function in nestR and how many were observed?

R code

The R code is not reproducible and needs to be edited with reproducibility in mind in order to allow readers/reviewers a better understanding of the analysis choices and approaches.

For example –

· Do not use setwd() when sharing code (or even in your own work) see https://www.tidyverse.org/blog/2017/12/workflow-vs-script/ for details of why not. I use RStudio Projects and/or the here package to help set paths that can be reproducible.

· In script 1.Monthly Home Ranges after the first for loop I get an error: Error in rgdal::writeOGR(hr95, dsn = paste(subset_kb$id_fix[1], sep = "_", : layer exists, use a new layer name In addition: Warning messages: 1: In amt::make_track(subset_kbmonth, x_, y_, dayofmoni = dayofmoni, : it looks like you used 'CRS()' to create the crs, please use the ESPG directly.2: OGR support is provided by the sf and terra packages among others 3: OGR support is provided by the sf and terra packages among others

· What is happening in the code when individuals are assessed? (line 121) – Add comments to help the reader understand what you are doing and why.

· Make sure that the code can run on your computer and can also run on "my" computer (someone other than you).

Reviewed by anonymous reviewer 1, 07 November 2023

This work aims to determine the importance of landscape heterogeneity and linear features on the spatial distribution of red-legged partridges. Data on red-legged partridges was obtained via remote tracking with GPS devices. based on movement data of tagged birds. Monthly and breeding home range sizes are assessed in relation to linear features density and a habitat selection during the breeding season is then carried out focussing on linear landscape features.

This work has merit, I found it well written, the study well designed (although with a small sample size, see below) and the statistical analysis sound.

My main concern with this paper is the small sample size, particularly for the breeding habitat selection analysis. I would therefore suggest for the authors to make it particularly clear in the discussion section that the results dealing with the breedinh habitat selection should be taken into consideration with caution due to the small number of animals considered in the analysis, which may not be representative of the population.

Line 21 – "In Europe, management prescriptions serve to increase heterogeneity by the creation of these seminatural and linear features which are not being used primarily for agricultural production" – this is an overstatement, only some management prescriptions are used to increase heterogeneity.

Lines 111-112 – Here the authors mention that the birds were not differentiated according to one of the two areas considered for the study due to the similarities of these areas. Still would this be worth testing? A random factor considering the id of the area could be used when running the analysis.

Line 118 – a reference is missing at the end of line 118

Lines 126-132 – was a width considered when classifying the different linear features?

Lines 137-138 – This sentence states that distance to linear features enables considering the different biological functions these features can have on the species, namely refuge, feeding and movement. I would suggest removing this content from the methods and add it to the introduction since linear features are a central topic of the paper.

Line 158 – How where erroneous locations screened?

Line 164 – It wasn't clear for me how you considered a bird nesting. When birds were located three times in the same place, do you mean that the birds were observed in the field, or do you refer to repeated GPS locations? Could better use of GPS data collected with 1 hour interval not be used to infer incubating behaviour?

Line 232 – At the end of the sentence a reference is missing

Lines 252-256 – this paragraph must be an error

Line 358 – replace "offer a good safety" by "provide cover"

361-365 – A question arises when reading this sentence which is: until what density of hedges is it favourable for the species? Would we expect that in very high density of hedges for the habitat to be as attractive for the partridges?

Line 377 – Replace "the regular discovery of red-legged partridges killed on the roads by collision with vehicles" by "frequent roadkill events"

Lines 381-382 – Could the pattern of nests being closer to roads be related to the presence of limited favourable nesting habitat concentrated closer to roads?